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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 8, NUMBER 7
APRIL 1, 1975

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 7
APRIL 1, 1975

W75-03301 – W75-03850

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

ON THE CHOICE OF METHODS FOR THE PREDICTION OF THE WATER-ACTIVITY AND ACTIVITY COEFFICIENT FOR MULTICOMPONENT AQUEOUS SOLUTIONS,
Ecole Polytechnique, Montreal (Quebec). Department de Genie Chimique.
For primary bibliographic entry see Field 2K.
W75-03540

THERMODYNAMIC PROPERTIES OF SEA SALT SOLUTIONS,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2K.
W75-03808

2. WATER CYCLE

2A. General

HYDROLOGIC SIMULATION OF A COMPLEX WATERSHED,
Washington State Univ., Pullman. Coll. of Engineering.
H. D. Copp, D. T. Higgins, and G. T. Thompson.
Presented at Ninth American Water Resources Conference, October 1973, Seattle, Washington, Honolulu, Hawaii. 23 p, 11 fig. OWRT B-036-WASH(2), B-043-WASH(1), and B-050-WASH(1).

Descriptors: *Washington, *Watersheds(Basins), Systems analysis, Decision making, *Simulation analysis, Hydrology, Planning, River basin development, *Model studies.
Identifiers: *Yakima basin(Wash).

In the summer of 1970, a program to develop simulation models and to perform certain systems analyses on the Yakima basin was funded. The fundamental intent of three year's research was to develop river basin planning methodology for water and related land resources. Once the techniques were available, they could be used to examine various aspects of resource management. We were not interested in making decisions on how to best manage these resources in the Yakima basin. That is best left to the government agencies, to local basin planners and to the public who are directly affected by resource management. The methodology would be used by the decision-makers to arrive at rational plans. A hydrologic model was developed which will aid planners and decision makers in analyzing impacts of future water management in rather complex watersheds.
W75-03325

THE PROBLEM OF DETERMINING THE MAXIMUM STORM RUNOFF YIELD IN SMALL RIVERS (IN PROBLEMA DETERMINARII DEBITELOR MAXIME DIN PLOI PE RIURI MICI),
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
L. Mustata.
Hidrotechnica, Vol 19, No 5, p 236-241, 247, May, 1974. 2 fig, 2 tab, 15 ref.

Descriptors: *Mathematical models, *Storm water, *Storm runoff, Rivers, Climates, *Forecasting, Model studies.
Identifiers: *Romania.

The determination of the maximum storm runoff yield in small rivers is based on the utilization of the maximum runoff modality from the reductional equation, worked out for 7 various climatic zones, depending upon the climatic conditions of Romania. Seven series of module values were transposed by using known empirical values. Thus, the maximum yield in percent and cu m/sec equals the elementary maximum runoff, or the maximum intensity of water replacement in cu m/sec sq km multiplied by the receiving surface in sq km, divided by the receiving surface plus 1 to the n power. The maximum elementary runoff must be determined, considering the other parameters as known. The n parameter varies from 0.46 in the southwestern zone of the Southern Carpathians to 0.55 in the southern part of the Transylvania Plateau. The empirical accuracy of the series was calculated according to the equation: P security value in percent equals m, the number of the values in the series, divided by n, the number of the yrs of the series plus 1, all multiplied by 100 percent. In order to prolong the series of maximum yields for as long a period of time as possible, 7 climatically similar zones were delineated. The method presented permits the determination of maximum storm runoff yields in small rivers without using the statistical parameters Cv and Cs. (Takacs-FIRL)
W75-03535

BINARY TREE MODEL SIMULATION OF THE BEHAVIOR OF URBAN HYDROLOGIC SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Computer Science.
A. J. Surkan, and P. Kelton.
International Journal of Systems Science, Vol 5, No 7, p 639-653, July, 1974. 9 fig, 3 ref.

Descriptors: *Urban hydrology, *Hydrograph analysis, Model studies, Data analysis, Flow, Experiments, *Networks, *Maryland.
Identifiers: *Baltimore(Md).

A simulator of urban hydrologic networks was designed based primarily on geometric descriptors. Its application is demonstrated using data from the Northwood Gaging Installation in Baltimore, Maryland. The simulator incorporates a binary tree model of the network, a polygon representation of the storm geometry, and time-varying rainfall intensity to produce simulated hydrographs of flow. Simulated hydrographs and experimental runoff graphs are compared. (Prague-FIRL)
W75-03541

THE COASTAL UPWELLING CYCLE ON A BETA-PLANE: HYDRODYNAMICS AND THERMODYNAMICS,
Florida State Univ., Tallahassee. Dept. of Meteorology.
For primary bibliographic entry see Field 2L.
W75-03642

'PROJECT AQUA' IN POLAND, (IN POLISH),
Polskie Towarzystwo Przyrodnikow im. Kopernika, Warsaw.
B. Szczesny.
Kosmos (Warsaw), Vol 22, No 2, p 147-152, 1973.
Identifiers: Legal aspects, *Limnology classification, *Poland, Projects, Classifications, *Project Aqua, International Biological Program.

'Project Aqua' was created in 1959 during the 14th Session of the International Society of Limnologists for the purpose of selecting fresh water bodies of special interest or value in the world, which would be under special care and legal protection. The following water bodies in Poland were earmarked for inclusion in the project: Lakes Wdzydze, Leba, Sniardwy, Luknajno, Mikolajiki, Mamry, Tajty, Jeziorak, Czarne, Wigry, Hancza, Tatra Mountains Lakes, Goczakowo and 2 rivers, Dunajec and Drweca. Characteristic data for each of the mentioned bodies are given. The above list is not closed and will be corrected and supplemented as progress is made in Poland in hydrobiological studies on other water bodies. 'Project Aqua' falls under the International Biological Program.--Copyright 1974, Biological Abstracts, Inc.
W75-03843

2B. Precipitation

A ONE-DIMENSIONAL NUMERICAL MODEL OF PRECIPITATION SCAVENGING WITH APPLICATION TO RAINOUT OF RADIOACTIVE DEBRIS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W75-03427

SOME PREDICTED CLIMATIC EFFECTS OF A SIMULATED SAHARA LAKE,
RAND Corp., Santa Monica, Calif.
R. R. Rapp, and M. Warshaw.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-780 652, $3.75 in paper copy, $2.25 in microfiche. Publication No R-1415-ARPA, March 1974. 40 p, 12 fig, 3 tab, 17 ref, 1 append. DAHC15-73-C-0181.

Descriptors: *Climates, *Evaporation, *Computer models, Simulation analysis, Precipitation(Atmospheric), Winds, Deserts, Lakes, Africa, Moisture, Statistical methods.
Identifiers: *Inadvertent climate changes, *Sahara lakes, Moisture flux.

The results of simulating the addition of a large body of water to the Sahara desert using the Rand version of the Mintz-Arakawa general circulation model were described. The simulated lake is a relatively small perturbation to the earth's boundary condition and was chosen to test the hypothesis that an observable and statistically significant change would be produced in the local circulation. By observing the moisture flux and moisture flux divergence as a function of the lake addition, a region was selected in which to test the hypothesis that the precipitation was altered. A significant change in precipitation was subsequently observed over the chosen area. Similarly, a significant wind direction shift in the lower (800-mb) level of the model was found. Speculation on how these simulated results might be used to predict the actual change in the climate was also given. (Schickedanz-ISWS)
W75-03635

MEASUREMENT OF ATMOSPHERIC PRECIPITABLE WATER USING A SOLAR RADIOMETER,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
D. E. Pitts, W. McAllum, and A. E. Dillinger.
Available from the National Technical Information Service, Springfield, Va. 22161, as N74-19983, $3.75 in paper copy, $2.25 in microfiche. Technical Memorandum X-58129, February 1974. 27 p, 7 fig, 1 tab, 23 ref.

Descriptors: *Precipitable water, *Solar radiation, *Statistical methods, Remote sensing, Water vapor, Absorption, Least squares method, Atmosphere, Radiosondes, Measurement.
Identifiers: *Solar radiometer, Atmospheric profiles, Transmission(Atmospheric), Spectral bands.

A technique was described and tested that allows the determination of atmospheric precipitable water from two measurements of solar intensity: one in a water-vapor absorption band and another in a nearby spectral region unaffected by water vapor. Measurements of total atmospheric water

vapor were accomplished by determining the ratio of a water-vapor absorbing region (0.9435 micrometer) to a clear channel (0.8730 micrometer). Aerosol extinction is usually a slowly varying function of wavelength in the visible and near infrared. This ratio effectively eliminates the aerosol and Rayleigh scattering leaving only the water-vapor absorption effects. Because a small amount of water vapor may saturate the strong water bands and a large amount of water vapor may not saturate the weak bands, this ratio is neither a linear nor an exponential function of precipitable water. (Jones-ISWS)
W75-03638

TWELVE BASIN INVESTIGATION: ANALYSIS OF POTENTIAL INCREASES IN PRECIPITATION AND STREAMFLOW RESULTING FROM MODIFICATION OF COLD OROGRAPHIC CLOUDS IN SELECTED RIVER BASINS OF THE WESTERN UNITED STATES. VOLUME 2,
North American Weather Consultants, Goleta, Calif.
For primary bibliographic entry see Field 3B.
W75-03639

RAINFALL INTERCEPTION IN A FOREST IN THE VELEN HYDROLOGICAL REPRESENTATIVE BASIN,
Swedish Meteorological and Hydrological Inst., Stockholm.
For primary bibliographic entry see Field 2I.
W75-03654

A SIMPLE DEVICE FOR ANALYZING THE ENERGY LOAD AND INTENSITY OF RAINSTORMS,
Institute for Agricultural Research, Zaria (Negeria).
J. M. Kowal, W. Kijewski, and A. H. Kassam.
Agric Meteorol 12(2): 271-280, Illus. 1973.

Descriptors: *Rainfall intensity, Rainfall, Rain, Precipitation(Atmospheric), Equipment, *Soil erosion, Surface runoff, *Electrical equipment, Storm runoff, Storms.
Identifiers: Nigeria.

A simple apparatus is described for evaluating the energy load and intensity of rainstorms relevant to studies of soil erosion and surface runn-off. The instrument records graphically, on a time scale, the amplitude of electric pulses originating from the impact of raindrops on the surface of a transducer disc, by making use of the piezo-electric effect. The size distribution of raindrops is calculated by analysing the graphic records of pulses on the chart from the number and the amplitude of pulses, and from the measured volume of total rainfall. The apparatus can be assembled using commercially available materials and recorders. It combines easy handling with acceptable accuracy.--Copyright 1974, Biological Abstracts, Inc.
W75-03838

2C. Snow, Ice, and Frost

USING AERIAL MEASUREMENTS OF FOREST OVERSTORY AND TOPOGRAPHY TO ESTIMATE PEAK SNOWPACK,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
F. R. Larson, P. F. Ffolliott, and K. E. Moessner.
Forest Service Research Note RM-267, July 1974. 4 p, 2 fig, 1 tab, 8 ref.

Descriptors: *Snowpacks, *Water equivalent, *Snow surveys, *Aerial photography, Forests, Canopy, Topography, Slopes, Data collections, Remote sensing, Pine trees, Watersheds(Divides).

It is possible to relate peak snowpack water equivalent measured on the ground to forest overstory and topography attributes measured on aerial photographs. On sites where slope steepness and aspect vary widely and several forest overstory size and density classes are intermixed, only topographic attributes need be measured, and any of the tested photo scales (1:3,000; 1:6,000; 1:15,840) may be used. On nearly level sites where size and density classes are homogeneous, forest overstory attributes also must be measured, and the 1:15,840 scale is best. (Witt-IPC)
W75-03570

ADVANCE OF THE GREENLAND ICE SHEET ON TO NORTH-EASTERN ELLESMERE ISLAND,
Alberta Univ., Edmonton. Dept. of Geography.
J. England.
Nature, Vol 252, No 5482, p 373-375, November 29, 1974. 1 fig, 18 ref.

Descriptors: *Glaciation, *Glaciology, Glaciers, Arctic, Ice, Movement, Geology, Geomorphology, Canada.
Identifiers: Greenland ice sheet, Ellesmere Island.

Geological evidence suggests that an important restricted ice advance occurred along northwestern Greenland and northeastern Ellesmere Island during the last glaciation. Detailed records of multiple glaciations and sea level changes are preserved along the coastlines of Smith Sound, Nares Strait, and Kennedy and Robeson channels. At present the advance of the Greenland Ice Sheet on to northeastern Ellesmere Island is considered inconclusive and, if it did occur, it would have to pre-date the late Wisconsin, and possibly the entire Wisconsin, glaciation. Evidence from glacial geology is also critical for the reconstruction of the time profiles through existing and future ice cores in the region as such data will directly affect the parameters in the flow models chosen. If the ice sheets in the High Canadian and Greenland Arctic were relatively inactive during the last glaciation or glaciations then the ice cores obtained from these areas may be older than originally expected. The chronology of glacial activity during the late Quaternary is, therefore, an important source for both the dating and palaeoclimatic interpretation of the ice cores. (Humphreys-ISWS)
W75-03645

EFFECTS OF OIL UNDER SEA ICE,
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
L. S. Wolfe, and D. P. Hoult.
Journal of Glaciology, Vol 13, No 69, p 473-488, 1974. 8 fig, 12 ref. DOT-CG-12438-A.

Descriptors: *Laboratory tests, *Sea ice, *Oil spills, Laboratory equipment, Water pollution sources, Ice, Evaluation, Arctic, Analytical techniques, Oil pollution, Testing procedures.
Identifiers: Ice-oil interfaces.

Laboratory research was performed to determine the effects of crude and diesel oils on the porous sub-structure of Arctic sea ice. A qualitative description was given of what occurs when oil is placed under the ice and an evaluation of some quantitative measurements was made to determine the maximum extent to which crude oil can spread in an Arctic environment. The extent of the entrapment of oil in the ice-brine matrix was negligible. Even when the porosity of the ice increases markedly during pre-melt conditions, the volume of oil entrapped remains small. The ice does not in any way grow through the oil. The oil is neatly pocketed by the ice as more ice proceeds to form under it. The presence of an oil pool under the ice causes a marked change in the temperature distribution in the ice because the oil pool acts as an insulating layer between the cold air and the relatively warmer sea water. If the crude oil spilled is from a supertanker of 100,000 metric tons capacity, the total volume of oil will be 113,000 cu m and the total area over which it will spread was calculated to be a maximum of 45 sq km (17 square miles), a minimum of 9 sq km (4 square miles) and a 'best' estimate of 17 sq km (6 square miles). Even the largest of these values is considerably smaller than the area over which such a spill would spread in temperate waters. All of these conclusions apply to conditions typical for first-year sea ice. (Humphreys-ISWS)
W75-03646

OBSERVATIONS ON THE INTERNAL STRUCTURE AND ORIGIN OF SOME FLUTES IN GLACIO-FLUVIAL SEDIMENTS, BLOMSTRANDBREEN, NORTH-WEST SPITSBERGEN,
Univ. of East Anglia, Norwich (England). School of Environmental Sciences.
M. A. Paul, and H. Evans.
Journal of Glaciology, Vol 13, No 69, p 393-400, 1974. 7 fig, 5 ref.

Descriptors: *Glaciation, *Geomorphology, *Glacial sediments, On-site investigations, Glaciology, Ice, Tunnels, Glacial soils, Fluvial sediments.
Identifiers: Blomstrandbreen(Spitsbergen), *Flutes.

Some flutes which occur on the surface of a series of glacio-fluvial sediments at the margin of Blomstrandbreen, north-west Spitsbergen, were described. A section in one has revealed a complex internal structure, in which originally horizontal beds have been folded into an anticline whose axis is normal to the ice margin, and whose structure is related to the morphology of the flute. Comparison of the observed deformation with the theoretical distribution of stresses around the base of a subglacial tunnel showed that this deformation could have resulted from flow under such a stress system. These observations support the hypothesis that flutes are formed when unfrozen, water-soaked materials deform subglacially due to the pressure differences that exist in the vicinity of an ice tunnel formed in the lee of some rigid obstruction to ice flow. (Humphreys-ISWS)
W75-03647

NUCLEATION AND GROWTH OF BUBBLES AT AN ICE-WATER INTERFACE,
Nevada Univ., Reno. Lab. of Atmospheric Physics.
S. A. Bari, and J. Hallett.
Journal of Glaciology, Vol 13, No 69, p 489-520, 1974. 25 fig, 4 tab, 23 ref, 1 append. NSF Grant GA-27943.

Descriptors: *Ice-water interfaces, *Laboratory tests, *Bubbles, *Nucleation, Ice, Freezing, Gases, Air, Helium, Growth rates, *Crystal growth, Evaluation, Laboratory equipment.

Nucleation and growth of bubbles during freezing of solutions of air and helium in water were investigated experimentally by using different techniques to give freezing rates between 1 micrometer/sec and 10 mm/sec. Bubbles grow as cylinders below 5 micrometer/sec and become egg shaped, with the narrow ends towards the freezing interface, at higher ice growth velocities. Bubble concentration increases and size decreases with increase of growth rate. The detail of bubble size and concentration is influenced appreciably by the particulate content of the water sample. Very high freezing rates give initially clear ice. Subsequently, bubbles nucleate and grow at grain boundaries within the ice. Bubbles do not move with recrystallization and their spatial distribution shows the grain boundary positions at the time of nucleation. Observations were interpreted in terms of nucleation on particles in suspension in the water and a significant incorporation of air molecules into the ice lattice. Bubble nucleation and growth at a growing ice-water interface is characterized by the initial air concentration, by

the water particulate content, and by the growth rate. Deduction of growth conditions from air bubble characteristics may be achieved subject to the uncertainty caused by the variable particulate content. (Humphreys-ISWS)
W75-03648

DIFFERENTIAL SEA-ICE DRIFT. I. SPATIAL AND TEMPORAL VARIATIONS IN SEA-ICE DEFORMATION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
W. D. Hibler, III, W. F. Weeks, A. Kovacs, and S. F. Ackley.
Journal of Glaciology, Vol 13, No 69, p 437-455, 1974. 10 fig, 4 tab, 17 ref. NSF Grants AG-344 and AG-492.

Descriptors: *Sea ice, *On-site investigations, *Deformation, Movement, Ice, Velocity, Dynamics, Evaluation, Investigations, Analytical techniques, Mathematical studies, Mathematical models, Least squares method.
Identifiers: *Drift(Sea ice), *Beaufort Sea.

Measurements of mesoscale sea-ice deformation over a region approximately 20 km in diameter were carried out over a five-week period in the spring of 1972 at the Beaufort Sea. They have been analyzed to determine non-linearities in the ice velocity field (due to the discrete small-scale nature of the ice pack), as well as a continuum mode of deformation represented by a least-squares strain-rate tensor and vorticity. The deformation-rate time series between Julian day 88 and 112 exhibited net areal changes as large as 3% and deformation rates up to 0.16% per hour. In the principal axis coordinate system, the strain-rate typically exhibited a much larger compression (or extension) along one axis than along the other. Persistent cycles at approximately 12 h wavelengths were observed in the divergence rate. A comparison of the average residual error with the average strain-rate magnitude indicated that strains measured on a scale of 10 km or greater can serve as a valid measure of the continuum motion of the sea ice. This conclusion was substantiated by a comparison between the mesoscale and macroscale deformation measured over an approximately 100-km diameter region. Regarding pack-ice rotation, vorticity calculations indicate that at low temporal frequencies (0.02/h), the whole mesoscale array rotates as an entity, and consequently, the low-frequency vorticity can be estimated accurately from the rotation of a single floe. (See also W75-03650) (Humphreys-ISWS)
W75-03649

DIFFERENTIAL SEA-ICE DRIFT. II. COMPARISON OF MESOSCALE STRAIN MEASUREMENTS TO LINEAR DRIFT THEORY PREDICTIONS,
Cold Regions Research and Engineering Lab., Hanover, N.H.
W. D. Hibler, III.
Journal of Glaciology, Vol 13, No 69, p 457-471, 1974. 5 fig, 2 tab, 18 ref, 1 append. NSF Grants AG-344 and AG-492.

Descriptors: *Sea ice, Movement, *Theoretical analysis, *Strain, Equations, Mathematical studies, Arctic, Atmosphere, Evaluation, Analytical techniques, Dynamics, Investigations.
Identifiers: *Drift(Sea ice), Mesoscale.

A comparison of mesoscale strain measurements with the atmospheric pressure field and the wind velocity field indicates that the ice divergence rate and vorticity follow the local pressure and wind divergence with significant correlation. For low atmospheric pressures and converging winds the divergence rate was negative with the vorticity being counter-clockwise. The inverse behavior was observed for high pressures and diverging winds. This behavior was shown to agree with predictions based on the infinite boundary solution of a linearized drift theory in the absence of gradient current effects and using the constitutive law proposed by Glen for pack ice. The best least-squares values of the constitutive law viscosity parameters were approximately 10 to the 12th power kg/s. With typical divergence rates these values yield compressive stresses of the magnitude of 100,000 N/m which are similar to values suggested by the Parmerter and Coon ridge model. The infinite boundary solution of the linear drift equation indicates that in a low-pressure region that is reasonably localized in space, ice would be expected to converge for high compactness (winter) and diverge for low compactness (summer). Calculations were carried out with a general linear viscoelastic constitutive law that includes memory effects and a generalized Hooke's law as well as the Glen law as special cases. A best fit of this calculation with strain measurements indicated a better agreement with viscous behavior than with elastic behavior, and the frequency behavior of the estimated 'viscosities' similar to the Glen law behavior at temporal frequencies less than approximately 0.01/h. (See also W75-03649) (Humphreys-ISWS)
W75-03650

A STUDY OF GLACIER FLOW FOR AN OPEN-PIT MINE: AN EXERCISE IN APPLIED GLACIOLOGY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. C. Colbeck.
Journal of Glaciology, Vol 13, No 69, p 401-414, 1974. 12 fig, 8 ref.

Descriptors: *Glaciology, *Mathematical models, *Glaciers, Movement, Investigations, Flow, Ice, Velocity, Strain, Ablation, Equations, Feasibility studies, Project feasibility.
Identifiers: *Greenland(Isua).

As part of the feasibility study for the development of an open-pit mine at the edge of the Greenland ice sheet, a study was made of the ice flow toward the proposed pit. The flow was analyzed by considering the two-dimensional flow along seven cross sections. The most favorable profile was determined for each cross section and its flow calculated. The excavation necessary to expose the ore is 106 million cu m of ice. In order to establish favorable profiles 66 million cu m of ice will have to be removed and an additional 7.9 million cu m of ice will have to be removed each year in order to prevent the glacier from thickening and advancing into the mine. Many other glaciological problems must be considered, and field work continues in order to provide more information about the area. (Humphreys-ISWS)
W75-03663

MULTIVARIATE STATISTICAL ANALYSIS OF GLACIER ANNUAL BALANCES,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie.
L. Lliboutry.
Journal of Glaciology, Vol 13, No 69, p 371-392, 1974. 3 fig, 6 tab, 5 ref, 2 append.

Descriptors: *Glaciers, *Glaciology, *Statistical models, *On-site investigations, Mathematical models, Ablation, Analytical techniques, Stochastic processes, *Statistical methods, Model studies.
Identifiers: Multivariate statistical analysis, Annual balances, Linear models.

A statistical analysis was made of the annual balances collected during 16 consecutive years at 32 sites on the ablation area of the Glacier de Saint-Sorlin (French Alps). Only 38% of the 32 times 16 balances are known; moreover, in 8 cases only the total balance for 2 consecutive years is known, and in one case the balance for 4 consecutive years. A comprehensive study of the errors led to the assumption of a linear model for the annual balance. A test of the linear model derived from Tukey's non-additivity test was positive. Although a much more general, non-linear model gives a better representation of 13 times 6 balances forming a complete table of data, the linear model with a standard error of about 0.20 m is good enough to be used in theoretical studies or in routine work. (Humphreys-ISWS)
W75-03664

AUTUMN, WINTER AND SPRING SOIL TEMPERATURES IN OKSTINDAN, NORWAY,
University Coll., Cardiff (Wales). Dept. of Geology.
C. Harris.
Journal of Glaciology, Vol 13, No 69, p 521-533, 1974. 7 fig, 3 tab, 12 ref.

Descriptors: *Soil temperature, *Surveys, *On-site investigations, Temperature, Evaluation, Soil investigations, Instrumentation, Snow cover, Air temperature, Freezing, Thawing, Seasonal, Autumn, Winter, Spring.
Identifiers: *Norway(Okstindan).

Soil temperatures were recorded over periods of several weeks in the years 1969 and 1970 at two sites to a depth of 100 cm. Snow depth was of major importance in the rate of freezing of the soil in winter; where snow cover was less than 5 cm in depth, freezing rates were almost double those where snow depth was over 1 m. Snow cover also insulated the soil surface from above-zero air temperatures during spring, and soil thawing commenced from the surface only following the clearance of snow. Similarly, insulation of the soil surface by snow prevented short-term freezing and thawing cycles penetrating the soil, although even where snow cover was absent such short-term cycles were not observed to penetrate the soil to depths in excess of 5 cm. This surficial freezing and thawing of the soil took place more readily in spring than in the autumn. The annual cycle of soil freezing and thawing was the dominant factor in the thermal regime of these soils, short-term freezing cycles affecting only the immediate surface soil layers. (Humphreys-ISWS)
W75-03665

VARIATIONS IN THE SLIDING OF A TEMPERATE GLACIER,
Washington Univ., Seattle. Geophysics Program.
S. M. Hodge.
Journal of Glaciology, Vol 13, No 69, p 349-369, 1974. 15 fig, 42 ref. NSF GU-2655. ONR N00014-67-A-0103-0007.

Descriptors: *Glaciers, *Glaciology, *On-site investigations, *Washington, Ice, Surveys, Movement, Velocity, Evaluation, Surfaces, Slopes, Profiles, Temperate, Seasonal, Measurement.
Identifiers: *Basal sliding, *Nisqually Glacier, Mount Rainier.

Measurements of the positions of stakes along the center-line of the lower Nisqually Glacier were made over a two-year period. Variations in the basal sliding speed were calculated from the measured changes in surface speed, surface slope, and thickness, using the glacier flow model of Nye and allowing for the effect of the valley walls, longitudinal stress gradients, and uncertainties in the flow law of ice. The flow is mainly by basal sliding and has a pronounced seasonal variation of approximately + or - 25%. Internal deformation contributes progressively less to the total motion with distance up-glacier. Neither the phase nor the magnitude of the seasonal velocity fluctuations can be accounted for by seasonal variations in the state of stress within the ice or at the bed, and the variations do not correlate directly with the melt-water discharge from the terminus. A seasonal wave in the ice flow travels down the glacier at a speed too high for propagation by internal deformation or basal sliding. The rate of sliding is primarily determined by the amount of water in temporary

storage in the glacier. The peak in sliding speed occurs, on the average, at the same time as the maximum liquid water storage of the South Cascade Glacier. The data support the idea that glaciers store water in the fall, winter, and spring and release it in the summer. This temporary storage may be greatest near the equilibrium line. The amount of stored water may increase over a period of years and be released catastrophically as a jokulhlaup. Any dependence of sliding on the basal shear stress is probably masked by the effect of variations in the hydrostatic pressure of water with access to the bed. (Humphreys-ISWS)
W75-03666

SUBGLACIAL GEOMORPHOLOGY SURROUNDING THE ICE-FREE VALLEYS OF SOUTHERN VICTORIA LAND, ANTARCTICA,
State Univ., of New York, Buffalo. Dept. of Geological Sciences.
P. E. Calkin.
Journal of Glaciology, Vol 13, No 69, p 415-429, 1974. 7 fig, 47 ref. NSF GV-22761.

Descriptors: *Glaciers, *Geomorphology, *Remote sensing, *On-site investigations, *Antarctic, Glaciology, Evaluation, Ice, Topography, Shape, Surveys, Sounding, Depth.
Identifiers: *Radio-echo, Subglacial topography, Wilson Piedmont Glacier, Mackay outlet glacier, Ferrar outlet glacier, Taylor outlet glacier, Victoria Land(Antarctia).

The results of airborne radio-echo (R/E) depth sounding over Wilson Piedmont Glacier, Mackay, Ferrar and Taylor outlet glaciers, and over the ice sheet bordering the mountains, provide ice thicknesses and subglacial topography accurate to 20 m and to 1 km areally. The R/E records show that floors of the Debenham, Wright, and Victoria Valleys occur beneath the Wilson Piedmont at elevations of -260 m, and up to 260 and 670 m, respectively. The 670 m 'threshold' may have blocked easterly marine and glacial invasions experienced by lower valleys. Profiles along the outlet glaciers display large depressions, some below sea-level. These are associated with erosion by tributaries and with glacial erosion through thick dolerite sills. Elevated ridges thought to be sills submerged beneath the heads of these glaciers also limit nourishment from the adjacent part of the ice sheet. The subglacial west flank of the mountains is formed by a series of high steep-sided plateaux with gentle west-sloping surfaces. Block faulting, west-dipping dolerite and sandstone units, and glacial erosion must explain this topography. (Humphreys-ISWS)
W75-03667

GROWTH OF ENGELMANN SPRUCE (PICEA ENGELMANNII) UNAFFECTED BY INCREASED SNOWPACK,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2I.
W75-03844

2D. Evaporation and Transpiration

RELATIONSHIPS BETWEEN MOISTURE AVAILABILITY AND NITROGEN RESPONSE IN WINTER WHEAT,
Kansas State Univ., Manhattan. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-03307

SOME PREDICTED CLIMATIC EFFECTS OF A SIMULATED SAHARA LAKE,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 2B.
W75-03635

ACTUAL EVAPOTRANSPIRATION IN RELATION TO LEAF AREA,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Hydrotechnical Lab.; and Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Climate Station.
K. J. Kristensen.
Nordic Hydrology, Vol 5, No 3, p 173-182, 1974. 4 fig, 1 tab, 6 ref.

Descriptors: *Evapotranspiration, *Soil-water-plant relationships, Soils, Vegetation, Grasses, Water balance, Precipitation(Atmospheric), Leaves, Water utilization, Barley, Sugar beets.
Identifiers: *Potential evapotranspiration, *Leaf-area index.

The ratio of leaf area to ground area required for maintaining potential evaporation was studied in a 4-year investigation. The influence of leaf area index on the water use and the actual water balance was discussed. Soil water content under barley, sugar beets, short grass and long grass was followed regularly during the growing seasons of 1969-1973 with the neutron scattering method. Soil water content was determined for 20 cm soil layers through a 0-160 cm soil profile. Periodic actual evaporation was calculated from a simplified water balance equation. The potential evapotranspiration was measured directly, and estimated according to Penman. Ratios of actual to potential evapotranspiration were shown as functions of the leaf area index, measured simultaneously with the soil water measurements. The leaf area index must exceed 3 in order to achieve potential evapotranspiration from a crop. As the maximum actual evapotranspiration exceeds the measured potential one, but not significantly the calculated one, the latter was considered to be the most realistic in the growing season. The actual evapotranspiration from barley and sugar beets is constant from one year to another when these crops are grown in high water capacity soils under Danish conditions. (Roberts-ISWS)
W75-03653

POTENTIAL EVAPOTRANSPIRATION IN CENTRAL IRAQ USING THE PENMAN METHOD WITH MODIFIED WIND FUNCTION,
Baghdad Univ. (Iraq). Coll. of Agriculture.
G. A. Al-Nakshabandi, and J. W. Kijne.
Journal of Hydrology, Vol 23, No 3/4, p 319-328, 1974. 1 fig, 3 tab, 27 ref.

Descriptors: *Evapotranspiration, *Winds, Radiation, Pan evaporation, Equations, *Regression analysis, Wind velocity, Meteorology, Statistical methods.
Identifiers: *Potential evapotranspiration, *Iraq, *Penman equation, Wind function.

Radiation was correlated with hours of bright sunshine for central Iraq. The resulting regression equation, which was in good agreement with other regressions derived for similar climatic regions, was used in Penman's combination equation. Wind velocity and the aerodynamic component of pan evaporation were better correlated than wind velocity and pan evaporation divided by the vapor pressure deficit. The resulting wind functions for the standard U.S. Weather Bureau A-pan and the sunken Colorado pan were incorporated in modified Penman equations for use in central Iraq. Potential evapotranspiration calculated according to the modified equations was compared to potential evapotranspiration calculated from the standard Penman equation and from equations with modified wind functions reported in the literature, as well as with experimental data on water use by crops in Iraq. The equation modified for use in Iraq by means of the wind function for the A-pan resulted in a maximum value of the potential evapotranspiration of about 15 mm/day in July and August, which is a reasonable value for tall crops. The relative importance of the aerodynamic term in the combination equation is stressed for arid conditions where advection may be important and the vapor pressure deficit is great. (Roberts-ISWS)
W75-03656

ESTIMATING SOIL WATER CONTENT ON NATIVE RANGELAND,
Department of Agriculture, Sidney, Mont.
For primary bibliographic entry see Field 2G.
W75-03800

2E. Streamflow and Runoff

PREDICTING THE FLOW OF WATER WITHIN A CHANNEL BOUNDARY OF GRAVEL,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
For primary bibliographic entry see Field 8B.
W75-03320

MIXING AND TRANSPORT, (LITERATURE REVIEW),
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-03554

FITTING A THREE-PARAMETER LOG-NORMAL DISTRIBUTION BY LEAST SQUARES,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
W. M. Snyder, and J. R. Wallace.
Nordic Hydrology, Vol 5, No 3, p 129-145, 1974. 11 fig, 13 ref.

Descriptors: *Probability, *Distribution patterns, *Histograms, *Hydrologic data, Analytical techniques, *Least squares method, Parametric hydrology, Statistical methods, Streamflow, Runoff, Mathematics.
Identifiers: *Log-normal distribution, *Functional transform, Tolerance limits.

A three-parameter log-normal distribution was derived as an exact functional transform of an embedded normal distribution. The parameters of this function were evaluated by fitting to histograms of natural hydrologic data. The practice of transformation of data was made unnecessary and could be eliminated. Tolerance limits of extreme hydrologic events can be calculated as transforms of the exact tolerance limits of the embedded normal, permitting precise probabilistic statements on such statistics as T-year floods or droughts. (Singh-ISWS)
W75-03651

CALCULATION OF TEMPERATURE VARIATIONS OF SMALL MOUNTAIN STREAMS,
Vrije Universiteit, Amsterdam (Netherlands). Dept. of Meteorology.
H. F. Vugts.
Journal of Hydrology, Vol 23, No 3/4, p 267-278, 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Streams, *Temperature, Energy equation, Radiation, Heat flow, Mountains, *Water temperature, Measurement, Meteorology, *Energy budget.
Identifiers: Net radiation, Bowen ratio.

Temperatures of small mountain streams were accurately predicted by an energy balance method. The technique was tested by performing micrometeorological measurements along the Vigilbach (Rio di San Vigilio/Dolomites, northern Italy). The water temperature was measured at 8 points from the source down to a distance of 9 km. A simple energy budget equation and measurements of five meteorological parameters made it possible to predict water temperature variations of a mountain stream with an accuracy of 10%. It appeared that during the day on unshaded stretches the net radiation and the transfer of heat by conduction and turbulence are the predominant energy sources,

and that during the night the energy gain due to friction of the water with the bottom plays an important role in the energy budget. The minimum water temperature was reached at 6 a.m. and the maximum was observed near 2 p.m., an hour after the maximum air temperature and the maximum net radiation. The fast response of the water temperature to the meteorological elements was the result of the shallowness of the stream. The mean daily water temperature occurred at about 10 a.m., and the daily amplitude of the water temperature increased in a downstream direction. Various energy balance terms were discussed and some results were shown. (Roberts-ISWS)
W75-03655

ON THE VARIABILITY OF SEASONAL PARAMETERS IN HYDROLOGIC TIME SERIES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
R. G. Quimpo, and M-S. Cheng.
Journal of Hydrology, Vol 23, No 3/4, p 279-287, 1974. 5 fig, 2 tab, 4 ref. NSF Grant GK-20388.

Descriptors: *Time series analysis, *Seasonal, *Synthetic hydrology, *Statistical methods, Analytical techniques, Stochastic processes, Streamflow, Simulation analysis, Mathematics, Model studies, Least squares method.
Identifiers: *Harmonic analysis, Random component.

The attempt to preserve seasonal characteristics in the modeling of streamflow time series has given rise to a decomposition scheme wherein a random process is superimposed on another periodic process. The identification of the seasonal component is generally done by harmonic analysis. The residuals are fitted with models which preserve autocorrelation at non-zero lags. Strong empirical evidence indicates that the amplitude and phase of the periodic component vary a lot with variation in the random process. The nature of this variability was examined by using simulated time series whose structure was assumed known. The random component tends to distort estimates of the amplitude and phase so that a relatively long series is needed to estimate parameters (60 years of simulated monthly data to give coefficients of variation of 0.16 for the amplitude and 0.20 for the phase angle). The variation of the phase angle and amplitude is highly dependent on the ratio of the variance explained by the periodic component to the variance of the random component. (Singh-ISWS)
W75-03658

2F. Groundwater

ESTIMATION OF GROUNDWATER ACCESSION TO AND EVAPORATION FROM A SOUTH AUSTRALIAN LAKE USING ENVIRONMENTAL TRITIUM,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
For primary bibliographic entry see Field 2H.
W75-03528

GROUND-WATER QUALITY STUDY,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5B.
W75-03534

GROUND-WATER QUALITY MODELING,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Hydrology.
For primary bibliographic entry see Field 5B.
W75-03661

OPTIMAL IDENTIFICATION OF PARAMETERS IN AN INHOMOGENEOUS MEDIUM WITH QUADRATIC PROGRAMMING,
California Univ., Los Angeles. Dept. of Engineering Systems.
W. W-G. Yeh.
49th Annual Fall Meeting of Society of Petroleum Engineers of AIME, October 6-9, 1974, Huston, Texas. Paper Number SPE 5021, 1974, (California Water Resources Center Project UCAL-WRC-W-290). 3 tab, 12 ref.

Descriptors: *Computer programs, *Algorithms, *Aquifers, *Optimization, Equations.
Identifiers: *Quadratic programming.

A new algorithm is developed for parameter identification in a partial differential equation associated with an inhomogeneous aquifer system. The parameters chosen for identification are the storage coefficient, a constant and transmissivities, functions of the space variable. An implicit finite-difference scheme is used to approximate the solutions of the governing equation. A least-squares criterion is then established. Using distributed observations on the dependent variable within the system, parameters are directly identified by solving a sequence of quadratic programming problems such that the final solution converges to the original problem. The advantages of this new algorithm include rapid rate of convergence, ability to handle any inequality constraints and easy computer implementation. Numerical example presented demonstrates simultaneous identification of twelve (12) parameters in matter of seconds of computer time. (Snyder-California,Davis)
W75-03804

ON THE OPTIMAL IDENTIFICATION OF PARAMETERS IN A PARABOLIC SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
W. W-G. Yeh.
48th Annual Fall Meeting of American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., Sept 30-Oct 3, 1973, Las Vegas, Nevada. Paper Number SPE 4547, (California Water Resources Center Project UCAL-WRC-W-290). 2 fig, 2 tab, 8 ref.

Descriptors: *Systems analysis, *Porous media, *Unsteady flow, *Optimization, Equations, Linear programming.
Identifiers: *Quasilinearization.

An analysis is presented of the problem of parameter identification in unsteady fluid flow through a porous medium. The response of the system is governed by a second order partial differential equation of parabolic type. Identification is an inverse process whereby the parameters imbedded in a differential equation is determined from observations of systems input and output along with appropriate initial and boundary conditions. These parameters are usually not physically measurable. In general, the governing equation is non-linear with no closed-form solution. This inverse problem is solved by quasilinearization, maximum principle, gradient method, influence coefficient method and linear programming. A comparison is made between these methods. The problem of convergence and stability is discussed and demonstrated by numerical experimentation. (Snyder-California,Davis)
W75-03805

2G. Water In Soils

RELATIONSHIPS BETWEEN MOISTURE AVAILABILITY AND NITROGEN RESPONSE IN WINTER WHEAT,
Kansas State Univ., Manhattan. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-03307

MOBILITY AND DEACTIVATION OF HERBICIDES IN SOIL-WATER SYSTEMS,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-03314

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03422

CHARACTERIZATION OF ACTINIDE BEARING SOILS: TOP SIXTY CENTIMETERS OF 216-Z-9 ENCLOSED TRENCH,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03423

MOISTURE PROFILES IN SWELLING SOILS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
T. Talsma.
Australian Journal of Soil Research, Vol 12, No 2, p 71-75, December 1974. 2 fig, 1 tab, 9 ref.

Descriptors: *Soil water movement, *Expansive clays, Soil physical properties, Expansive soils, Moisture content, On-site tests, Water table, Equilibrium, *Soil moisture, *Soil profiles.
Identifiers: *Swelling soils.

Recent developments in the theory of hydrostatics and hydrodynamics of swelling soils have predicted that they will differ considerably from non-swelling soils in many aspects of their hydrologic behavior. Examples used to illustrate the results have been derived from arbitrary or laboratory data on soil properties. To test the results in the field, equilibrium moisture profiles in two clay soils and one loam soil with permanent shallow water tables are examined. In addition, moisture profiles in periods of approximately steady upward flow are examined for one of the clay soils. The equilibrium profiles observed in the clays are typical of the predicted 'hydric' profiles for swelling materials; and water moves upwards against the moisture gradient. The equilibrium profile for the loam is typical of those observed for non-swelling materials. (Levick-CSIRO)
W75-03527

DETERMINATION OF LIQUID CONDUCTIVITY OF CAPILLARY POROUS SOLIDS,
Waterloo Univ. (Ontario).
D. Berger, and D. C. Poi.
Australian Chemical Engineering, Vol 15, No 9, p 19-23, September 1974. 3 fig, 2 tab, 3 ref.

Descriptors: *Hydraulic conductivity, *Porous media, *Measurement, Laboratory tests, *Capillary conductivity, Drying, Heat balance, Heat transfer.

An experimental technique is proposed, and results of tests reported, whereby conductivity is determined by a method based on the rate of drying of the solid within an isothermal constant rate period. This factor is direct and easy to measure, by contrast with the liquid content profile, which is required by other methods. The value of conductivity obtained represents the effective value for the entire drying process, and can be utilized to predict the performance of the same solid under non-isothermal conditions. (Levick-CSIRO)
W75-03532

PRODUCTIVITY IN DWARF WHEATS IN A SILT-LOAM SOIL AS INFLUENCED BY SOIL-

MOISTURE REGIMES AND NITROGEN FERTILIZATION UNDER SHALLOW WATER TABLE CONDITIONS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-03557

THE EFFECT OF SHELTER BELTS AND IRRIGATION ON WATER USE IN A DRY REGION,
Norges Landbrukshoegskole, Vollebeck. Dept. of Agricultural Hydrotechnics.
For primary bibliographic entry see Field 3F.
W75-03652

SOIL MOISTURE-VEGETATION-TEMPERATURE RELATIONSHIPS IN CENTRAL ALASKA,
California Univ., Davis. Dept. of Water Science and Engineering.
J. N. Luthin, and G. L. Guymon.
Journal of Hydrology, Vol 23, No 3/4, p 233-246, 1974. 4 fig, 1 tab, 19 ref.

Descriptors: *Soil moisture, *Alaska, *Vegetation, *Soil temperature, Temperature, Frozen soils, Pore pressure, Drainage, Hydrology, Model studies, On-site investigations.
Identifiers: Thermistors, Internal drainage, Thermal regime, *Goldstream Valley(Alas).

Measurements of soil moisture and soil temperature were made during the summer of 1972 at four locations in the Goldstream valley near Fairbanks, Alaska. Two sites were under aspen-birch forest, one in stunted black spruce forest, and one in cleared grassland. These field results and observations of conditions in central Alaska led to the development of a model showing the interrelationship among drainage, vegetative cover, and the thermal regime of the mineral soil. In addition the subsystem comprising the thermal regime system have been identified. There were areas where the microclimate will cause permafrost to occur in the soil regardless of the vegetative cover and/or presence of peat layer. The remainder of the region normally did not have permafrost if vegetative effects were removed. The vegetative canopy, the snow, and the surface organic layer may be lumped together as a single system, a buffer zone between the atmosphere and the mineral soil. Permafrost created a poorly drained environment that inhibited evapotranspiration. (Roberts-ISWS)
W75-03657

AUTUMN, WINTER AND SPRING SOIL TEMPERATURES IN OKSTINDAN, NORWAY,
University Coll., Cardiff (Wales). Dept. of Geology.
For primary bibliographic entry see Field 2C.
W75-03665

AXISYMMETRIC INFILTRATION IN SOILS, II. SUMMARY OF INFILTRATION CHARACTERISTICS RELATED TO PROBLEM SPECIFICATIONS,
Utah Water Research Lab., Logan.
R. W. Jeppson.
Journal of Hydrology, Vol 23, No 3/4, p 191-202, 1974. 9 fig, 2 ref, append.

Descriptors: *Infiltration, *Soil moisture, *Soil water movement, Pores, Soil properties, Percolation, Pore pressure, Saturation, Infiltrometers, Hydraulic properties, Boundary processes, Regression analysis, Numerical analysis, Hydraulic gradient.
Identifiers: *One-dimensional flow, *Wetting front, Flux, Hydraulic head.

Part II compiles solutions obtained by the methods described in part I (See also W75-01990). Techniques for numerical solutions were obtained in part I to the transient, three-dimensional axisymmetric, unsaturated moisture movement through homogeneous soil due to infiltration over a horizontal circular surface area. These relationships were applied to measurements in ring infiltrometers and similar problems of unsaturated axisymmetrical flow. The results illustrated how greater understanding of the infiltration process can result by contracting a series of solutions obtained by varying a single problem solution. (Visocky-ISWS)
W75-03670

EFFECTS OF EXPERIMENTAL SOIL MOISTURE FLUCTUATIONS ON TURNOVER RATES OF TESTACEA,
Calgary Univ. (Alberta). Dept. of Biology.
J. D. Lousier.
Soil Biol Biochem, Vol 6, No 1, p 19-26, 1974.
Identifiers: Aspen, *Soil moisture, *Testacea, Turnover rates, *Canada(Rocky Mountain region).

Experiments designed to obtain data on the quantitative effects of an artificial increase in soil moisture content during a seasonal dry period on numbers of soil Testacea were carried out in well-drained aspen woodland soil in the Rocky Mountains of Canada. The general effect of the addition of water to the soil was to increase significantly the number of active Testacea and decrease the number of encysted forms. Numbers of active Testacea and of living Testacea (active plus encysted forms) showed significant, positive correlation with soil moisture content. A method for the estimation of standing crop turnover and secondary production is discussed. Generation times were shorter and secondary production higher in the watered plots.--Copyright 1974, Biological Abstracts, Inc.
W75-03681

ESTIMATING SOIL WATER CONTENT ON NATIVE RANGELAND,
Department of Agriculture, Sidney, Mont.
J. K. Aase, J. R. Wight, and F. H. Siddoway.
Agric Meteorol, 12(2): 185-191, 1973.
Identifiers: Evaporation, *Mathematical models, Model studies, *Penman method, Rangeland, *Soil water, *Evapotranspiration, Estimating, *Range management.

A model for estimating soil water content on native rangeland was tested at Sidney, Montana. Based on the Penman combination method for estimating potential ET (evapotranspiration) the model includes factors to account for crop development, limiting soil water content, and increased evaporation after rain. The model gave reasonable estimates of actual soil water conditions within a 15% limit suggested as being practical for rangeland management purposes.--Copyright 1974, Biological Abstracts, Inc.
W75-03800

PREDICTION OF SUBTROPICAL STORM SOIL LOSSES FROM FIELD PLOT STUDIES,
Rhodesia Univ., Salisbury. Dept. of Geography.
M. A. Stocking, and H. A. Elwell.
Agric Meteorol, Vol 12, No 2, p 193-201, 1973.
Identifiers: Infiltration, *Prediction, Runoff, *Soil losses, *Vegetation cover, *Corn(Field), *Tropical storms.

Daily soil losses were recorded from experimental field plots planted to maize on 2 different but common soil types. Planting densities were 12,350-37,000 plants/ha and slopes, 3-8%. One bare fallow plot was included in the investigation. The results show the significance of derived energy-intensity parameters in predicting soil losses: EI30 (total kinetic energy x maximum sustained energy over 30 min) on bare soil; EI15 on all covered plots to nearly maximum vegetal cover; and EI5 on high density late season crops. Different slopes appear to have no relevance as to choice of parameter. Cover combined with varied infiltration and runoff conditions are suggested as the main determinants for choice of storm soil loss parameters.--Copyright 1974, Biological Abstracts, Inc.
W75-03806

EVALUATING WELL CONSTRUCTION, (PART II),
Agricultural Research Service, Beltsville, Md.
For primary bibliographic entry see Field 5B.
W75-03813

EFFECT OF ORGANIC MULCHES ON THE HYDROTHERMAL REGIME OF SOIL AND GROWTH OF POTATO CROP IN NORTHERN INDIA,
Punjab Agricultural Univ., Ludhiana (India).
For primary bibliographic entry see Field 3F.
W75-03837

2H. Lakes

SOURCES OF PHOSPHORUS INPUTS FROM THE ATMOSPHERE AND THEIR SIGNIFICANCE TO OLIGOTROPHIC LAKES,
De Paul Univ., Chicago, Ill. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-03304

EPIDEMIOLOGIC RELATIONSHIPS BETWEEN HUMAN AND ANIMAL SALMONELLA CARRIERS AND THEIR ENVIRONMENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE, (IN GERMAN),
Institut fuer Medizinisches Mikrobiologie Kantons Sankt Gallen (Switzerland).
For primary bibliographic entry see Field 5C.
W75-03330

CHEMISTRY OF SOME SEDGELAND WATERS: LAKE PEDDER, SOUTH-WEST TASMANIA,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 5B.
W75-03390

ESTIMATION OF GROUNDWATER ACCESSION TO AND EVAPORATION FROM A SOUTH AUSTRALIAN LAKE USING ENVIRONMENTAL TRITIUM,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
G. B. Allison.
Australian Journal of Soil Research, Vol 12, No 2, p 119-131, December 1974. 6 fig, 3 tab, 15 ref.

Descriptors: *Lakes, *Groundwater movement, *Evaporation, *Water balance, *Tritium, Radioisotopes, Energy budget, Estimating, Advection, *Australia.
Identifiers: Little Blue Lake(SA), Gambi Plain(SA).

In an investigation of the water balance of a small lake which penetrates a limestone aquifer in South Australia, a combination of tritium balance and evaporation estimates was used. Calculation of an approximate tritium balance using semi-empirical methods of estimating evaporation gave an approximate value for groundwater inflow, which was used to estimate the advected term in the lake's energy budget, and hence revise the initial estimate for evaporation. The revised estimate allowed a refinement of the tritium balance which in turn gave a more precise estimate of groundwater inflow. The estimate of groundwater flow is in good agreement with a value computed using groundwater isopotentials and lake and ground-

water chemistry. Groundwater throughflow in the lake, which has a volume of 96,000 cubic meters, is estimated to be about 30,000 cubic meters annually. (Levick-CSIRO)
W75-03528

INVESTIGATIONS ON AEROBIC PECTOLYTIC BACTERIA IN AN EUTROPHIC LAKE, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
For primary bibliographic entry see Field 5C.
W75-03538

SOLUTION, DIFFUSION AND SORPTION IN UPPER LAYER OF LAKE SEDIMENTS: III. CHEMICAL AND PHYSICAL CONDITIONS IN SEDIMENT-WATER TRANSITION ZONE OF MEROMICTIC BOG LATE (URSEE) AND ITS RELATION TO ACCUMULATION OF VIVIANITE, (IN GERMAN),
Freiburg Univ. (West Germany). Limnoloaisches Institut.
For primary bibliographic entry see Field 5B.
W75-03571

THE BIOLOGY OF A LANDLOCKED FORM OF THE NORMALLY CATADROMOUS SALMONIFORM FISH GALAXIAS MACULATUS (JONYNS): V. COMPOSITION OF THE DIET,
New South Wales State Fisheries, Sydney (Australia).
D. A. Pollard.
Aust J Mar Freshwater Res Vol 24, No 3, p 281-295, 1973.
Identifiers: Amphipods, *Australia(Lake Modewarre), Biology, Catadromous, Chironomids, Cladocers, Copepods, Crustacean, *Diet(Fish), *Galaxias-maculatus, Growth, Insects, Lakes, Larvae, Ostracod, Salmoniform, Seasons, Trichoptera, Victoria, Zygoptera.

The composition of the diet of a landlocked form of the normally catadromous stream-dwelling fish G. maculatus from Lake Modewarre in southwestern Victoria (Australia) was studied using a new method of stomach contents analysis based on the principle of ranking. The overall diet of this landlocked fish was found to consist mainly of amphipods, chironomid larvae and copepods (basic food types), with other groups of crustaceans (Cladocerans and ostracods) and insects (trichopteran and zygopteran larvae) being of lesser importance (secondary food types) and a few other incidential food types occurring in only small amounts. The diet of this landlocked form thus consists mainly of crustaceans, in contrast to that of the stream-dwelling form which comprises mainly insects. There was a change in the pattern of feeding in the landlocked fish with growth, the smaller fish eating more of the smaller planktonic and the larger fish more of the larger littoral-benthic food organisms. Amphipods were the dominant food type during all seasons except autumn, when copepods were dominant. Cladocerans were also important when they bloomed in summer, and chironomid adults when they swarmed in autumn. Selection coefficients indicated that those food types which were dominant in the diet were actively selected and those that were unimportant were avoided. This landlocked galaziid was found to share most of the available food resources with the other 4 fish species found in the lake and can be broadly classified as a euryphagic carnivore. (See also W73-02855 and W75-02856)--Copyright 1974, Biological Abstracts, Inc.
W75-03597

OBSERVATIONS ON THE ECOLOGY OF LACRUSTRINE POPULATIONS OF THE THREESPINE STICKLEBACK (GASTEROSTEUS ACULEATUS L., 1758) IN THE MATAMEK RIVER SYSTEM, QUEBEC,
Ottawa Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-03625

AN OUTLINE OF THE PHYSICAL LIMNOLOGY OF LAKE MALAWI (LAKE NYASA),
Ministry of Agriculture and Natural Resources, Monkey Bay (Malawi). Fisheries Research Unit.
D. H. Eccles.
Limnology and Oceanography, Vol 19, No 5, p 730-742, September 1974. 9 fig, 1 tab, 14 ref.

Descriptors: *Limnology, *Lakes, *Data collections, Physical properties, Thermocline, Water temperature, Stratification, Geomorphology, Profiles, Currents(Water), Climatic data, Hydrologic data, On-site data collections, Evaluation, Africa.
Identifiers: *Malawi(Lake Malawi).

Lake Malawi, in tropical central Africa, is 560 by 75 km and consists of a single basin, maximum depth 695 m. Below 250 m the lake is homothermal at about 22.5C and is anoxic. Above this level there is a seasonal cycle with the development of a marked thermocline. By May the upper 60 m is homothermal at about 27C. During the dry, windy, cool season the epilimnion cools, but only in exceptional years approaches a homothermal condition. Complete mixing has never been observed. In the shallower southeast arm the surface temperature may fall to 21C as the result of inshore chilling; this cool water flows northward as a profile-bound density current and appears to maintain the stability of the stratification. Large-scale oscillations of the level of the thermocline, apparently the result of internal waves and of wind-induced upwelling, cause advections of water from the metalimnion into the southeast arm, site of the major fishery in the lake. (Humphreys-ISWS)
W75-03660

RANGE OF CUMULATIVE SUMS, II. APPLICATION TO STORAGE CAPACITY OF RESERVOIRS,
Colorado State Univ., Fort Collins.
J. D. Salas-La Cruz.
Journal of Hydrology, Vol 23, No 3/4, p 329-339, 1974. 9 fig, 1 tab, 5 ref. NSF Grant GK-31512X.

Descriptors: *Storage capacity, *Reservoirs, *Seasonal, *Mathematical models, Inflow, Statistical methods, Markov processes, Streamflow, Stochastic processes, Hydrology, Analytical techniques, Computers, Water level fluctuations.
Identifiers: *Range of cumulative sums, Periodic variables.

An attempt was made to determine the storage capacity of a reservoir when within-the-year water fluctuations are taken into account. A sensitivity analysis was carried out to determine the characteristics of the expected range for various types of input series and the long-term effect of the phases of the periodic components. Subsequently, a mathematical model was proposed for the expected storage as composed of a deterministic part and a stochastic part. An example of the application of the proposed model was included. (Singh-ISWS)
W75-03669

AGRICULTURE'S POLLUTION SOLUTION FOR LAKE APOPKA,
For primary bibliographic entry see Field 5C.
W75-03686

ALGAL NUTRIENT LIMITATION IN LAKE ONTARIO AND TRIBUTARY WATERS,
Wisconsin Univ., Madison. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W75-03757

PRIMARY PRODUCTION IN RELATION TO TEMPERATURE STRUCTURE, BIOMASS CONCENTRATION, AND LIGHT CONDITIONS AT AN INSHORE AND OFFSHORE STATION IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-03764

NUTRIENT UPTAKE KINETICS IN PHYTOPLANKTON: A BASIS FOR NICHE SEPARATION,
State Univ. of New York, Albany. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-03766

NITROGEN AND PHOSPHORUS AVAILABILITY IN LAKE ONTARIO TRIBUTARY WATERS DURING IFYGL,
Texas Univ., Dallas. Inst. for Environmental Sciences.
For primary bibliographic entry see Field 5C.
W75-03768

RECENT LIMNOLOGICAL STUDIES OF OKANAGAN BASIN LAKES AND THEIR CONTRIBUTION TO COMPREHENSIVE WATER RESOURCE PLANNING,
Fisheries Research Board of Canada, West Vancouver (British Columbia). Pacific Environment Inst.
J. G. Stockner, and T. G. Northcote.
Journal Fisheries Research Board of Canada, Vol 31, No 5, p 955-976, 1974. 9 fig, 11 tab, 28 ref.

Descriptors: *Limnology, *Lakes, *Water resources, *Comprehensive planning, *Canada, Management, Geomorphology, Thermal properties, Economic impact, Currents(Water), Alternative planning, Ions, Nutrients, Phosphorus, Chemical properties, Mercury, Nitrogen, Phytoplankton, Rooted aquatic plants, Periphyton, Water pollution sources, Zooplankton, Benthos, Paleolimnology, Fisheries, Bioassay, Water quality, Trophic level.
Identifiers: *Okanagan Basin(British Columbia).

The contribution of limnology in comprehensive planning for water resources management served four basic functions in the study of the Okanagan Basin, British Columbia Lakes by providing an assessment of current conditions, predicting lakes' response to future waste loadings, estimating lake assimilative capacity, and in developing a monitoring program to assess lake response to implementation of waste management plans. The manner and sequence in which these functions were allied to the development of overall planning strategies is diagrammatically illustrated. Essentially all limnological studies were necessary to an understanding of current conditions although fewer contributed to the determination of lake nutrient assimilative capacity. Only five studies served to guide future lake monitoring. The effectiveness of a particular study is determined on the number of functions it fulfills. Five studies were major contributors: Paleolimnology, chemical and physical limnology, bioassay, and periphyton. The remaining investigations contributed more to specific programs than to general functions. Paring down expansive programs to 'bare bones' limnology has proved to be a valuable feature of the initial planning procedure and should be encouraged in future studies of this type. The role of limnologists in this type of study is discussed and encouraged. (Auen-Wisconsin)
W75-03769

PHYTOPLANKTON WHICH ARE POLLUTION INDICATORS IN LAKES, (IN SWEDISH),
Vandkvalitetsinstitut, Soborg (Denmark).
For primary bibliographic entry see Field 5B.
W75-03828

2I. Water In Plants

STATIC PRESSURE FRACTIONATION CHARACTERISTICS OF WATER HYACINTH,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W75-03302

SPECIFIC PRODUCTION OF AQUATIC INVERTEBRATES,
For primary bibliographic entry see Field 5C.
W75-03327

THE NATURE OF WATER POTENTIAL GRADIENTS IN TREES, (IN GERMAN),
Hochschule fuer Bodenkultur, Vienna (Austria). Botanisches Institut.
H. Richter.
Ber Dtsch Bot Ges, Vol 85, No 7/9, p 341-351, 1972. English summary.
Identifiers: Cohesion, Gradients, *Suction tensions, *Trees, *Water potential gradients, *Distribution patterns.

The distribution of water potentials (or, in a closely corresponding terminology, suction tensions) in trees is frequently discussed without an adequate consideration of both experimental and theoretical aspects of the problem. The relative importance of hydrostatic tensions thus generally becomes vastly overestimated (Plumb and Bridgman 1972). Results from work with the pressure bomb technique suggest frictional gradients as a by far more important factor for the total tension difference between 2 points in the plant. A true gradient of potential or pressure is established only along a coherent conduit in the xylem, however not between the twigs at the end of different branches. It can be shown that, under certain environmental conditions, tension differences between these end twigs may become negligible. This fact cannot serve as an argument against the validity of the cohesion concept as suggested by Tobiessen et al. 1971; rather it is a necessary consequence of the suction tension equation and the well-known minimal differences of potential osmotic pressures in a tree.--Copyright 1974, Biological Abstracts, Inc.
W75-03336

LIGHT AND WATER SUPPLY AS FACTORS INFLUENCING THE DEGREE OF STOMATAL OPENING IN CONIFERS, (IN GERMAN),
Hochschule fuer Bodenkultur, Vienna (Austria). Botanisches Institut.
W. Rottenburg, and T. Koeppner.
Ber Dtsch Bot Ges, Vol 85, No 7/9, p 353-362, 1972. English summary.
Identifiers: Abies-alba, *Confers, Flow, *Light, Porometer, *Stomatal openings, Taxus-baccata, Viscous, *Water supply.

Dependence of stomatal reactions on light and water supply was investigated on Abies alba and Taxus baccata under controlled environmental conditions. A viscous flow porometer specially developed for determination of the opening degree of coniferstomata was used. The maximum stomatal opening of Abies and Taxus is given as a result of an illumination time of approximately 40-50 min. The stomata of Abies show an earlier and more sensitive reaction than Taxus on water deficit caused by transpiration. In principle, the stomata of Abies and Taxus show a similar reaction to darkening, Taxus however closes faster. Each species reaches a maximum of stomatal opening according to the light intensity. These maxima are at very different light intensities. An increase of leaf-temperature must not be held responsible for the decrease of the stomatal opening with increasing light intensity. On the contrary, the increasing water deficit seems to cause the closure of the stomata. The more the water deficit increases the more the stomata are closed. Taxus reacts significantly more sensitively than Abies. If a needle is detached and measurements of the stomatal opening are done in short intervals (30s), no change shows up during the 1st 2 min. Afterwards a short opening reaction can be observed owing to the loss of turgor of the cells adjacent to the guard cells. Then the degree of stomatal opening decreases constantly owing to the loss of water. Again the stomata of Taxus are closed significantly faster than the stomata of Abies.--Copyright 1974, Biological Abstracts, Inc.
W75-03338

THE ENTERPRISE, WISCONSIN, RADIATION FOREST - PREIRRADIATION ECOLOGICAL STUDIES.
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-03401

FLORA OF THE ENTERPRISE RADIATION FOREST,
Nicolet Coll.-Technical Inst., Rhinelander, Wis.
For primary bibliographic entry see Field 5C.
W75-03406

DESCRIPTION AND CLASSIFICATION OF PLANT COMMUNITIES IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-03407

PHYSICAL CONDITION AND DIMENSIONS OF TREES IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-03408

PROPERTIES OF THE TREE FLORA IN THE FOREST TRANSITION FROM ASPEN TO MAPLE-BIRCH TYPE,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 5C.
W75-03409

TEMPORAL AND SPATIAL PATTERNS OF PRETREATMENT LITTER PRODUCTION IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-03411

LEAF-LITTER PRODUCTION IN THE ASPEN AND MAPLE-BIRCH FOREST TYPES AND THE CONTRIBUTION BY INDIVIDUAL TREE SPECIES,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 5C.
W75-03412

EFFECTS OF THINNING ON NEEDLE WATER POTENTIAL IN RED PINE,
Minnesota Univ., Saint Paul. Coll. of Forestry.
E. Sucoff, and S. G. Hong.
For Sci, Vol 20, No 1, p 25-29, 1974, Illus.
Identifiers: *Needle water potential, *Pine trees(Red), *Pinus-resinosa, Soil moisture, *Thinning(Trees).

Soil moisture (SM) and needle water potential (Psi sub n) were measured the season following thinning on comparable trees (Pinus resinosa) in thinned and unthinned plots. SM availability was described by plotting Psi sub n at dawn against SM content. SM was always higher in the thinned plot but Psi sub n was significantly higher in the thinned plot on only 4 of 10 measurement days. On these 4 days, SM was more available to the thinned trees. Significant differences in Psi sub n occurred on 20% of the days during the 1969 growing season.--Copyright 1974, Biological Abstracts, Inc.
W75-03499

HYDRATION OF EASTERN HEMLOCK AS INFLUENCED BY WAXING AND WEATHER,
Connecticut Agricultural Experiment Station, New Haven. Dept. of Ecology and Climatology.
N. C. Turner, and H. C. De Roo.
For Sci, Vol 20, No 1, p 19-24, 1974, Illus.
Identifiers: Air, Extracellular, Film, Freezing, *Hemlock, *Hydration, Stem diameter, Temperature, Transpirant, Tsuga-canadensis, Wax, *Waxing, *Weather, *Xylem pressure potential, Trees.

The xylem pressure potential and stem diameter of small, container-grown, eastern hemlock (Tsuga canadensis (L.) Carr.) trees placed in an open field were measured several times during 6 Jan. and 1 May 1972. Some trees were sprayed with 1 or 2 coats of either 20% (v/v(volume in volume)) or 40% Mobileaf, a wax-film antitransparant. The wax provided no significant thermal insulation for the needles. On days when the air temperature was above 0C, the xylem pressure potential was lower in unwaxed trees than in waxed trees and decreased with increasing vapor pressure deficit of the air in the unwaxed but not in the waxed trees. Those treated with 40% Mobileaf had only slightly higher potentials than those treated with 20% Mobileaf, and trees with a 2nd film of wax maintained only slightly higher potentials than those with a single film. On days when air temperatures were below 0C, the potentials of the waxed and unwaxed foliage were very similar but differed after warming for 1 hr at 19C. Warming the foliage initially increased the potentials in all treatments. At temperatures below 0C the trees had lower potentials at equivalent vapor pressure deficits than those sampled at above 0C. Temperatures below 0C also significantly reduced the diameter of the stems in both waxed and unwaxed hemlocks. Apparently, low potentials and stem shrinkage at temperatures below 0C arise from extra-cellular freezing which antitranspirants affect little, but antitranspirants can reduce dehydration markedly on warm spring days.--Copyright 1974, Biological Abstracts, Inc.
W75-03500

THE SPHAGNUM FLORA OF HOT SPRINGS IN ICELAND,
Copenhagen Univ. (Denmark). Inst. of Systematic Botany.
B. Lange.
Lindbergia, Vol 2, No 1/2, p 81-93, 1973.
Identifiers: Flora, *Iceland(Hot springs), *Sphagnum, Sphagnum-palustre, Sphagnum-papillosum, Sphagnum-subnitens, Sphagnum-teres, Springs, Temperature, Aquatic plants, Hydrogen ion concentration.

The Sphagnum flora of the hot springs in Iceland is mostly associated with alkaline waters and is often much more richly developed there than in other parts of Iceland. Dominant species are S. teres, S. papillosum, S. subnitens and S. palustre. Of these, only S. teres is dominant in the Sphagnum flora of Iceland as a whole, while S. palustre is exclusive to the springs. Several species associated with the springs can be considered members of an oceanic element. The flora of the individual springs varies, probably due to differences in chemical composition of the water but, overall, the spring flora differs radically from that elsewhere in Iceland. The most characteristic species are also those which grow closest to the very hot water. Water temperatures of up to 42C have been measured in Sphagnum tussocks.--Copyright 1974, Biological Abstracts, Inc.
W75-03526

RAINFALL INTERCEPTION IN A FOREST IN THE VELEN HYDROLOGICAL REPRESENTATIVE BASIN,
Swedish Meteorological and Hydrological Inst., Stockholm.
B. Bringfelt, and P-O. Harsmar.
Nordic Hydrology, Vol 5, No 3, p 146-165, 1974. 7 fig, 7 tab, 5 ref.

Descriptors: *Rainfall disposition, *Forests, Canopy, Precipitation gages, *Interception, Rainfall, Throguhfall, Evaporation, Hydrology, Watersheds(Basins), Rain gages, On-site data collections, Storage capacity.
Identifiers: *Sweden.

During the summer and autumn of 1973, 25 rain troughs were operating below canopy and 4 in clearings of a predominantly coniferous forest in the Velen hydrological research area in southern Sweden. The troughs gave values of rainfall and throughfall. Stemflow was found to be below 5%, therefore, the difference was the rain intercepted on the canopy. The collected rain water amounts were measured 14 times, about once a week. These data and the records from a tipping-bucket rain gage were used in a simple model for throughfall. The overall water storage capacity of the forest canopy was about 2 mm and the free throughfall coefficient p was about 0.5. Observation of 50 photographs taken upward from the troughs indicated a smaller p-value. The time for evaporation of the intercepted water after an average rain storm was roughly estimated as 5 hours. About 26% of the total rainfall was intercepted and evaporated. Errors due to differences between types of gages were eliminated by using only values from troughs for both rainfall and throughfall. (Roberts-ISWS)
W75-03654

EFFECTS OF EXPERIMENTAL SOIL MOISTURE FLUCTUATIONS ON TURNOVER RATES OF TESTACEA,
Calgary Univ. (Alberta). Dept. of Biology.
For primary bibliographic entry see Field 2G.
W75-03681

SNAIL POPULATION IN RUNNING WATER,
Universidade Federal de Pernambuco, Recife (Brazil). Instituto de Biociencias.
A. B. Coutinho, and F. A. B. Coutinho.
Bull Math Biol, Vol 35, No 4, p 449-458, Illus, 1973.

Descriptors: *Running waters, Streams, Rivers, *Snails, Shellfish, Aquatic animals, *Animal populations, Channels, Animal control, Ecology, Model studies, *Ecosystems.
Identifiers: Biomphalaria-glabrata.

A model developed in a previous paper is used to study populations of Biomphalaria glabrata in fast-flowing rivers and channels. The results are in good qualitative agreement with the phenomena experimentally observed and suggest that the use of artificial channels can be a very useful tool for the experimental study of some important aspects of the ecology of the B. glabrata.--Copyright 1974, Biological Abstracts, Inc.
W75-03803

OBSERVATIONS ON THE NUTRITION OF LARVAE OF CHIRONOMUS F.L. PLUMOSUS IN THE WATERS OF THE DANUBE FLOOD AREA, (IN ROMANIAN),
G. Ignat, and L. Gruia.
Stud Cercet Biol Ser Zool Vol 25, No 2, p 137-149, 1973. English summary.
Identifiers: *Algae, *Chironomus-plumosus, Flood areas, Larvae, *Nutrition, *Romania(Danube River), Swamps.

Data on the feeding place of larval of C. plumosus is presented by comparing algae from the intestine of larvae with algae existing in the mud of the Crapina and Comorofca swamps (Romania). The intensity of diurnal feeding, the capacity of food (algae) selecting and digestion degree were analyzed in larvae.--Copyright 1974, Biological Abstracts, Inc.
W75-03827

EFFECT OF WATER ON BACTERIAL MULTIPLICATION IN PLANT TISSUE,
Department of Scientific and Industrial Research, Auckland (New Zealand). Plant Disease Div.
For primary bibliographic entry see Field 5C.
W75-03831

POPULATION DYNAMICS OF HOPLOLAIMUS SP. AT VARIOUS LEVELS OF SOIL MOISTURE,
Pakistan Council of Scientific and Industrial Research, Karachi.
For primary bibliographic entry see Field 5C.
W75-03832

MICROCLIMATE AND THERMAL STRESS OF MAN IN AN ALEPPO PINE PLANTATION AND AN OAK SCRUB,
Volcani Inst. of Agricultural Research, Ilanot (Israel). Forestry Div.
G. Schiller, and R. Karschon.
Isr J Agric Res 23(2): 79-90, Illus. 1973.

Descriptors: *Recreation, Camp sites, *Forest management, Forests, *Microclimatology, Climates, *Pine trees, *Oak trees, *Environmental effects.
Identifiers: Aleppo pine, *Israel(Judean Hills).

Microclimatic measurements in an Aleppo pine plantation and in an open scrub in the Judean Hills showed a distinct improvement of the microclimate by the pine forest over that outside the plantation: lowering of air temperature, black-body temperature, global radiation, wind velocity and evaporation, and rise of relative humidity. Estimated values of thermal stress of man expressing the combined effects of environmental conditions and metabolic rate, were generally lower both within the Aleppo pine plantation and near its edge, than in the oak scrub. The implications of the findings for recreation and forest management are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03834

CHANGES IN STEM DIAMETER OF HERBACEOUS AND WOODY PLANTS AS A MEASURE OF INTERNAL WATER BALANCE,
Pahlavi Univ., Shiraz (India). Coll. of Agriculture.
N. Sionit, and D. W. Henderson.
Iran J Agric Res 2(1): 39-50, 1973.

Descriptors: Climates, *Dendrometers, Electronic equipment, *Herbaceous plants, Irrigation, Light, Ligustrum-vulgare, Nicotiana-tabacum, Soils, Solanum-Tuberosum, *Stem diameter, Transpiration, *Woody plants, *Water balance.

A highly sensitive electronic dendrometer was used for studying the water relations and factors affecting the internal water balance of herbaceous plants. A potato (Solanum tuberosum L.) and a tobacco plant, (Nicotiana tabacum L.) with non-woody stem structure, as well as a privet tree (Ligustrum vulgare L.), with woody-stem structure, showed the following changes in stem diameter: rapid changes in response to light, diurnal variations due to climatic conditions and long term changes due to soil conditions Shrinkage in stem diameter was observed as soon as lights were turned on. This shrinkage was faster in the afternoon, when other climatic conditions were suitable for high transpiration. A rapid increase in stem diameter and transpiration rate was observed in both herbaceous and woody-stem plants immediately after irrigation. As soil water was depleted the rate of increase in stem diameter and transpiration declined. At low soil water content the stem started to shrink. These variations in stem diameter, due to changes in climatic and soil water conditions, were good indicators of the internal water balance for both herbaceous and woody-stem plants.--Copyright 1974, Biological Abstracts, Inc.
W75-03840

EFFECT OF WATER STRESS UPON ENDOGENOUS ETHYLENE LEVELS IN VICIA FABA,
Ain Shams Univ., Cairo (Egypt). Dept. of Horticulture.
A. S. El-Beltagy, and M. A. Hall.
New Phytol, Vol 73, No 1, p 47-60, 1974.
Identifiers: Abscission, Diffusion, *Ethylene(Endogenous), Flower abscission, Growth rates, Leaf abscission, Senescence, Synthesis, *Vicia-faba, *Water stress.

Conditions of drought or waterlogging lead to greatly increased internal ethylene concentrations in Vicia faba L. These increases appear to be due partly to decreased diffusion and partly to increased synthesis and are superimposed on normal diurnal fluctuations in internal ethylene concentration. The higher concentrations observed are correlated with a reduction in growth rate and increased leaf and flower abscission and senescence. The role of ethylene in the mediation of developmental responses to water stress is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03841

GROWTH OF ENGELMANN SPRUCE (PICEA ENGELMANNII) UNAFFECTED BY INCREASED SNOWPACK,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. L. Gary.
Arctic and Alpine Research, Vol 6, No 1, p 29-36, 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Dendrochronology, *Growth rates, *Snowpacks, *Snowmelt, *Mountain forests, *Cold regions, Coniferous forests, Forestry, Forest soil, Hydrologic cycle, Rime ice, Snowmelt water, Snow cover, Soil water, Soil-water plant relationships, Water yield improvement, Weather modification, Winds, *New Mexico.
Identifiers: Rio Grande, Blowing snow, Snowdrifts, Tree breakage.

Annual radial growth of spruce in a forest interior where a natural snowpack is 1 to 1.5 m deep was only a little greater than near the border of an old burn where a large snowdrift ranges from 3 to 4.5 m deep. Growth was studied in the Sangre de Cristo Mountains, northeast of Santa Fe, New Mexico. The shallow snow cover melts during May and early June, while the deep snowdrift persists until late July or early August. Tree diameters averaged 24 to 30 cm and basal areas averaged 49 and 58 sq m ha to the minus one for deep and shallow snow sites, respectively. The results provide a good basis for speculating that weather modification programs to increase snowfall in the Southwest will have little detrimental effect on the annual or long-term radial growth of the existing forest stands.
W75-03844

LUCERNE IN WET SOILS: THE EFFECT OF STAGE OF REGROWTH, CULTIVAR, AIR TEMPERATURE AND ROOT TEMPERATURE,
Department of Primary Industries, Brisbane (Australia).
D. G. Cameron.
Aust J Agric Res, Vol 24, No 6, p 851-861, 1973.
Identifiers: *Air temperature, Cultivars, Damage, Flooding, Growth, *Lucerne, Medicago-sativa, *Root temperature, Soils, Temperature.

'Hunter River' lucerne (Medicago sativa L.) grown in pots, was subjected to either 21C or 33C constant temperatures for the 1st 10 days of regrowth. At 33C, flooding immediately after cutting killed 85% of the plants. Flooding 5 days after cutting killed 35% of the plants. Even when plants were not killed by flooding at 33C they were severely checked, and made negligible regrowth during the next 30 days. At 21C no plants were killed by flooding. Plants flooded immediately after cutting were severely checked but those flooded 5 days after cutting were similar to the unflooded controls. 'Hunter River' lucerne flooded under all combinations of 20C and 30C air and root temperatures for the 1st 5 days after cutting was more severely affected at both root temperatures than Rhizoma and Lahontan lucernes. High root temperature during flooding had a severe effect on all cultivars, but high air temperatures did not affect flooding reaction. Possible mechanisms by which flooding occurs are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03847

DEFOLIATION, LEAF AREA INDEX, AND THE WATER USE OF FOUR TEMPERATE PASTURE SPECIES UNDER IRRIGATED AND DRYLAND CONDITIONS,
University of New England, Armidale (Australia). Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-03848

SNOW-VEGETATION RELATIONSHIPS IN THE FOREST TUNDRA OF NOUVEAU-QUEBEC, HUDSON BAY, (IN FRENCH),
Laval Univ., Quebec. Centre d'Etudes Nordiques.
S. Payette, L. Filion, and J. Ouzilleau.
Nat Can (Que), Vol 100, No 5, p 493-508, 1973, English summary.
Identifiers: Bays, *Canada(Hudson Bay), Cryptograms, *Forest tundra, Herbs, Krummholz subzone, New Quebec, *Soil-water-plant relationships, Snow, Soils, Tundra, Vegtation.

During the winter 1973, a snow study was undertaken at Poste-de-la-Baleine and Richmond Gulf, Nouveau-Quebec (Canada). There exists a strong relationship between snow cover properties and vegetation in the forest-tundra. Within defined topographic units, low vegetational structures, such as herbaceous and cryptogamic formations, have denser and more variable depth of snow cover than high vegetational structures, such as shrub and tree formations. These differences depend on the process of snow saturation in the environment; this process is influenced by the nature and the spatial pattern of structural types of vegetation. Pattern of snow distribution is similar to pattern of major structural elements of the hemi-arctic landscape. Soil conditions at Poste-de-la-Baleine and in the forest subzone at Richmond Gulf seem more restrictive than snow conditions for regional expansion of forest formations. But snow influence is more pronounced in the krummholz subzone of Richmond Gulf.--Copyright 1974, Biological Abstracts, Inc.
W75-03849

2J. Erosion and Sedimentation

SEDIMENT IN STREAMS AND ITS EFFECTS ON AQUATIC LIFE,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
T. C. Bjornn, M. A. Brusven, M. Molnau, F. J. Watts, and R. L. Wallace.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 594, $4.25 in paper copy, $2.25 in microfiche. Completion Report, Idaho Water Resources Research Institute, Moscow, October 1974. 47 p, 19 fig, 11 tab, 10 ref. OWRT B-025-IDA(1). 14-31-0001-3876.

Descriptors: Effects, Sediments, Aquatic insects, Trout, Salmon, Insect drift, Benthos, Idaho, Carrying capacity, *Sediment transport, Fish food organisms, Streams, Chinook salmon.
Identifiers: *Idaho batholith, Steelhead trout, Bedload sediment, Mountain streams, Diversity indices, Substrate material.

Natural streams were surveyed, laboratory experiments were conducted, and sediment was added to a natural stream from July 1972 to June 1974 to assess the temporal and spatial impact of granitic bedload sediment (< 1/4 inch) on insect and fish populations, and on the capability of the streams to transport sediment. Juvenile chinook salmon and steelhead trout were not adversely affected during the summer when sediment comprised up to 52% of the substrate in riffles. Reduction of pool area or volume in a small stream resulted in a reduction in summer capacity for fish proportional to the percentage of pool area or volume lost. Winter capacity of experimental streams for age-0 steelhead trout and chinook salmon was reduced when the riffles were fully sedimented. Addition of sediment to riffles temporarily reduced insect species diversity indices, but no reduction in insect abundance was observed. The Meyer-Peter Muller formula appears most applicable to estimate sediment transport capabilities of mountain streams in the Idaho batholith. Sediment transport during the summer, low flow period was negligible in the streams studied.
W75-03303

SURVEY OF EROSION AND LAND USE WITHIN THE CATCHMENT AREA OF KEEPIT DAM (AUSTRALIA): PART 1 - CLIMATE, GEOLOGY, SOILS,
Soil Conservation Service of New South Wales, Sydney (Australia).
For primary bibliographic entry see Field 4D.
W75-03530

SOLUTION, DIFFUSION AND SORPTION IN UPPER LAYER OF LAKE SEDIMENTS: III. CHEMICAL AND PHYSICAL CONDITIONS IN SEDIMENT-WATER TRANSITION ZONE OF MEROMICTIC BOG LATE (URSEE) AND ITS RELATION TO ACCUMULATION OF VIVIANITE, (IN GERMAN),
Freiburg Univ. (West Germany). Limnoloaisches Institut.
For primary bibliographic entry see Field 5B.
W75-03571

MECHANICAL REEF,
J. Karnas.
US Patent No 3,845,630, 5 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 55, November 5, 1974.

Descriptors: *Patents, *Shore protection, *Reefs, *Beach erosion, *Coastal structures, Structures, Sedimentation, Offshore platforms, Erosion, Deposition.
Identifiers: Artificial reefs, Wave action.

The mechanical reef is adapted for use in water of substantial depth (100 feet and more). As the amount of sand and particulate matter deposited below and in front of the reef increases, new sections of reef can be added periodically to previously installed sections in order to increase the height of the reef. When used in this manner, the mechanical reef makes it possible to create an accumulation of solid material in water of substantial depth and to build-up the accumulation to water level. The mechanical reef can be installed parallel to the area to be protected such as the shoreline, and can be used to effect a gradual widening of the shoreline. In this case it is desirable to extend the ends of the reef into the shore at the termination points in order to preclude wave movement behind the reef. The new reef is also adapted to be installed in circular or other patterns which will be effective to protect a selected area, for example, offshore drilling equipment, etc., from wave assult. (Sinha-OEIS)
W75-03738

ANTI-EROSION DEVICE,
J. D. Williams, Sr.
U.S. Patent No. 3,844,125, 4 p, 10 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1839, October 29, 1974.

Descriptors: *Patents, *Erosion control, *Beach erosion, *Shore protection, *Wind erosion, Equipment, Windbreaks, Tides, Conservation, Reclamation, Resources, Recreation.
Identifiers: *Wave action, *Wind effects.

Apparatus for controlling erosion of the earth primarily in sound and beach areas by water and wind is described. The apparatus includes a frame having a substructure to be embedded in the earth and a superstructure for trapping and retaining earth which is being displaced by either water or wind. The superstructure is mounted on a frame and extends upward. It consists of parallel rows of vertically disposed posts. The posts are staggered so that water or wind follows a tortuous path and sediments are trapped and a sediment build-up occurs. Along coastal areas, the structure can be emplaced either in the water or on the beach to resist erosion. (Sinha-OEIS)
W75-03742

BEACH-PROTECTORS,
W. Stiles, and G. V. R. Dunan.
U.S. Patent No. 3,842,606, 3 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1352, October 22, 1974.

Descriptors: *Patents, *Beach erosion, *Shore protection, *Erosion control, Surf, Equipment, Beaches, Recreation, Reclamation, Conservation, Resources.

Used pneumatic type tires are arranged in horizontal and vertical rows, the vertical rows having contact with the beach to be protected, those tires in the horizontal rows being slightly elevated above the beaches. All the tires are interlocked forming a mat having solids and walled voids. Sand is deposited both in and around the tires as the surf tumbles shoreward and again as the swash and undertow gravitates seaward. The tires also form a flexible and resilient barrier to protect the beach from the turbulent waters of the surf. (Sinha-OEIS)
W75-03748

REINFORCED MATTRESS FOR PROTECTING SHORELINES AND THE LIKE,
B. A. Lamberton.
U. S. Patent No. 3,837,169, 5 p, 10 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 4, p 1181-2, September 24, 1974.

Descriptors: *Patents, *Erosion control, *Shore protection, *Beaches, *Beach erosion, Equipment.

A form for use in construction of an erosion control mattress or the like comprises a pair of sheets of flexible material having mutually facing interior surfaces and upper and lower cord systems, each comprising a plurality of intersecting flexible cords. Individual fasteners secure the upper cord system to one of the sheets and the lower cord system to the other sheets. The form constructed in this manner may be injected with a cementitious slurry which will inflate the form with the cord permitting separation of the two sheets for a substantial but controlled amount. (Sinha-OEIS)
W75-03749

STUDY OF DRAINAGE PATTERNS IN THE MAHANADI CATCHMENT (ABOVE HIRAKUD DAM),
Indian Agricultural Research Inst., Nagpur. All India Soil Land Use Survey.
For primary bibliographic entry see Field 4D.
W75-03835

A SIMPLE DEVICE FOR ANALYZING THE ENERGY LOAD AND INTENSITY OF RAINSTORMS,
Institute for Agricultural Research, Zaria (Negeria).
For primary bibliographic entry see Field 2B.
W75-03838

2K. Chemical Processes

GAS CHROMATOGRAPHY OF VOLATILE METAL CHELATES: APPLICATION OF A NEW TECHNIQUE TO METAL ANALYSIS IN NATURAL WATERS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5A.
W75-03305

SELECTED PHYSICOCHEMICAL PROPERTIES OF BASALTIC ROCKS, LIQUIDS, AND GLASSES,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 8H.
W75-03419

AUTOMATIC DOSAGE OF SULFATES BY AN IMPROVED NEPHELOMETRIC METHOD (DOSAGE AUTOMATIQUE DES SULFATES PAR UNE METHODE NEPHELOMETRIQUE AMELIOREE),
Institut d'Hygiene et d'Epidemiologie, Brussels (Belgium).
For primary bibliographic entry see Field 5A.
W75-03536

ON THE CHOICE OF METHODS FOR THE PREDICTION OF THE WATER-ACTIVITY AND ACTIVITY COEFFICIENT FOR MULTICOMPONENT AQUEOUS SOLUTIONS,
Ecole Polytechnique, Montreal (Quebec). Department de Genie Chimique.
J. Sangster, and F. Lenzi.
The Canadian Journal of Chemical Engineering, Vol 52, No 3, p 392-396, June, 1974. 2 tab, 22 ref.

Descriptors: *Mathematical models, Solutions, *Electrolytes, Solutes, Thermodynamics, *Aqueous solutions, Model studies, Thermodynamic behavior.
Identifiers: Water activity, Solute activity coefficient.

Two important thermodynamic properties of aqueous solutions are the solute activity coefficient (gamma) and the water activity. A number of methods of predicting solute activity coefficient and water activity for multicomponent aqueous solutions exist. These vary by complexity, accuracy, and applicability. Methods of prediction discussed are those by Reilly, Wood, and Robinson (1971), Robinson and Bower (1965), Meissner and Kusik (1973), and Zdanovskii-Stokes-Robinson (1973). The first three are limited to solutions of electrolytes, while the fourth also applies to solutions containing non-electrolytes. (Prague-FIRL)
W75-03540

AN AUTOMATED METHOD FOR DETERMINATION OF CHLORIDE AND SULFATE IN FRESHWATER USING CATION EXCHANGE AND MEASUREMENT OF ELECTRICAL CONDUCTANCE,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5A.
W75-03576

DETERMINATION OF TOTAL WATER HARDNESS BY CONDUCTOMETRIC TITRATION WITH COMPLEXING AGENTS (DETERMINAREA DURITATII TOALE A APEI PRIN TITRARI CONDUCTOMETRICE CU COMPLEXONI),
Institutul Politehnic, Iasi (Rumania).
For primary bibliographic entry see Field 5A.
W75-03604

A STUDY OF ADSORPTION CHARACTERISTICS OF TRACES OF CHROMIUM(III) AND (VI) ON SELECTED SURFACES,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-03613

THE OPENING UP OF INSOLUBLE OXIDES (TANTALUM, NIOBIUM, CHROMIUM, ALUMINIUM, AND OTHERS), WITH LIQUID SELENIUM DIOXIDE,
Philips Gloeilampenfabrieken N.V., Eindhoven (Netherlands).
For primary bibliographic entry see Field 5A.
W75-03614

SELECTIVE DETERMINATION OF IRON IN ALLOYS BY REACTION WITH 2,3-PYRIDINEDIOL AND RING COLORIMETRY,
M.M.H. College, Ghaziabad (India). Dept. of Chemistry.
I. C. Mehra, and G. R. Chhatwal.
Analytica Chimica Acta, Vol 72, No 1, p 194-195, September, 1974. 1 tab, 2 ref.
Identifiers: *Analytical techniques, *Iron, *Metals, *Colorimetry, Chemical analysis, Testing procedures, Laboratory tests, Pollutant identification.

This study found that 2,3-pyridinediol can be more usefully and conveniently employed for the selective determination of iron, especially when present in trace concentrations, when it is used in conjunction with ring-oven colorimetry. The intensity of the ring determinations were compared with a standard scale, which had been prepared by taking 7 aliquots between 1 and 12 microliters of standard Fe(III) solution through the procedure. Tests carried out in the range 0.18-0.72 micrograms of Fe(III) gave results which showed errors ranging from 0 to 3%. The range for the determination of iron was 0.15-0.7 micrograms in the total ring; outside this range, visual comparison was not feasible. The validity of the procedure was tested for two different alloys after dissolution in hydrochloric acid. The interferences of various ions were studied by developing rings for 0.6 micrograms of Fe(III) in the presence of varying amounts of foreign ion up to 15 micrograms. (Pulliam-Vanderbilt)
W75-03623

SEPARATION OF COPPER (II) FROM URANIUM (VI) AND MANY OTHER ELEMENTS BY CATION-EXCHANGE CHROMATOGRAPHY IN ACETONE-HYDROBROMIC ACID MEDIA - IMPROVED SELECTIVE SEPARATION OF COPPER,
National Chemical Research Lab., Pretoria (South Africa).
For primary bibliographic entry see Field 5A.
W75-03628

PHOTOMETRIC TITRATION OF BERYLLIUM(II) WITH 5-SULFOSALICYLIC ACID,
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
G. DenBoef, W. E. Van der Linden, and N. M. Saad.
Analytica Chimica Acta, Vol 69, No 2, p 469-472, April, 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Analytical techniques, *Spectrophotometry, *Beryllium, *Metals, *Chelation, Chemical analysis, Testing procedures, Laboratory tests, Volumetric analysis, *Pollutant identification.

Previous data had suggested that a selective photometric titration of beryllium(II) with 5-sulfosalicylic acid should be possible. No endpoint was expected for the titration at the point of 1:1 complex formation, since the ratio of the molar absorptivities of BeL2 and BeL is about 2 at all wavelengths. However, at 325 nm an endpoint was expected corresponding to 1:2 complex formation if certain requirements involving the product of the conditional stability constants, which could only be calculated roughly, and the Be(II) concentration were met. To prevent other metal ions reacting with the ligand under the experimental conditions or causing precipitation of hydroxides, EDTA or a similar compound was added as a masking agent. Results of determinations of Be(II) alone and in the presence of other metal ions supposed to complex with the ligand were presented. Iron(III) interfered because of the large absorption by the Fe(III)-EDTA complex at 325 nm. The optimal pH was found to be 9. Successful determinations could be carried out at the 0.0001 M level. The titration appeared to be rather selective, and could be increased by removing interfering metal ions. (Pulliam-Vanderbilt)
W75-03629

THE EXTRACTION OF NICKEL FROM VARIOUS SALT SOLUTIONS WITH OXINE IN CHLOROFORM,
Shizuoka Univ., Hamamatsu (Japan). Faculty of Engineering.
S. Oki, and I. Terada.
Analytica Chimica Acta, Vol 69, No 1, p 220-223, March, 1974. 3 fig, 1 tab, 4 ref.

Descriptors: *Nickel, *Alkali metals, *Salts, *Aqueous solutions, *Separation techniques, Laboratory tests, Testing procedures, Absorbance, *Pollutant identification.

The extraction of nickel from aqueous solutions containing various common inorganic alkali metal salts was studied by means of absorbance measurements of the organic extracts, and the results were compared with extraction from perchlorate solutions. The absorbance spectra of the nickel-oxine complexes extracted into oxine solutions in chloroform from the various salt solutions were practically the same as those from the perchlorate solutions. The absorbance by an excess of oxine was negligible at 400 mm. The absorbance-pH curves were essentially analogous to those of the perchlorate system; they had a low constant absorbance in the low pH region, but a high constant absorbance in the high pH region where nickel was completely extracted. The rising parts of the absorbance-pH curves differed from each other, depending on the kind and concentration of the salt used. (Jernigan-Vanderbilt)
W75-03630

METHOD FOR DETERMINATION OF SELENIUM, ARSENIC, ZINC, CADMIUM, AND MERCURY IN ENVIRONMENTAL MATRICES BY NEUTRON ACTIVATION ANALYSIS,
National Bureau of Standards, Washington, D.C. Activation Analysis Section.
For primary bibliographic entry see Field 5A.
W75-03792

THERMODYNAMIC PROPERTIES OF SEA SALT SOLUTIONS,
California Univ., Berkeley. Dept. of Chemical Engineering.
L. A. Bromley, D. Singh, P. Ray, S. Sridhar, and S. M. Read.
AIChE Journal, Vol 20, No 2, p 326-336, March, 1974. 4 fig, 9 tab, 27 ref.

Descriptors: *Thermodynamic, *Saline water systems, *Thermal capacity, Equations, Electrolytes, Enthalpy, Aqueous solutions.

Based on new experimental data presented for the boiling point elevation of natural sea water solutions, smoothed tabular values are presented for boiling point elevation (BPE), osmotic coefficient, water activity, osmotic pressure, and minimum separation energy to 200C and 12% sea salt. The concentration of sodium chloride solutions having the same water activities as sea salt solutions is also presented. Rigorous thermodynamics and the equations for strong electrolytes by Bromley (1973) were used for the correlation together with previously obtained heat capacity and enthalpy data and equations. A simplified equation is presented for boiling point elevation. (Snyder-California,Davis)
W75-03808

HYDROGEN EVOLUTION ON BETA III TITANIUM ALLOY,
California Univ., Los Angeles. School of Engineering and Applied Science.
D. L. Dull, and K. Nobe.
Corrosion, Vol 30, No 8, p 291-295, August 1974, (University of California Water Resources Center Project UCAL-WRC-S-144). 5 fig, 4 tab, 12 ref.

Descriptors: *Desalination processes, *Sea water, *Corrosion, *Titanium, Alloys, Metals, *Chemical reactions, Hydrogen, Hydrogen sulfide.

The rate of hydrogen evolution on Beta III titanium alloy in 1.0, 2.5, 5.0, 7.5, and 10.0 N sulfuric acid at 23, 45, 60, and 75 C (73, 113, 140, and 167 F) has been investigated. The cathodic Tafel slopes were 60, 64, 67, 70 mV, respectively, at each temperature. The reaction order was first order with respect to the concentration of hydrogen ions. The chemical recombination mechanism for the hydrogen evolution reaction using the Temkin adsorption with activated heat of adsorption is consistent with the experimental data. The corrosion rate increased with increase in both acid concentration and temperature. The activation energies for corrosion were 22.1, 20.8, and 19.3 kcal/mole for corrosion in 1.0, 2.5, and 5.0 N H2SO4, respectively, and 15.9 kcal/mole in 7.5 and 10.0 N H2SO4. (Snyder-California,Davis)
W75-03809

STREAM CHEMISTRY FOLLOWING A FOREST FIRE AND UREA FERTILIZATION IN NORTH-CENTRAL WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
A. R. Tiedemann.
Available from Library Pacific Northwest For. and Range Expt. Sta., Box 3141, Portland, Ore. 97208. U.S.D.A. Forest Service Research Note PNW-203, 1973. 20 p, 8 fig, 1 tab, 23 ref.

Descriptors: Streams, *Fertilizers, Erosion control, Forest fires, *Water chemistry, *Nitrogen, *Nitrates, *Urea, Ammonia, Calcium, Magnesium, Sodium, Potassium, Hydrogen ion concentration, Alkalinity, Electrical conductivity, *Washington.
Identifiers: Entiat Experimental Forest(Wash).

During 2 years of study, nitrate-N in streamflow increased from background levels of 0.005 part per million (p.p.m.) in a control stream to 0.042 and 0.310 p.p.m. in streams from burned and burned, urea-fertilized watersheds, respectively. Cation concentration increased on the burned, unfertilized watershed, but because of dilution effects, decreased to levels of the control stream on the burned, fertilized watershed. Neither burning nor urea fertilization caused increases in nitrogenous constituents to levels above those recommended for municipal water supplies. Concentrations of nitrate-N observed indicate that losses of N in this form will have a negligible effect on future productivity of these forest ecosystems. (Forest Service)
W75-03822

2L. Estuaries

STUDY OF THE HYDROGRAPHIC AND CHEMICAL CONDITIONS IN THE WATER OF THE LAGOON OF TACARIGUA, (IN SPANISH),
Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-03335

1971 SALMON RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03344

1971 SAND LAKE ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03345

1971 ALSEA RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
For primary bibliographic entry see Field 6C.
W75-03346

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS,
Delaware Univ., Newark. Academy of Natural Sciences; and Rutgers - the State Univ., New Brunswick, N.J. Work Group on Economic and Social Problems of the Delaware Estuary Region.
For primary bibliographic entry see Field 6G.
W75-03352

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POLLUTION AND TRANSFER RELATIONSHIPS,
Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships.
For primary bibliographic entry see Field 5B.
W75-03440

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. DELAWARE RIVER ESTUARINE MARSH SURVEY,
Academy of Natural Sciences of Philadelphia, Pa.
For primary bibliographic entry see Field 6G.
W75-03441

PERSPECTIVES ON COASTAL MANAGEMENT--MARINE TRADES AND THE COASTAL CRISIS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 6B.
W75-03458

UNNATURAL SHORELINE,
California State Univ., San Francisco. Dept. of Geology.
For primary bibliographic entry see Field 5G.
W75-03459

SALTWATER INTRUSION INTO A FLOWING STREAM,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
W. R. Waldrop, R. C. Farmer, and P. A. Bryant.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-779 849, $3.75 in paper copy, $2.25 in microfiche. Technical Report No 161, May 1974. 36 p, 9 fig, 1 tab, 12 ref, 1 append. ONR NR 388 002. ONR Contract No N00014-69-A-0211-0003.

Descriptors: *Saline water-freshwater interfaces, *Finite element analysis, *Mathematical models, Saline water intrusion, Parametric hydrology, Tidal streams, Coasts, Encroachment, Eddies, Mathematical studies, Streams, Flow, *Louisiana.
Identifiers: *Finite-difference model, Bayou Lafourche(La).

A parametric study of the flow of saline water intrusions which are driven into rivers by tidal fluctuations was accomplished with a mathematical model. Specifically, the saltwater intrusion at the bottom of Bayou Lafourche was studied. Empirical eddy transport was used, and available field data served as boundary conditions. The finite-difference model described unsteady flow variation in two spatial dimensions. The use of the third spatial dimension was not necessary to describe the physical phenomena governing the intrusion. (Jess-ISWS)
W75-03634

THE COASTAL UPWELLING CYCLE ON A BETA-PLANE: HYDRODYNAMICS AND THERMODYNAMICS,
Florida State Univ., Tallahassee. Dept. of Meteorology.
J. D. Thompson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 761, $6.25 in paper copy, $2.25 in microfiche. Report No 121, March 1974. 141 p, 27 fig, 2 tab, 95 ref, 4 append. ONR NONR-N00014-67-A-0235-0002; NSF GA-29734.

Descriptors: *Upwelling, *Oceanography, *Coasts, *Model studies, Circulation, Oceans, Mixing, Movement, Ocean currents, Mathematical models, Continental shelf, Air-water interfaces, Water temperature, Numerical analysis, Stratification.
Identifiers: *Oceanic fronts.

Vertically-averaged equations for velocity, density, and thickness fields were formulated for a time-dependent, nonlinear, two-layer model of coastal upwelling. The model included the effects of the earth's rotation, bottom topography, an atmospheric pressure gradient, short and long-wave radiation, latent and sensible heat flux, horizontal and vertical turbulence, and both barotropic and baroclinic modes. Surface, interfacial, and bottom stresses and vertical mixing based on a parameterization of boundary and shear generated turbulence were incorporated in the model. Depth of the mixed layer, stratification, and sea surface temperatures were predicted explicitly. Solutions to the vertically-averaged momentum equations for the two-dimensional case were obtained using a highly efficient semi-implicit numerical scheme and a discrete variation telescoping grid which allowed high resolution near the coast. Upon reconstruction of the total flow fields for model cases with and without bottom topography, solar heating, and continuous wind forcing, several features observed in actual coastal upwelling situations were reproduced and investigated, including: (1) strong sea surface temperature gradients that ap-

pear within 10-50 km of the coast; (2) the equatorward surface jet that is found within the baroclinic Rossby radius of deformation of the coast and the poleward undercurrent which appears over the continental shelf; (3) the two cyclonically rotating cells reported by Mooers et al. (1973), as situated in a plane normal to and within 10-50 km of the coast. (Humphreys-ISWS)
W75-03642

ESTUARIES OF OREGON-ECOSYSTEMS IN CRISIS, PROBLEMS AND LEGAL SOLUTIONS,
For primary bibliographic entry see Field 5G.
W75-03678

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE,
Maine State Planning Office, Augusta. Coastal Planning Group.
For primary bibliographic entry see Field 6E.
W75-03689

STATE UNIVERSITY SYSTEM OF FLORIDA SEA GRANT PROGRAM 1972.
For primary bibliographic entry see Field 6E.
W75-03714

SEA GRANT PROGRAM 1973, STATE UNIVERSITY SYSTEM OF FLORIDA.
Florida Univ., Gainesville. Marine Advisory Program.
For primary bibliographic entry see Field 9A.
W75-03720

ANTI-HEAVE PROTECTIVE SYSTEM,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France). (assignee)
For primary bibliographic entry see Field 8B.
W75-03732

MECHANICAL REEF,
For primary bibliographic entry see Field 2J.
W75-03738

ANTI-EROSION DEVICE,
For primary bibliographic entry see Field 2J.
W75-03742

BEACH-PROTECTORS,
For primary bibliographic entry see Field 2J.
W75-03748

REINFORCED MATTRESS FOR PROTECTING SHORELINES AND THE LIKE,
For primary bibliographic entry see Field 2J.
W75-03749

ULTRAVIOLET ABSORPTION/SALINITY CORRELATION AS AN INDEX OF POLLUTION IN INSHORE SEA WATERS,
University Coll. of North Wales, Manai Bridge. Marine Sciences Lab.
For primary bibliographic entry see Field 5A.
W75-03767

A CHECK LIST OF THE BIOTA OF LOWER CHESAPEAKE BAY,
Virginia Inst. of Marine Sciences, Gloucester Point.
For primary bibliographic entry see Field 5C.
W75-03786

MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. PROTOZOA: CILIOPHORA,
New Hampshire Univ., Durham. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-03787

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

FUTURE OF DESALTING IS BRIGHT BUT COSTS MUST DROP,
Water and Wastes Engineering, New York.
C. W. Heckroth.
Water and Wastes Engineering, Vol 11, No 7, p 20-23, 52-54, 1974. 15 fig, 1 tab.

Descriptors: *Water supply development, *Cost analysis, *Desalination, Water resources development, Desalination processes, Distillation, Membrane processes, Economic prediction, Desalination plants, Flash distillation.
Identifiers: Multistage flash process.

Desalting has become a growing source to meet increased water demand. In the U.S., over 800 desalting plants of over 25,000 gpd capacity are under construction or in operation. These units are capable of producing over 450 mgd of fresh water for cities and industries. Desalting has many advantages. In addition to supplying new water, it may also improve the water quality. Furthermore, it may provide an attractive form of drought insurance. A variety of processes are used in desalting with distillation furnishing most (95%) of the existing world capacity. About 2/3 of the capacity of the distillation plants use the multistage flash process. Distillation is used almost exclusively for desalting sea water, with membrane processes used only for brackish water. Graphic analysis of capital and operating cost is provided for an electrodialysis plant, ED plant, ion exchange plant, and a reversed osmosis plant. Desalting costs have reduced significantly over time, and are projected to drop even further. Several methods to reduce these costs are noted: (1) improved desalting technology, (2) reduction in energy costs, (3) more efficient use of energy, (4) geo-thermal plants, (5) economies of scale, and (6) staged construction. (Schroeder-Wisconsin)
W75-03356

CONCENTRATION OF POLARISATION IN REVERSE OSMOSIS FLOW SYSTEMS UNDER LAMINAR CONDITIONS. EFFECT OF SURFACE ROUGHNESS AND FOULING,
Birmingham Univ. (England). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W75-03375

MEMBRANES AND MODULES FOR THE WATER DESALINATION WITH REVERSE OSMOSIS (MEMBRANEN UND MODULE FUR DIE WASSERENTSLZUNG MIT UMGEKEHRTER OSMOSE),
U. Ermert, and H. D. Bauermann.
Meeresteckik, Vol 5, No 4, p 125-128, August, 1974. 6 fig, 4 ref.

Descriptors: *Reverse osmosis, *Filters, *Membranes, *Separation techniques, *Desalination, *Waste water treatment, Filtration, Equipment, Design.
Identifiers: Ultrafiltration, Plate and frame module, Wound spiral module, Pipe module, Hollow fiber module.

Beginning with the demarcation line between reverse osmosis (hyperfiltration) and ultrafiltration, the structure and materials of the usual types of membranes are discussed. The membranes are presented as complete modules. A comparison is made between the different modules including the plate and frame module, the wound spiral module, the pipe module, and the hollow fiber module. The various aspects of choosing membranes and modules are considered. (Orr-FIRL)
W75-03384

DESALINATION - NEW WATER FOR OLD (ENTSALZUNG-FRISCHWASSERVERSORGUNG UND ABWASSERAUFBEREITUNG),
United Kingdom Atomic Energy Authority, London (England).
For primary bibliographic entry see Field 5D.
W75-03385

DISTILLATION APPARATUS,
Aqua-Chem, Inc., Milwaukee, Wis. (assignee)
A. B. Steinbruchel.
US Patent No 3,849,259, 10 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1209, November 19, 1974.

Descriptors: *Patents, *Desalination, *Evaporators, *Distillation, *Condensation, Sea water, Thin films, Equipment, Heat exchangers.

A thin film evaporator having a plurality of effects arranged in a vertical array and connected in a series relationship is described. Each effect includes heat exchange tubes through which vapor is passed while the feed liquid is distributed as a thin film over their outer surfaces. A portion of the liquid fed over heat exchange tubes as a thin film is vaporized to condense vapor passed through the tubes. The unevaporated feed liquid is passed through successive effects and the vapor generated in each effect is employed as the heating vapor for the next effect. The heat exchange tubes of at least one of the initial effects is arranged vertically and those in the balance of the effects are arranged generally horizontally and extend radially with their outlet ends facing condensate collecting chambers disposed within a central core. Feed water preheaters extend vertically through a plurality of collecting chambers with a feed liquid take-off for each phase. (Sinha-OEIS)
W75-03735

POWER GENERATION FROM HOT BRINES,
Geothermal Investment Co., Pasadena, Calif. (assignee)
For primary bibliographic entry see Field 4B.
W75-03737

MULTISTAGE FLASH DISTILLATION,
General Atomic Co., San Diego, Calif. (assignee)
P. H. Sager, Jr.
US Patent No 3,844,899, 4 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2081, October 29, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Flash distillation, *Evaporators, *Condensers, Evaporation, Condensation, Equipment, Sea water, Brine, Freshwater, Waste water treatment.

A parallel train, multistage flash evaporation unit requires only a single brine heater to provide the heat necessary for operation of all stages for all parallel trains. Operation of the system in the described manner results in increased capacity of the product output from heat input of particular conditions. The first incoming brine stream is heated and injected into the flash evaporation section of the highest pressure stage of the longest train. A second brine stream is heated by passage through the condenser sections of the longest train, withdrawn from the highest pressure stage,

and injected into the evaporation section of the highest pressure stage of the next longest train. The heated condenser streams from each train are likewise injected into the next shorter train. Each flash distillation stage includes an evaporation chamber or section into which the heated solution being treated is fed and caused to partially flash to vapor. A condenser section is located in the upper portion of each stage, and a distillate take-off system is disposed vertically below the condenser tubing to catch the condensed water which falls there via gravity. In each train the heated brine flows from right to left successively through the evaporation chambers of each stage in the train. At the same time, cooler brine is passed through the interconnected piping in the condenser sections flowing from left to right, in countercurrent flow to the direction of the heated brine. (Sinha-OEIS)
W75-03739

METHOD OF PREPARING WATER PURIFICATION MEMBRANES,
National Aeronautics and Space Administration, Washington, D.C.
J. C. Fletcher, J. R. Hollahan, and T. Wydeven.
U.S. Patent No. 3,847,652, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 700, November 12, 1974.

Descriptors: *Patents, *Membranes, *Reverse osmosis, *Water purification, *Desalination, *Water reuse, Thin films, Freshwater, Potable water.
Identifiers: *Polymerization.

A process is described for the production of a reverse osmosis membrane. The membrane is prepared by plasma chemical synthetic methods that consist of disposing a microporous substrate in an enclosed space and generating a plasma of an inert gas within the enclosed space. The following steps consist of directing symmetrically a gaseous stream of an unsaturated organic compound including at least one allyl group toward and around the substrate and then directing the plasma symmetrically and countercurrently toward the gaseous stream and the substrate. The unsaturated organic compound is polymerized with the aid of the plasma and deposited on the substrate as a uniform polymer film to form the membrane. (Sinha-OEIS)
W75-03756

LONG TERM INVESTMENT CONSIDERATIONS OF CONJUNCTIVE DESALTING SYSTEMS,
California Univ., Los Angeles. School of Engineering and Applied Science.
J. M. English, and N. A. Young.
Desalination, Vol 13, p 359-371, 1973, (California Water Resources Center Project UCAL-WRC-W-305). 3 tab, 15 ref.

Descriptors: Economics, *Cost analysis, *Desalination plants, Aqueducts, *California, *Investment.
Identifiers: *Diablo Canyon(Calif).

Previous research which dealt with the desirability of considering water projects in a long range context, the measurement and costs of technological progress, and the value of preserving flexibility in future decision making has been combined and applied to the evaluation of the proposed prototype 40-mgd Diablo Canyon desalination plant. An alternative to the desalination plant is a very large scale aqueduct. In this paper the two projects are evaluated together as complementary components of a long range project against the alternative of earlier construction of the aqueduct. The analysis concerns the interest rate, growth rate, demand elasticity, planning horizon, number of planning periods, and area growth rate in parametric form. A simplified numerical example is given. (Snyder-California,Davis)
W75-03807

THERMODYNAMIC PROPERTIES OF SEA SALT SOLUTIONS,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2K.
W75-03808

HYDROGEN EVOLUTION ON BETA III TITANIUM ALLOY,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 2K.
W75-03809

TWENTY YEARS OF WORK ON SOLAR DISTILLATION AT THE UNIVERSITY OF CALIFORNIA,
California Univ., Berkeley. Sea Water Conversion Lab.
E. D. Howe, and B. W. Tleimat.
Solar Energy, Vol 16, p 97-105, 1974, (California Water Resources Center Project UCAL-WRC-S-106). 8 fig, 13 ref.

Descriptors: *Solar distillation, *Solar distillation, *Desalination processes, Energy, *California, Distillation, *Research facilities, Laboratories, Potable water, Design, Desalination plants.

Solar Distillation investigations at the Sea Water Conversion Laboratory, University of California, began in January 1952 and have continued to the present time. These studies have led to the development of still units of relatively small size, designed for furnishing potable water to isolated residences or small communities. Designs have been completed using wooden frames, precast concrete frames, and precast styrofoam basins. Information is presented on the construction and performance of the several units; it indicates the need for more effective utilization of solar energy; and it offers a conceptual design of a solar collector for furnishing low-pressure steam for operation of a seawater distillation plant of advanced design with a capacity of 10,000 U. S. gal. (37 x 85 cu m) per day. (Snyder-California,Davis)
W75-03810

NEW MULTI-PROBE TEMPERATURE-PROFILE MEASUREMENT SYSTEM--THE 'THERMISTOR COMB',
California Univ., Berkeley. Sea Water Conversion Lab.
N. Lior, J. Leibovitz, and A. Laird.
SWCL Report No 73-2, Water Resources Center Desalination Report No 56, December, 1973. 7 fig, 5 tab.

Descriptors: *Desalination, Temperature, *Measurement, *Flash distillation, Instrumentation.
Identifiers: *Thermistors, *Temperature distribution, *Temperature differentials.

In many cases, a multi-probe simultaneous-measurement system has considerable advantages over a traversing-probe system. A detailed description of the design, development, and construction of such a multi-probe system, incorporating 0.25-mm-diameter thermistor beads mounted in 0.5-mm outside diameter hypodermic tubes, is presented. This system was used for the measurement of temperatures and temperature differentials in the determination of temperature distributions. Some of the techniques such as the welding, insulation and handling of fine wires (0.025 mm diameter, or one mil), are applicable in other systems. The system has been used to measure temperature distributions with an accuracy of plus or minus 0.02C in a model of a flash-evaporator stage used for research on distillation of saline water. The methods of measurement and experimental results are presented. Results indicate that the system is very well-suited for the determination of temperature distributions in single- and two-phase fluids (whether electrically conductive or not), particularly for small overall temperature differentials. (Snyder-California,Davis)
W75-03811

3B. Water Yield Improvement

OPPORTUNITIES FOR WATERSHED MANAGEMENT IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4D.
W75-03326

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. I. WATER YIELD RESPONSE AND EFFECTS ON OTHER RESOURCES,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
A. R. Hibbert, E. A. Davis, and D. G. Scholl.
Forest Service Research Paper RM-126, July 1974. 36 p, 26 fig, 4 tab, 84 ref.

Descriptors: *Watershed management, *Arizona, *Chaparral, *Water yield improvement, Brush control, Soil erosion, Habitat improvement, Burning, Herbicides, Sediment yield, Erosion control, Land management, Arid lands, Forest fires, Wildlife, Brushlands, Chemcontrol, Forages, Grasslands, Water pollution, Streams, Browse utilization.

On areas favorable for treatment, conversion to grass reduces the fire hazard and increases water yield and forage for livestock. If treatment areas are kept small and interspersed with native chaparral, protective cover and browse for game animals will always be available nearby, and the edge effect created by the openings will enhance the overall environment for wildlife. Chaparral control methods that have proved effective in Arizona are rootplowing, prescribed burning, chemicals, and chemicals in combination with the others. Stream water from treated watersheds shows moderate to low contamination by herbicides. Over the long run, conversion should reduce erosion by reducing or eliminating the heavy erosion cycle set off by periodic wildfires in unmanaged chaparral. (See also W75-03573) (Witt-IPC)
W75-03572

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. II. AN ECONOMIC ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
T. C. Brown, P. F. O'Connell, and A. R. Hibbert.
Forest Service Research Paper RM-127, August 1974. 28 p, 3 fig, 10 tab, 22 ref.

Descriptors: *Chaparral, *Economic justification, *Cost analysis, *Arizona, *Watershed management, *Water yield improvement, Brush control, Erosion control, Habitat improvement, Burning, Herbicides, Arid lands, Brushlands, Grasslands, Forest fires, Wildlife, Recreation facilities, Soil erosion, Land management, Multiple-purpose projects, Forages, Browse utilization, Cost-benefit analysis, National forests.
Identifiers: Salt River(Arizona), Verde River(Arizona).

Chaparral covers approximately 850,000 acres on National Forest land in the Salt and Verde River Watersheds of central Arizona. An inventory revealed 139 chaparral areas totaling 332,796 acres that meet certain crown cover, slope, and managerial criteria for conversion. The costs of converting portions of these areas to grass and maintaining the conversion over a 50 year period were compared with the benefits to society in terms of increased water yield and forage for livestock, and reduced firefighting costs. Using fire as the main conversion tool, 96 acres have a benefit-cost ratio greater than 1; using a soil-ap-

plied herbicide, 72 areas meet that economic criterion. Proper management should favorably affect soil movement, wildlife habitat, and esthetics. Recreation use would be unaffected in most areas. (See also W75-03572) (Witt-IPC)
W75-03573

TWELVE BASIN INVESTIGATION: ANALYSIS OF POTENTIAL INCREASES IN PRECIPITATION AND STREAMFLOW RESULTING FROM MODIFICATION OF COLD OROGRAPHIC CLOUDS IN SELECTED RIVER BASINS OF THE WESTERN UNITED STATES. VOLUME 2,
North American Weather Consultants, Goleta, Calif.
R. D. Elliott, J. F. Hannaford, and R. W. Shaffer.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-232 132, $7.00 in paper copy, $2.25 in microfiche. Report No NAWC 15-18-2, December 31, 1973. 183 p, 20 fig, 6 tab, 4 ref, 2 append. Bureau of Reclamation 14-06-D-7368.

Descriptors: *River basins, *Weather modification, *Artificial precipitation, *Streamflow, *Data collections, *Meteorology, Cloud seeding, Precipitation(Atmospheric), Atmosphere, Hydrology, Orography, Snow, Snowpacks, Storm structure, Silver iodide, Nucleation, Runoff, Watersheds(Basins), Pacific Coast Region, Southwest US, Rocky Mountain region.
Identifiers: *Cloud seeding model.

Volume 2 presented the cloud seeding potential for increasing streamflow from five major river basins: Upper Missouri, San Joaquin, Deschutes, Bear-Wasatch, and Yakima. October-April hourly precipitation data were associated with appropriate rawinsonde data and the precipitation-cloud top temperature curves were plotted. From the curves, critical temperatures (for susceptibility to seeding) were determined for each massif. The area-of-effect model was employed in determining predicted seeded precipitation cloud top temperature curves, and the predicted curves were fitted to the historical curves based on the predicted not-seeded curve in the critical temperature and colder range. The seeding potential was then calculated from the difference between the predicted curve and the observed historical curve, and the frequency of cases. Mean elevations were specified for the upwind and downwind transition zones and crest zones. With the data, potential incremental streamflow was computed for 1951-1952 to 1970-1971. Details of the meteorological and hydrological approach were presented in Volume 1. Appendices contain extensive tabulations of data. (Humphreys-ISWS)
W75-03639

3C. Use Of Water Of Impaired Quality

GUIDELINES FOR LAND DISPOSAL OF FEEDLOT LAGOON WATER.
Kansas State Univ., Manhattan. Cooperative Extension Service.
For primary bibliographic entry see Field 5G.
W75-03306

EFFECT OF SALT WATER INGESTION ON PREGNANCY IN THE EWE AND ON LAMB SURVIVAL,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Nutritional Biochemistry.
B. J. Potter, and G. H. McIntosh.
Australian Journal of Agricultural Research, Vol 25, No 6, p 909-917, November 1974. 2 fig, 3 tab, 23 ref.

Descriptors: *Sheep, *Reproduction, *Salt tolerance, *Stock water, Saline water, Animal physiology, Aging(Biological), Livestock, Animal pathology, Mortality, Water pollution effects, Australia.
Identifiers: Progesterone, Blood plasma, Ion concentration, Lamb survival.

The effect of drinking saline water on the reproductive performance of ewes was investigated with reference to age, circulating hormones, electrolytes and lamb survival rate. Pregnant sheep, particularly those carrying twin fetuses, appear to be less able to adapt to high levels of sodium chloride in drinking water than non-pregnant sheep, and the problem is exacerbated by increasing age. Progesterone levels in blood plasma were higher in twin-bearing ewes than in ewes with single lambs, and drinking saline water augmented the increase in older ewes. Plasma levels of potassium and chloride were higher and calcium and magnesium lower in pregnant ewes which received saline water. These changes in blood plasma composition were associated with complicated births, and neonatal mortality of lambs. (Levick-CSIRO)
W75-03529

SALT TOLERANCE IN THE WILD RELATIVES OF THE CULTIVATED TOMATO: WATER BALANCE AND ABSCISIC ACID IN LYCOPERSICON ESCULENTUM AND L. PERUVIANUM UNDER LOW AND HIGH SALINITY,
Negev Inst. for Arid Zone Research, Beersheba (Israel). Div. of Life Sciences.
M. Tal, and U. Gavish.
Aust J Agric Res, Vol 24, No 3, p 353-361, 1973.
Identifiers: *Abscisic acid, Conductivity, Density, Fluid, Guttation, Lycopersicon-esculentum, Lycopersicon-peruvianum, Resistance, Root, *Salinity, *Salt tolerance, Stomatal, *Tomatos, Transpiration, *Water balance, Wild.

The cultivated tomato L. esculentum and the more salt-tolerant wild species L. peruvianum were used. Transpiration of whole plants and detached leaves, stomatal density and opening, and abscisic acid level were measured for the 2 species grown under both control and saline conditions. Root resistance to water flow and conductivity of guttation fluid were compared only for plants growing in the control solution. Transpiration of whole plants was higher in wild plants grown in the control solution, but decreased more under salinity. Wild plants had fewer stomata per unit leaf area, but these opened wider in the control solution and closed more in the saline solution as compared with the cultivated ones. Root resistance to water flow and conductivity of guttation fluid were higher in the wild plants. The abscisic acid level was higher in the cultivated species and increased somewhat in both plant types under salinity. The significance of these findings in relation to the greater adaptability of L. peruvianum to stress is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03549

MILL EFFLUENT AND ITS UTILISATION FOR CROP CULTIVATION PURPOSES,
For primary bibliographic entry see Field 5D.
W75-03585

INFLUENCE OF SALINE DRINKING WATER ON MINERAL BALANCES IN SHEEP,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Nutritional Biochemistry.
F. M. Tomas, G. B. Jones, B. J. Potter, and G. L. Langsford.
Aust J Agric Res, Vol 24, No 3, p 377-386, 1973.
Identifiers: Excretion, Filtration, Glomerular, *Mineral balance(Animals), Plasma, *Saline water, *Sheep, Urin, Potable water.

The influence of NaCl ingestion via the drinking water upon the mineral balance in sheep was examined. Merino ewes (4) were offered rainwater containing zero, 0.8 or 1.3% NaCl as the only source of drinking water. After correction for variations in mineral intake, the data showed that the urinary excretion of Ca, Mg, K, P, Na and chloride was increased by saline water ingestion. The fecal excretion of Ca, Mg and P was not affected by the inclusion of NaCl in the drinking water, but fecal K was decreased and Na and chloride increased. The drinking of saline water by the sheep resulted in a decline in the Ca, P and K balances, an increase in the Na and chloride balances, and no change in the Mg balance. The Na balance was negative for the rainwater treatment, but all other balances were positive. Saline water ingestion also caused an increase in the glomerular filtration rate, a decline in plasma Mg levels and an increase in plasma K levels. Saline water ingestion causes alteration in the pathways of excretion of minerals and the mineral balances in sheep, but the changes would appear to be of insufficient consequence to have detrimental effects.--Copyright 1974, Biological Abstracts, Inc.
W75-03637

POWERED MOBILE SPRAY IRRIGATION FOR PRODUCTIVE CROP SEWAGE UTILIZATION,
For primary bibliographic entry see Field 5D.
W75-03743

CONTENT OF CHEMICAL SUBSTANCES IN FARM CROPS GROWN ON SOIL IRRIGATED WITH WASTE WATERS OF COKE BY-PRODUCT PLANTS, (IN RUSSIAN),
Kiev Inst. of Nutritional Hygiene (USSR). Physicochemistry Lab.
For primary bibliographic entry see Field 5B.
W75-03846

3D. Conservation In Domestic and Municipal Use

MUNICIPAL WASTES - A DESIGN FOR AN INTEGRATED PLANT TO MAKE A PROFIT,
New South Wales Univ., Kensington (Australia). School of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W75-03531

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW),
National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div.
For primary bibliographic entry see Field 5D.
W75-03553

3E. Conservation In Industry

DETERMINING AN EQUITABLE SURCHARGE FOR INDUSTRIAL WASTES,
Gilbert Associates, Inc., Reading, Pa.
For primary bibliographic entry see Field 5G.
W75-03397

REGULATORY MANAGEMENT PROGRAMS FOR FLORIDA MARINE FISHERMEN,
For primary bibliographic entry see Field 6E.
W75-03487

INTERNAL POLLUTION CONTROLS IN THE PULPING INDUSTRY,
EKONO, Seattle, Washington.
For primary bibliographic entry see Field 5D.
W75-03566

THE ROLE OF THE CHEMICAL INDUSTRY IN THE FIGHT AGAINST WATER POLLUTION IN THE PAPER INDUSTRY (ROLE DE L'INDUSTRIE CHIMIQUE DANS LA LUTTE

CONTRE LA POLLUTION DES EAUX EN PAPETERIE),
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (Germany).
For primary bibliographic entry see Field 5G.
W75-03567

REMOVAL OF ARSENIC FROM EFFLUENT SLUDGES OF SULFATE AND OF PULP AND PAPER PRODUCTION (UDALENIE MYSH'YAKA IZ SHLAMOV SERNOKISLOTNOGO I TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA),
For primary bibliographic entry see Field 5D.
W75-03568

TREATMENT OF INDUSTRIAL EFFLUENTS BY FLOTATION (TRAITEMENT D'EFFLUENTS INDUSTRIELS PAR FLOTTATION),
Societe Generale d'Epuration et d'Assainissement Degremont, Suresnes (France).
For primary bibliographic entry see Field 5D.
W75-03569

SLIME CONTROL COMPOSITIONS AND THEIR USE,
Betz Labs., Inc., Trevose, Pa. (assignee)
For primary bibliographic entry see Field 5D.
W75-03575

SOME ASPECTS OF TREATMENT AND DISPOSAL OF BIOLOGICAL AND NON-BIOLOGICAL SLUDGES OF THE PAPER AND BOARD INDUSTRY (EINIGE ASPEKTE DER BEHANDLUNG UND BESEITIGUNG VON BIOLOGISCHEN UND NICHTBIOLOGISCHEN SCHLAEMMEN DER PAPIER- UND KARTONINDUSTRIE),
Cellulose Attisholz A.G., Solothurn (Switzerland).
For primary bibliographic entry see Field 5D.
W75-03580

METAL SALTS OF DITHIOCARBAMIC ACID DERIVATIVES, THEIR MANUFACTURE AND USE (METALLSALZE VON DITHIOCARBAMIDSAEURE-DERIVATEN, DEREN HERSTELLUNG UND VERSENDUNG),
Buckman Labs., Inc., Memphis, Tenn.
For primary bibliographic entry see Field 5D.
W75-03581

PROCESS FOR WASTE WATER PURIFICATION (VERFAHREN ZUM REINIGEN VON ABWASSER),
Casco A.B., Stockholm (Sweden).
For primary bibliographic entry see Field 5D.
W75-03582

PULPING PROCESS PREVENTS POLLUTION,
For primary bibliographic entry see Field 5D.
W75-03588

METHOD OF REDUCING THE DISCHARGE OF WASTE PRODUCTS FROM PULP MILLS,
Skogsagarnas Industri A.B., Vaxjo (Sweden). (assignee)
For primary bibliographic entry see Field 5D.
W75-03590

SYSTEM FOR RECOVERY OF FIBER FROM PAPER MILL EFFLUENT, INCLUDING A SIEVE BEND SCREEN,
Dorr-Oliver, Inc., Stamford, Conn. (assignee)
For primary bibliographic entry see Field 5D.
W75-03592

BENEFICIATION OF LIGNIN SOLUTIONS AND PULP MILL WASTES,
Betz Labs., Inc., Trevose, Pa. (assignee)
For primary bibliographic entry see Field 5D.
W75-03593

SLIME CONTROL IN INDUSTRIAL WATERS,
Economics Lab., Inc., St. Paul, Minn. (assignee)
For primary bibliographic entry see Field 5D.
W75-03594

METHOD OF DECOLORIZING WASTE PROCESS LIQUID DISCHARGED BY A PAPER MILL,
Owens-Illinois, Inc., Toledo, Ohio. (assignee)
For primary bibliographic entry see Field 5D.
W75-03595

METHOD OF DECOLORIZING PAPER MILL EFFLUENT LIQUID,
Owens-Illinois, Inc., Toledo, Ohio. (assignee)
For primary bibliographic entry see Field 5D.
W75-03596

AIR AND WATER POLLUTION CONTROL IN CRUDE TALL OIL MANUFACTURE IN THE PULP AND PAPER INDUSTRY,
Rust Engineering Co., Birmingham, Ala.
For primary bibliographic entry see Field 5D.
W75-03598

HYBRID DONNACONA TMR PLANT FEATURES ZERO POLLUTION,
For primary bibliographic entry see Field 5D.
W75-03603

POWER GENERATION FROM HOT BRINES,
Geothermal Investment Co., Pasadena, Calif. (assignee)
For primary bibliographic entry see Field 4B.
W75-03737

HYDROMETALLURGY,
Pennsylvania State Univ., University Park. Metallurgy and Mineral Processing Sections.
F. F. Aplan.
Society of Mining Engineering, Vol 26, No 2, p 70-72, February 1974. 32 ref.

Descriptors: *Metallurgy, *Research and development, *Heavy metals, *Separation techniques, Trace metals, Copper, Nickel, Zinc, Gold, Cobalt, Industrial wastes, Sulfur compounds, Recycling.
Identifiers: *Hydrometallurgy.

Hydrometallurgy is currently the fastest growing segment of the mining profession. Environmental factors have forced consideration of these processes which might mitigate the SO2 off-gas problem of conventional smelters, but the ever-increasing demand for metals probably plays the greater role. Copper is the most active area of research and many alternative processes to the traditional sulfuric acid-iron sulfate leach have been proposed. Magnetic separation and chemical refining recover pure nickel from the cemented product. The Japanese propose a chlorination-volatilization process for lateric ores followed by conventional solution chemistry to recover the nickel. Interest in zinc hydrometallurgy has been sparked by two new zinc smelters, both using electrolysis. Recent dramatic increases in the price of gold have sparked renewed interest in gold recovery processes. As far as environmental considerations go, the mining industry has committed much effort to the search for solutions to the smelting problems associated with copper and other ores. Hydrometallurgy has proven to be valuable in this endeavor. (Jernigan-Vanderbilt)
W75-03793

RECYCLING MILLING WATER IN MISSOURI'S NEW LEAD BELT,
Cominco American, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 5D.
W75-03799

3F. Conservation In Agriculture

RELATIONSHIPS BETWEEN MOISTURE AVAILABILITY AND NITROGEN RESPONSE IN WINTER WHEAT,
Kansas State Univ., Manhattan. Dept. of Agronomy.
R. L. Vanderlip, L. S. Murphy, D. A. Whitney, and C. A. Thompson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 635, $3.75 in paper copy, $2.25 in microfiche. Kansas State University Agricultural Experiment Station, Research Paper 20, April 1974. KWRRI Contribution No 99. 37 p, 9 fig, 10 tab, 40 ref, append. OWRT A-022-KAN(2). 14-01-0001-1635.

Descriptors: *Soil moisture, *Wheat, *Nitrogen, *Rainfall, *Regression analysis, Estimating, *Kansas, Equation, *Forecasting.
Identifiers: *Winter wheat, Seeding rate, Soil nitrogen.

Multiple regression techniques were used to obtain prediction equations relating wheat response to applied nitrogen, soil moisture, rainfall, soil nitrogen content, variety, and seeding rate. Yield variability could be significantly related to these variables in both central and western Kansas. However, coefficients of determination were approximately 0.9 for western Kansas and 0.7 for central Kansas. All variables considered were important in accounting for variability in yields. Crop variables contributed most to prediction followed by moisture and soil nitrogen variables. Applied nitrogen was significantly related to yield; however, it contributed least to the prediction equations. Measured soil moisture at the experimental sites and estimated soil moisture as provided by the Kansas Crop and Livestock Reporting Service each were effective as soil moisture variables as measured by coefficients of determination. However, they did not result in consistent predicted effects of applied nitrogen, spring rainfall or to soil moisture itself. It is anticipated these or similar equations could be used to provide a guide for spring application of nitrogenous fertilizer.
W75-03307

POLLUTIONAL ASPECTS AND CROP YIELDS RESULTING FROM HIGH MANURE APPLICATIONS ON SOIL,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-03310

INFLUENCE OF FERTILIZER PRACTICES ON WATER AND THE QUALITY OF THE ENVIRONMENT (PHASE II),
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-03315

WATER CONSERVATION IN THREE GRAIN CROPS IN THE ZAMBEZI VALLEY,
Department of Agriculture, Lusaka (Zambia).
O. Honisch.
Exp Agric, Vol 10, No 1, p 1-8, 1974.
Identifiers: Bulrush millet, *Grain crops, Infiltration, Seedbeds, Sorghum, *Zambia(Zambezi Valley), *Water conservation, Corn(Field).

The results of a 3-yr water conservation trial in the Zambezi Valley of Zambia are reported, for an area characterized by high temperatures and low,

often poorly distributed rainfall, with low infiltration and high evapotranspiration rates. As a result of these conditions local farmers often produce grain crops yielding as little as 200-300 kg/ha, though considerable increases could be obtained by simple water conservation methods. Of 4 treatments, tie-ridges made before the start of the 1st rains consistently gave the heaviest yields. Mean yields of the 3 crops under trial (maize, sorghum and bulrush millet) were higher on tie-ridges than on conventionally prepared seedbeds by 168, 159 and 17% in the 1968-69 to 1970-71 seasons, respectively.--Copyright 1974, Biological Abstracts, Inc.
W75-03332

PHYSIOLOGICAL ANALYSIS OF THE RESPONSE OF SORGHUM HYBRIDS 'CSH-1' AND 'CSH-2' TO RAIN-FED CULTIVATION,
Indian Agricultural Research Inst., New Delhi. Div. of Plant Physiology.
A. K. Bagga, M. M. Ghare, and R. D. Asana.
Indian J Agric Sci, Vol 43, No 3, p 225-229, 1973.
Identifiers: *Cultivation, Grain, Growth, Hybrids, Moisture, *Physiological analysis, Seasonal, *Sorghum hybrids, Sorghum-bicolor, Temperature, Crop yields.

Hybrid sorghum 'CSH 2' (Sorghum bicolor (L.) Moench) produced higher grain yield than hybrid 'CSH 1' under irrigation, but equal or less yield under rain-fed cultivation. The crop-growth rate, the leaf-area index and the net assimilation rate during the stage of maximum leaf area were similar in both, but 'CSH 2' had a taller stem and higher dry weight than 'CSH 1' at anthesis. 'CSH 2' had consistently higher grain number per panicle, but owing to its late-flowering habit its grain developed much later after the cessation of rains at lower temperatures and under greater moisture stress, with the result that the single-grain weight was sometimes reduced under rain-fed condition. The emergence of panicle was also more hampered in rain-fed 'CSH 2.' Thus high grain number and flowering by the end of rainy season would be desirable for rain-fed cultivation.--Copyright 1974, Biological Abstracts, Inc.
W75-03368

UTILITY OF A SIMPLE SOIL WATER BUDGET MODEL IN AGRONOMIC RESEARCH: I. EFFECTS OF PLANT DENSITY, TIME-OF-SOWING AND FALLOW WATER ON AVAILABLE SOIL WATER UNDER SPRING WHEAT,
Thai-Australian Colombo Plan Project, Chainat (Thailand).
R. G. Fawcett, and O. G. Carter.
Aust J Exp Agric Anim Husb Vol 13, No 65, p 714-717, 1973.
Identifiers: Agronomic research, Density, *Model studies, *Soil water, Sowing, Spring, Utility, *Water budget, *Wheat, *Australia.

A simple soil water budget model was used to estimate weekly changes in available soil water as affected by plant density, time of sowing and level of available fallow water for spring wheat cultivars grown on a black earth in northern New South Wales (Australia). Estimated values of available water were mostly within plus or minus 10 mm of observed values (ranging from 50-270 mm) obtained at 4 intervals during the growing season. The results are discussed in relation to both the interpretation of agronomic field experiments and use of the model in regions where conserved fallow water contributes significantly to cereal production.--Copyright 1974, Biological Abstracts, Inc.
W75-03450

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT),
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 4A.
W75-03452

PRODUCTIVITY IN DWARF WHEATS IN A SILT-LOAM SOIL AS INFLUENCED BY SOIL-MOISTURE REGIMES AND NITROGEN FERTILIZATION UNDER SHALLOW WATER TABLE CONDITIONS,
Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Agronomy.
Pyare Lal, and K. C. Sharma.
Indian J Agric Sci, Vol 43, No 3, p 255-261, 1973.
Identifiers: *Dwarf wheats, *Fertilization, Grain yields, Loam, Nitrogen, *Productivity, Silt, *Soil moisture, Water table, Wheats, *India.

Field experiments were conducted in the winter seasons of 1968-69 and 1969-70 at Pantnagar (India) to study the response of dwarf wheats ('Kalyan Sona' and 'Sonalika') to soil moisture regimes and N fertilization. The different soil moisture regimes (25, 50 and 75% depletion of available moisture) maintained after a common irrigation at crown-root initiation stage had no significant bearing on the yield, probably because of the shallow water table. Fertilization up to 100 kg N/ha increased the grain yield significantly. The response to N was quadratic in both the varieties. The most profitable levels of fertilization for 'Kalyan Sona' and 'Sonalika' were 133 and 156 kg N/ha in 1968-69 and 152 and 141 kg N/ha in 1969-70. The maximum net profit as a result of N application was higher in 'Kalyan Sona' than in 'Sonalika.'--Copyright 1974, Biological Abstracts, Inc.
W75-03557

THE EFFECT OF SHELTER BELTS AND IRRIGATION ON WATER USE IN A DRY REGION,
Norges Landbrukshoegskole, Vollebeck. Dept. of Agricultural Hydrotechnics.
B. Rognerud, and K. Varum.
Nordic Hydrology, Vol 5, No 3, p 166-172, 1974. 3 fig, 2 tab.

Descriptors: *Shelterbelts, *Irrigation, Water balance, *Soil moisture, Evapotranspiration, Tensiometers, Water utilization, On-site investigations, Profiles.
Identifiers: *Norway, Neutron probe.

Results are presented of a water balance investigation on irrigated and non-irrigated plots at Lesja, an extremely arid area of North Gudbrandsdal, Norway. Wooden shelter belts were used across the valley and the prevailing wind direction. These belts were 60 cm high, 8 to 15 m apart, and were used to accumulate snow, prevent wind erosion, and to protect plants against heavy winds. Average yearly precipitation was 300 to 400 mm. Soil moisture measurements were made with neutron probes 8 times, 4 on irrigated and 4 on non-irrigated research plots. On each water treatment 2 profiles were located close to the shelter belts and 2 midway between. The distance between the shelter belts was 8 m. The soil was deep and the water holding capacity high. Values of actual evapotranspiration on all plots were presented. On irrigated fields the evapotranspiration was higher between shelter belts than at the shelter belts. Plant cover was well developed on all irrigated plots. The effect of the shelter belts on yield was about 10% on irrigated plots. The climate in the area is characterized by low humidity and high winds, and this may cause some oasis effect on the water use on the irrigated plots. (Roberts-ISWS)
W75-03652

ACTUAL EVAPOTRANSPIRATION IN RELATION TO LEAF AREA,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Hydrotechnical Lab.; and Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Climate Station.
For primary bibliographic entry see Field 2D.
W75-03653

IN SITU MEASUREMENTS OF LEAF WATER POTENTIAL AND RESISTANCE TO WATER FLOW IN CORN, SOYBEAN, AND SUNFLOWER AT SEVERAL TRANSPIRATION RATES,
Atmospheric Environment Service, Downsview (Ontario).
H. H. Neumann, G. W. Thurtell, and K. R. Stevenson.
Can J Plant Sci, Vol 54, No 1, p 175-184, 1974.
Identifiers: Corn(Field), Flow, Glycine-max, Helianthus-annuus, *Leaf water potential, Measurement, Roots, Soybean, Stalk, Sunflower, *Transpiration, *Hygrometry.

Peltier-cooled thermocouple dewpoint hygrometers were used to measure leaf water potentials at several transpiration rates on intact corn (Zea mays L.), soybean (Glycine max (L.) Merr.), and sunflower (Helianthus annuus L.), grown in a controlled environment in silica sand rooting media frequently watered with nutrient solution. Hygrometers were left in position for the duration of measurements on each plant, but tests showed this to have little effect on measured potentials. Measured potentials were linearly related to the transpiration rates (correlation coefficients greater than 0.98). Extrapolated values of leaf water potential at zero transpiration were within a few tenths bar of measured nutrient solution potentials. Plant resistances to water flow remained constant from near zero transpiration up to the maximum obtained average rates of 1.8-3.0 g dm-2 h-1. The magnitude of the resistance varied considerably from plant even within a single cultivar of 1 sp. and definite conclusions as to interspecies differences in resistance were not made. Estimates of the relative resistance in the root, stalk, and the leaf that were made for a few plants were similar to previously published results.--Copyright 1974, Biological Abstracts, Inc.
W75-03668

WATER MANAGEMENT DISTRICTS IN NORTH DAKOTA,
For primary bibliographic entry see Field 6E.
W75-03701

POWERED MOBILE SPRAY IRRIGATION FOR PRODUCTIVE CROP SEWAGE UTILIZATION,
For primary bibliographic entry see Field 5D.
W75-03743

THE HYDROLOGY OF A SMALL CATCHMENT BASIN AT SAMARU, NIGERIA: III. ASSESSMENT OF SURFACE RUN-OFF UNDER VARIED LAND MANAGEMENT AND VEGETATION COVER,
Institute for Agricultural Research, Zaria (Nigeria).
For primary bibliographic entry see Field 4A.
W75-03765

COMPARATIVE STUDY OF NITROGEN SOURCES FOR FERTILISATION OF RAINFED BAJRA,
Central Arid Zone Research Inst., Jodhpur (India).
D. L. Vyas, S. D. Singh, H. S. Daulay, and D. K. Misra.
Ann Arid Zone 11(3/4): 145-153, 1972.

Descriptors: *Nitrogen, Plant growth, Asia, *Fertilizers, Agricultural chemicals, Crop response.
Identifiers: *Bajra, India, Pennisetum-typhoides.

Sources of N did not influence the grain and stalk yields. N-treated plots indicated an increase in yield over the control, but the 3 units of N gave equal yields. The optimum dose of N for the local cultivar R.S.K. was 23.2 kg/ha. Any source of N can be used for bajra (Pennisetum typhoides) cultivation under natural rainfall conditions of the sandy arid plains of Rajasthan, India.--Copyright 1974, Biological Abstracts, Inc.

W75-03829

PRODUCTION AND UTILIZATION OF FODDER AND GRAIN SORGHUM AS FORAGE FOR CATTLE IN THE ORD RIVER VALLEY, WESTERN AUSTRALIA,
Commonwealth Scientific and Industrial Research Organization, Kununurra (Australia). Div. of Land Research.
C. G. Blunt, and M. J. Fisher.
Aust J Exp Agric Anim Husb 13(62): 234-237, 1973.

Descriptors: Irrigation effects, *Forage sorghum, Crops, Field crops, Grasses, *Forage grasses, *Australia, *Cattle, *Grain sorghum, Animal growth, Growth rates.
Identifiers: Fodder.

Three experiments were carried out to obtain data on optimum water and N regimes for growing fodder sorghum: on cattle liveweight gains on irrigated fodder sorghum and grain sorghum regrowth and on cattle liveweight gains on green chop fodder sorghum in feed lots. Near maximum dry matter yields of fodder sorghum were obtained with 180 kg ha-1 N and 4-weekly irrigation. Fodder sorghum grazed at 6.4 and 4.0 head ha-1 for 26 wk gave mean liveweight gains of 0.36 and 0.41 kg head-1 day-1. Ratooned grain sorghum grazed at 4.0 head ha-1 gave 0.35 kg head-1 day-1, but was unable to carry 6.4 head ha-1. Green chop fodder sorghum fed at the preflowering and at the soft dough stages gave mean liveweight gains of 0.48 and 0.37 kg head-1 day-1 over 26 wk.--Copyright 1974, Biological Abstracts, Inc.
W75-03830

EFFECT OF ORGANIC MULCHES ON THE HYDROTHERMAL REGIME OF SOIL AND GROWTH OF POTATO CROP IN NORTHERN INDIA,
Punjab Agricultural Univ., Ludhiana (India).
S. S. Grewal, and N. T. Singh.
Plant Soil 40(1): 33-47, Illus. 1974.

Descriptors: *Mulching, *Potatoes, Crops, Dicots, Field crops, Vegetable crops, *Plant growth, Asia, *Soil temperature plastics, Irrigation practices.
Identifiers: Ethylene, *India, Mulches, Pennisetum, Typha, Polyethylene.

Possibilities of manipulating hydrothermal regime of soil with different organic mulches and their effect on the growth of potato crop was studied. Mulches like mat (Typha sp. interwoven into a web) and Pennistum stalks lowered the soil temperatures maxima at a depth of 10 cm by 1.5C during autumn and by 3.5C during spring as compared with control plots. Polyethylene mulch increased soil temperature maxima by 1.4C and 2.2C during autumn and spring, respectively and minima by 2.4C during both the seasons. This treatment saved 2 and the former treatment 1 irrigation each out of a total of 6 irrigations applied to control plots. During autumn polyethylene gave significantly higher yield as compared with other treatments. During spring, when both polyethylene and coal dust increased soil temperature, yields were low under these treatments and the tubers were malformed with many sprouts. The yield as well as tuber size were governed by minmum soil temperature during autumn but soil temperature maxima influenced both yield and quality in the spring crop. The possibility of manipulating soil temperature in order to improve quality and yield of potato crop under the climatic conditions of North India is pointed out.--Copyright 1974, Biological Abstracts, Inc.
W75-03837

LEAF WATER CONTENT AND POTENTIAL IN CORN, SORGHUM, SOYBEAN, AND SUNFLOWER,
Atmospheric Environment Service, Downsview (Ontario).
H. H. Neumann, G. W. Thurtell, K. R. Stevenson, and C. L. Beadle.
Can J Plant Sci 54(1): 185-195, 1974.
Identifiers: Age, Corn(Field), Glycine-max, Helianthus-annuus, *Leaf water potential, Sorghum, Sorghum-vulgare, Soybean, Sunflower, Wilting, *Hygrometry, Measurement.

The Peltier-cooled thermocouple dewpoint hygrometer technique of in situ measurement of leaf water potential was further developed. The observed response of the instrument agreed so well with theoretical analysis that calibration based on theory was within 1% of that obtained using salt solutions of known water potential. Simultaneous measurements with the hygrometer and a beta gauge were made to derive the leaf water content-potential relationships for several crop plants. Results showed relative water contents dropping only to near 0.95 for mature corn (Zea mays L.); sorghum (Sorghum vulgare Pers.); and sunflower (Helianthus annus L.) leaves, and to 0.90 for not quite mature soybean (Glycine max (L.) Merr.) leaves as potentials declined from near -1 bar to the plant wilting point (-8 to -14 bars). Further decline of leaf water potential resulted in relatively much greater loss of leaf water.--Copyright 1974, Biological Abstracts, Inc.
W75-03839

CHANGES IN STEM DIAMETER OF HERBACEOUS AND WOODY PLANTS AS A MEASURE OF INTERNAL WATER BALANCE,
Pahlavi Univ., Shiraz (India). Coll. of Agriculture.
For primary bibliographic entry see Field 2I.
W75-03840

RESPONSE OF MYCORRHIZAL AND NON-MYCORRHIZAL ROOTED CUTTINGS OF HEATHER (CALLUNA VULGARIS(L.) HULL) TO VARIATIONS IN NUTRIENT AND WATER REGIMES,
Stirling Univ. (Scotland). Dept. of Biology.
P. Bannister, and W. M. Norton.
New Phytol, Vol 73, No 1, p 81-89, 1974.
Identifiers: Calluna-vulgaris, *Dry matter production, Growth rates, *Heather, *Mycorrhizal rooted cuttings, Nitrogen, Nutrients, Phosphorus, Potassium, Production, Roots, Fertilization.

Rooted cuttings of heather showed their best dry matter production in drained regimes with a frequent addition of nutrients. Mycorrhizal plants generally showed a decreased production when compared with equivalent non-mycorrhizal plants, except on drained regimes low in nutrients where the mycorrhizal plants grew better. Concentrations of N in the shoot and K and P in the root were higher in mycorrhizal than in non-mycorrhizal plants, effects most marked in well-drained regimes with the minimum addition of nutrients. In general, alterations in nutrient and water regimes had more significant effects on dry matter production than did the presence or absence of mycorrhiza. Mycorrhizal infection may have a beneficial effect in freely drained, infertile, soils that are characteristic of well-developed heathland.--Copyright 1974, Biological Abstracts, Inc.
W75-03842

DEFOLIATION, LEAF AREA INDEX, AND THE WATER USE OF FOUR TEMPERATE PASTURE SPECIES UNDER IRRIGATED AND DRYLAND CONDITIONS,
University of New England, Armidale (Australia). Dept. of Agronomy.
G. G. Johns, and A. Lazenby.
Aust J Agric Res, Vol 24, No 6, p 783-795, 1973.
Identifiers: *Defoliation, Dryland, Festuca-arundinacea, Irrigated soils, *Leaf area index, Lolium-perenne, Pasture species, Phalaris-tuberosa, Senescence, Transpiration, Trifolium-repens, *Water utilization, *Swards.

Measurements were made over a 12-mo. period of the water use and leaf area index (LAI) of both dryland and irrigated monoculture swards of 4 temperate pasture species (Trifolium repens, Lolium perenne, Festuca arundinacea and Phalaris tuberosa) under 2 defoliation regimes. All 4 species used similar quantities of water on the dryland plots despite large differences in their ability to grow under such conditions. Even though very dry conditions prevailed during part of the study, the dryland swards generally failed to exploit reserves of soil moisture below a depth of about 120 cm. The water use of the irrigated swards was sensitive to the manipulation of LAI by defoliation, while in contrast, dryland water use was not. On the irrigated swards, at an LAI of 1, a 1% decrease in LAI was associated with a 1% decrease in water use. This sensitivity of water use decreased as LAI increased until, at an LAI of 3 and above, water use appeared to be insensitive to charges in LAI. During the late spring to early autumn period both irrigated and dryland water use were significantly related to LAI. In this period, those irrigated and dryland swards which had common values of LAI generally used similar quantities of water. This finding indicated that stomatal control was ineffective in reducing water use per unit of leaf area. The quantity of dead herbage present in the swards suggests that pronounced leaf senescence (and hence reduction of leaf area) may have been a consequence of ineffective stomatal control of transpiration.--Copyright 1974, Biological Abstracts, Inc.
W75-03848

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

STATIC PRESSURE FRACTIONATION CHARACTERISTICS OF WATER HYACINTH,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
L. O. Bagnall, and F. J. Corral.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 669, $3.25 in paper copy, $2.25 in microfiche. Paper No 74-5007, presented before the American Society of Agricultural Engineers, Stillwater, Oklahoma, June 23-26, 1974. 20 p, 10 fig, 5 tab, 13 ref. OWRR A-017-FLA(7). 14-31-0001-3809.

Descriptors: *Drying, Chemical analysis, Nutrients, Digestion, *Aquatic weeds, *Water hyacinth, *Rooted aquatic plants, Animal physiology, Toxins, Feeds.

Up to 82% of the water hyacinth was removed from prepared plants by multiple pressings in a screen-lined cylinder with a low speed press. Plants as wet as 2089% dry basis moisture content were pressed to as low as 404% dry basis moisture content using pressures as low as 45 psi. A maximum of 0.35 horsepower-hour was required to remove a ton of water in single or multiple pressings. Water expression increased with increasing pressure, dwell time under pressure, pressure rise time and screen open area. Energy increased with increasing pressure and screen open area and decreased as rise time increased. Mincing increased expression and decreased energy requirement and cake moisture content. Chopped plants did not press satisfactorily without additional reduction; this reduction can be combined with the pressing process in devices such as screw presses. Regressions relating relevant expressions, moistures and energies to selected pressing variables were developed. (Morgan-Florida)
W75-03302

WATER QUALITY MODELS FOR URBAN AND SUBURBAN AREAS.
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 5B.
W75-03311

AMES RESERVOIR ENVIRONMENTAL STUDY, APPENDIX 1. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE RESERVOIR SITE AND STREAM SYSTEM.
Iowa State Water Resources Research Inst., Ames; and Iowa State Univ., Ames. Engineering Research Inst.
For primary bibliographic entry see Field 6G.
W75-03318

PREDICTING THE FLOW OF WATER WITHIN A CHANNEL BOUNDARY OF GRAVEL,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
For primary bibliographic entry see Field 8B.
W75-03320

AQUATIC WEED HARVESTING COSTS AND EQUIPMENT--1972,
Aquamarine Corp., Waukesha, Wis.
C. B. Bryant.
Hyacinth Control Journal, Vol 12, p 53-55, May 1974. 3 tab, 2 ref.

Descriptors: *Harvesting, *Costs, Aquatic plants, *Aquatic weed control, Equipment, Machinery, Water pollution control, *Cost comparisons, Estimating, Labor.

Not until the mid-20th century have machines for harvesting aquatic weeds become commercially available. The design of the equipment has been generally uniform: a powered barge equipped with mounted underwater cutters in front of an inclined porous conveyor and a holding area for the harvested weeds, and a handling and/or transportation system to shore and trucks. Costs of harvesting depend on the equipment used and the location harvested. Results of a cost-and-performance questionnaire prepared for harvesting operations put into service after 1970 in six locations are summarized. Information requested for the 1971 harvesting season included acres harvested, tonnage harvested, transportation distances (both land and water), equipment used, movements between lakes, maintenance down time, type of weed harvested, and use of harvested weeds. Labor cost/ton varied significantly in the six locations surveyed, from $0.60 to $10.42, and labor costs/acre ranged from $10.00 to $28.18. Cost variations were traced to weed type, infestation density, transportation distance, and disposal requirements, as well as equipment. All but one location surveyed utilized Aquamarine equipment from which cost estimates were derived. (Schroeder-Wisconsin)
W75-03391

GREAT LAKES-ST. LAWRENCE SEAWAY SYSTEM AND THE MID-CONTINENT ECONOMY,
Great Lakes Basin Commission, Ann Arbor, Mich.
For primary bibliographic entry see Field 6B.
W75-03394

PROPOSED NATURAL AREAS, SALT RIVER SALT BANKS, REPORT NO 2,
Arizona Academy of Science, Tempe.
For primary bibliographic entry see Field 6B.
W75-03396

TACNA MARSH. NATURAL AREA REPORT NO. 35,
Arizona Academy of Science, Tempe.
For primary bibliographic entry see Field 6B.
W75-03400

THE ENTERPRISE, WISCONSIN, RADIATION FOREST - PREIRRADIATION ECOLOGICAL STUDIES.
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-03401

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-FIFTH ANNUAL REPORT, YEAR ENDED 30TH JUNE 1973.
Metropolitan Water Sewage and Drainage Board, Sydney (Australia).
For primary bibliographic entry see Field 5G.
W75-03432

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-SECOND ANNUAL REPORT YEAR ENDED JUNE 1970.
Metropolitan Water, Sewage and Drainage Board, Sydney (Australia).
For primary bibliographic entry see Field 5G.
W75-03433

EAST BRIMFIELD AND WESTVILLE RESERVOIRS. QUANTITY AND VALUE OF WATER SUPPLY STORAGE. QUINEBAUG RIVER--MASSACHUSETTS.
Public Health Service, New York.
For primary bibliographic entry see Field 6D.
W75-03437

RAPID CREEK FLOOD HAZARD ANALYSES-(INCLUDING INMAN CREEK AND WEST FORK CREEK TRIBUTARIES) BANNOCK COUNTY, IDAHO.
Soil Conservation Service, Boise, Idaho.
June 1974. 22 p, 26 fig, 2 append.

Descriptors: *Flood plain zoning, Flood plains, Floods, *Watershed management, *Flood data, *Flood control, *Flood profiles, *Idaho, Flood forecasting, Flood damage, Flood plain insurance, Flood peak, Flood proofing, Water management, Water policy, Runoff, Snowmelt, Rural areas, Community development, Land use, Storm runoff, Regulations, Legal aspects.
Identifiers: Bannock Co.(Idaho), Rapid Creek(Idaho), Soil Conservation Service, Ordinances, Subdivision regulations, Flood plain management, Inman Creek(Idaho), West Fork Creek Tributaries(Idaho).

Increased flood damages to rural residences in Bannock County, Idaho, from Rapid Creek prompted a need to recognize and evaluate flooding risks. This study identifies flood hazard areas and provides a basis for further study and action to prevent or minimize flood damages. Convective thunderstorms produced from rising and cooling of moist air masses are the major cause of flooding; with runoff from winter storms and snowmelt as a secondary cause. Stream channel profiles, valley cross sections, aerial photos, and maps by the U.S. Geological Survey are included. Recommendations include that agriculture can continue to make effective use of the flood plain, flood insurance is needed, buildings must be protected by dikes and flood proofing, and dikes and levees must be constructed. A regulatory approach combining the use of flood lines or floodway zoning regulations to restrict types of development in high hazard areas is needed, together with zoning standards, building codes, or sanitary codes requiring minimum building protection elevations for uses in low hazard areas. In rural lands where floodplain zoning is not immediately possible, stringent sanitary codes and subdivision regulations could prohibit development in flood-prone lands. (Grden-North Carolina)
W75-03438

FLOOD HAZARD ANALYSES - CITY OF LISBON, RANSOM COUNTY, NORTH DAKOTA.
Soil Conservation Service, Bismarck, N. Dak.
Prepared in cooperation with City of Lisbon and the North Dakota State Water Commission, July 1974. 27 p, 21 fig, 2 tab, 10 plates.

Descriptors: Flood plains, Floods, *Watershed management, *Flood protection, *Flood control, Flood forecasting, Channel improvement, Dams, Flood recurrence interval, Floodproofing, Floodways, Levees, Flood plain insurance, Flow control, Warning systems, Insurance, Flood peak, Planning, Management, City planning, Historic floods, Floodwater, Runoff, Channels, *North Dakota.
Identifiers: *Flood plain management, Sheyenne River(ND), Lisbon(ND), Ransom County(ND), Flood plain regulation, Flood control measures.

Flood hazards in Lisbon, North Dakota, are identified to implement a local flood plain management program since flooding due to spring snowmelt runoff occurs in Lisbon about once every 10 years. Included are aerial photomosaic maps, high water profiles, and typical valley cross sections indicating the extent of flooding which can occur from the Sheyenne River which has a total drainage area of about 8,190 square miles above Lisbon with 5,700 square miles as noncontributing. With 1,440 acres within the corporate limits, a 50-year frequency flood will inundate approximately 325 acres (22 per cent of the city); a 100-year flood will inundate approximately 453 acres (31 per cent of the city); and a 500-year flood will inundate approximately 558 acres (39 per cent of the city). An elevation-frequency curve is also developed for the river at the Burlington Northern Railroad crossing which is typical of the river within the city. Recommendations to solve local flooding problems and develop a flood plain management program include installation of dikes and levees, adoption of local land use and zoning regulations for flood plain areas, flood proofing for existing and future buildings, application to the Federal Insurance Administration for flood plain insurance, installation of a flood warning system and use of flood plain areas for city parks and other open space uses. This technical information can aid in overall community planning and can be coordinated with the need to temporarily store and convey floodwaters. (Grden-North Carolina)
W75-03439

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. CONSTRUCTION SITE SELECTION,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 8A.
W75-03443

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT),
Army Engineer District, St. Louis, Mo.
Available from the National Technical Information Service, Dept. of Commerce, Springfield, Va 22161 as EIS-IL-73-1259-F, $4.00 in paper copy, $2.25 in microfiche. September 1972. 32 p, 1 map, 3 tab, 7 append.

Descriptors: *Illinois, *Flow augmentation, *Drainage systems, *Pumping plants, Engineering structures, River, Budget, Cost-benefit analysis, Economic justification, Financing, Project planning, Direct benefits, Direct costs, Government finance, Federal government, Land resources, Social aspects, Wildlife conservation, Water resources development, Runoff, Levees, Seepage, Flood protection, Flood damages, Administration, Drainage, Crop production, Arable land, Agricultural engineering.
Identifiers: *Environmental Impact Statements, Administrative regulations, *Monroe County(Ill).

The estimated cost of construction of two pumping stations and appurtenant facilities on the Mississippi River in Illinois, is over $2,000,000. The project will provide flood protection to 9,000 rural acres. Even though the problem of direct flooding from the river has been largely eliminated by the levee system, there is still a problem with removing runoff and seepage. Substantial flood damage occurs when the gravity drainage system is blocked by high Mississippi River stages. In choosing the project design, economic factors were the primary consideration. Pumping and ditch capacities which provided the greatest excess of average annual benefits over annual costs were used. The project, when completed, will meet 1980 water resource needs. It will also make available increased land for urban, crop, and timber uses. The construction of the project will also provide employment and other economic benefits to the area. Local interests will provide without cost, all lands and easements necessary for the project. The project will have no adverse effect on water quality or wildlife populations of the area. (Sperling-Florida)
W75-03452

EVOLUTION OF THE SMALL WATERSHED PROGRAM, CHANGES IN PUBLIC LAW 566--WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM, 1954-72,
Economic Research Service, Washington, D.C. National Resource Economics Div.
For primary bibliographic entry see Field 4D.
W75-03483

THE PLANNING AUDIT: A FRAMEWORK WITH PARTICULAR REFERENCES TO RIVER BASIN PLANNING,
For primary bibliographic entry see Field 6B.
W75-03525

FITTING A THREE-PARAMETER LOG-NORMAL DISTRIBUTION BY LEAST SQUARES,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 2E.
W75-03651

RAINFALL INTERCEPTION IN A FOREST IN THE VELEN HYDROLOGICAL REPRESENTATIVE BASIN,
Swedish Meteorological and Hydrological Inst., Stockholm.
For primary bibliographic entry see Field 2I.
W75-03654

ON THE VARIABILITY OF SEASONAL PARAMETERS IN HYDROLOGIC TIME SERIES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-03658

COMPENSATORY STORAGE,
For primary bibliographic entry see Field 6E.
W75-03676

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX G--REGULATORY WORKS--REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission--United States and Canada. Great Lakes Levels Board.
Available from International Joint Commission, through Detroit District Corps of Engineers, PO Box 1027, Detroit, Mich. December 7, 1973. 213 p, 34 tab, 84 fig, 3 annex.

Descriptors: *Great Lakes, *Water level fluctuations, *International Joint Commission, *Engineering structures, *Evaluation, Lakes, Great Lakes region, Water levels, Discharge(Water), Regulated flow, Regulation, Water management(Applied), Comprehensive planning, Planning, Water policy, Water resources development, Structures, Economic feasibility, Environmental effects, Cost-benefit analysis, Governmental interrelations, United States, Canada.
Identifiers: *Environmental policy, *State policy, *Effluent limitations, *International agreements, Coastal zone management.

Engineering works are described which would be necessary to accomplish further regulation of the levels and flows of the Great Lakes, as described in the report on Regulation of Great Lakes Water Levels, dated December 7, 1973. Existing facilities for Lake Superior and Lake Ontario are described and the problems to be faced in providing new facilities, particularly in the outlet rivers of the presently unregulated Lakes Michigan, Huron, and Erie are discussed. Also described are the site investigations carried out, the design criteria and methods used, and the environmental factors considered in the preparation of preliminary designs and cost estimates of the works necessary for the various regulation plans considered in the Board's study. All necessary construction would be economically feasible, with the exception of work necessary to regulate the level of Lakes Michigan-Huron. The cost of required construction in the St. Clair-Detroit Rivers system far exceeds the estimated economic benefits of such regulation. (Deckert-Florida)
W75-03682

ALTERING ALABAMA'S HISTORY,
Soil Conservation Service, Auburn, Ala.
W. B. Lingle.
Soil Conservation, p 4-5, December 1973. 2 illus.

Descriptors: *Alabama, *Legislation, *Water supply, *Watershed management, *Reservoirs, Water policy, Siltation, Floods, Flood plains, Flood protection, Conservation, Recreation, Environment, Environmental effects, Impoundments, Impounded waters, Water management(Applied), Flood control.

In Alabama, projects to help reduce flooding and conserve resources are having a beneficial effect on the state. The Watershed Protection and Flood Prevention Act is inducing people to use flood-prone areas not only by protecting them from floods but also by offering opportunities for community growth and improvement. The city of Heflin is moving to take full advantage of its 84-acre multi-purpose watershed lake to attract new industry. In Randolph County, High Pine Creek was previously clogged with silt and debris. The creek flooded three to five times every year. People were leaving Roanoke and the surrounding area in droves. Sedimentation of Roanoke's water supply reservoir had reduced its capacity by one-third in seven years. Water rationing was normal during dry seasons. Today, 209 surface-acres of water are stored in nine flood detention reservoirs. The Choccolocco Creek Watershed Project near Anniston is another example of multiple-use of floodwater retarding structures. Multipurpose structures will provide recreation areas in Talladega National Forest and in the Cypress Creek watershed. These watershed projects offer many ways to improve both the environment and the economy of Alabama. (Ritchie-Florida)
W75-03688

WATER MANAGEMENT DISTRICTS IN NORTH DAKOTA,
For primary bibliographic entry see Field 6E.
W75-03701

HUMBOLDT HARBOR AND BAY JETTIES AND DREDGING, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
November 28, 1973. 60 p, 8 fig.

Descriptors: *Environmental effects, *Dredging, *Jetties, *Harbors, *California, Inlets(Waterways), Channel improvement, Spoil banks, Federal government, Bays, Rivers and Harbors Act, Breakwaters, Coastal engineering, Coasts, Coastal structures, Navigation, Disposal, Water quality, Benthic flora, Benthic fauna, Aquatic environment, Aquatic habitats, Oceans, Administrative agencies, Pacific Ocean, Water resources development.
Identifiers: *Environmental Impact Statements, *Humboldt Bay(Calif), *Coastal waters, *Offshore spoil disposal.

The project involves the rehabilitation and maintenance of rubble-mound jetties at the entrance to Humboldt Bay and maintenance dredging of the five channels in Humboldt Harbor and Bay, located on the northern coast of California. The dredge spoil is deposited offshore at a deep water disposal site approximately one mile from the entrance to the bay. Formerly a land locked harbor, the bay is quite shallow and continuous dredging is required to maintain the channels for navigation. Rehabilitation of the jetties has already been completed with no significant environmental effects. The dredging operation results in romoval of approximately 600,000 cubic yards of material annually, displacing immobile benthic organisms and causing temporary increases in turbidity in the bay and at the disposal site. The present site has been used for many years with no discernible change. The alternative of no action was not feasible due to the need to maintain the channels in order to allow continued operation of the harbor. While there is no significant opposition to the project, some concern has been expressed over the unknown effects of offshore spoil disposal. (Deckert-Florida)
W75-03706

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE CAPE FEAR (LOWER SECTION), LUMBER, NEUSE AND WHITE OAK RIVER BASINS.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
Water and Air Quality Control Committees, Board of Water and Air Resources, June 1, 1974. 185 p, 13 tab.

Descriptors: *North Carolina, *River regulation, *Water quality standards, *Classifications, *Administrative agencies, Water law, Water policy, Water conservation, Water pollution, Water pollution control, Pollution abatement, Water quality control, Water utilization, Legislation, Water resources development, Regulation, Administration, River basins, River systems, Rivers, Streams, Tributaries, Legal aspects, Environmental effects, Decision making, Urban runoff.
Identifiers: Environmental policy, State policy, Administrative regulation.

Presented are copies of all written materials and a record of all comments and discussions presented during the public hearing on the proposed upgrading of classifications of certain waters in the Lumber, Neuse, and White Oak River Basins, and the lower sections of the Cape Fear River Basin. The hearing was conducted by the Water and Air Quality Control Committee of the North Carolina Board of Water and Air Resources. Comments were received from various representatives of federal, state and local government and private industry, as well as private citizens and environmental groups. There was considerable controversy over several of the reclassification proposals due to possible adverse effects upon local agricultural and industrial activities. It was also contended that certain streams would be unable to meet the higher water quality standards imposed by the upgrade due to urban runoff. Included are the specific

reclassification proposals, and sections of the Laws of North Carolina pertaining to state policy concerning its water resources and the assignment of classifications to surface waters. (Deckert-Florida)
W75-03717

BEACH-PROTECTORS,
For primary bibliographic entry see Field 2J.
W75-03748

REINFORCED MATTRESS FOR PROTECTING SHORELINES AND THE LIKE,
For primary bibliographic entry see Field 2J.
W75-03749

THE HYDROLOGY OF A SMALL CATCHMENT BASIN AT SAMARU, NIGERIA: III. ASSESSMENT OF SURFACE RUN-OFF UNDER VARIED LAND MANAGEMENT AND VEGETATION COVER,
Institute for Agricultural Research, Zaria (Nigeria).
J. Kowal.
Samaru Res Bull 149. 120-133, Illus. 1972.

Descriptors: *Watersheds(Basins), Runoff, Agricultural runoff, *Surface runoff, *Runoff forecasting, Runoff coefficient, *Land management, *Vegetation.
Identifiers: *Nigeria(Samaru).

Results are given of a long-term field experiment designed to supplement water budget studies of a small catchment basin at Samaru, Nigeria, through assessment of surface run-off under varied land management practices and vegetation covers. The total annual run-off from cultivated land was considerably higher than that occurring in the catchment basin and ranged from 2.9 - 15.5 in. (74-394 mm) a year. Under natural vegetation the run-off was negligible and occurred only on 4 occasions during the 5 yr of the experiment. The highest run-off occurred from cropped land on 3-ft (0.9-m) ridges and from flat bare fallow, averaging 10.4 and 11.7 in (264 mm and 297 mm)/yr respectively. The lowest amount with an average of 5.5 in (140 mm)/yr occurred from cropped land with alternate tied ridges. Cropped flat land and ridged broadlands with alternate tied furrows yielded moderate run-off, averaging 8.5 in (216 mm)/yr. Data on rainfall characteristics are given and their relation with run-off is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03765

ESTIMATING SOIL WATER CONTENT ON NATIVE RANGELAND,
Department of Agriculture, Sidney, Mont.
For primary bibliographic entry see Field 2G.
W75-03800

CLIO NODS: ARIZONA V. CALIFORNIA AND THE BOULDER CANYON ACT - A REASSESSMENT,
California Univ., Los Angeles. Dept. of History.
For primary bibliographic entry see Field 6E.
W75-03801

STUDY OF DRAINAGE PATTERNS IN THE MAHANADI CATCHMENT (ABOVE HIRAKUD DAM),
Indian Agricultural Research Inst., Nagpur. All India Soil Land Use Survey.
For primary bibliographic entry see Field 4D.
W75-03835

4B. Groundwater Management

INFLUENCE OF FERTILIZER PRACTICES ON WATER AND THE QUALITY OF THE ENVIRONMENT (PHASE II),
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-03315

SELECTED PHYSICOCHEMICAL PROPERTIES OF BASALTIC ROCKS, LIQUIDS, AND GLASSES,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 8H.
W75-03419

COLLECTION AND ANALYSIS OF PUMP TEST DATA FOR TRANSMISSIVITY VALUES,
Battelle Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03421

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03422

POTENTIAL CONTAINMENT FAILURE MECHANISMS AND THEIR CONSEQUENCES AT A RADIOACTIVE WASTE REPOSITORY IN BEDDED SALT IN NEW MEXICO,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-03425

EFFECT OF FLUID CONTENT ON THE MECHANICAL PROPERTIES OF WESTERLY GRANITE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W75-03428

A GEOLOGICAL AND SEISMOLOGICAL INVESTIGATION OF THE LAWRENCE LIVERMORE LABORATORY SITE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W75-03429

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE,
Florida Univ., Gainesville. Coll. of Law.
F. L. Gillette, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 089, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report, July 1972. 110 p, 185 ref, append.

Descriptors: *Artificial recharge, *Legislation, *Groundwater, *Water reuse, *Water resources, Water resources development, Water supply, Rehabilitation, Water treatment, Legal aspects, Reclaimed water, Waste water(Pollution), Water quality control, Regulation, Adoption of practices, Environmental effects, Environmental sanitation, Administration, Water policy, Florida, Water supply development, Water management(Applied).
Identifiers: Administrative regulations, State policy.

Much research has been conducted in the area of artificial groundwater recharge. The present scientific emphasis is placed on the total systems approach of recycling and reclaiming as much waste production as possible, especially water resources. Suggested legislation is presented, which is general in nature with details to be worked out by regulation. This article is divided into four parts: technological considerations, legal considerations, present legislation, and proposed legislation. Part one evaluates the technological complexities involved and lays the foundation on which the proposed legislation is predicated. Part two elaborates the legal problems involved and stresses the various possible liabilities incurred by anyone who attempts to use the process of artificial groundwater recharge. Parts three and four review current and proposed legislation. (Sperling-Florida)
W75-03489

GROUND-WATER QUALITY STUDY,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5B.
W75-03534

HYDROCARBON DISPERSION IN GROUND WATER: SIGNIFICANCE AND CHARACTERISTICS,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
For primary bibliographic entry see Field 5B.
W75-03662

GROUNDWATER USE ACT OF 1972.
For primary bibliographic entry see Field 6E.
W75-03722

POWER GENERATION FROM HOT BRINES,
Geothermal Investment Co., Pasadena, Calif. (assignee)
A. J. L. Hutchinson.
US Patent No 3,845,627, 6 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 54, November 5, 1974.

Descriptors: *Patents, *Heat flow, *Heat exchangers, *Heat transfer, *Groundwater, Specific gravity, Vapor pressure, Salts, Minerals, Steam, Oily water.
Identifiers: *Power generation, Power sources, *Geothermal wells, *Geothermal heat, Fluids, Gas expansion.

Hot fluid which may contain salts and other dissolved minerals is passed through a direct contact heat exchanger in heat exchange relationship with a heating fluid that has a specific gravity sufficiently below the specific gravity of the hot fluid that it may pass from the bottom to the top of the heat exchanger chamber in contact with the hot fluid. The pressure of the chamber is maintained above the vapor pressure of the hot fluid at the entering temperature of the fluid. The heat transfer fluid is selected so that the salts and other minerals in the fluid are insoluble in the heated heat transfer fluid. The heated heat transfer fluid is passed in heat exchange relationship with a working fluid that is vaporized in the heat exchangers and is subsequently passed through a power extracting gas expansion device. Alternatively, an oily substance is added to the hot fluid which may contain salts and other dissolved minerals, and the composition is passed through one or more surface contact heat exchangers for heating a working fluid. The oily substance coats the surface of the exchangers to prevent any mineral deposition. (Sinha-OEIS)
W75-03737

RECLAMATION OF HYDROCARBON CONTAMINATED GROUND WATERS,
Sun Research and Development Co., Philadelphia, Pa. (assignee)
For primary bibliographic entry see Field 5D.
W75-03750

4C. Effects On Water Of Man's Non-Water Activities

UNNATURAL SHORELINE,
California State Univ., San Francisco. Dept. of Geology.
For primary bibliographic entry see Field 5G.
W75-03459

WATER: ITS QUALITY OFTEN DEPENDS ON THE FORESTER,
Food and Agriculture Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 5B.
W75-03589

GROUND-WATER QUALITY MODELING,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Hydrology.
For primary bibliographic entry see Field 5B.
W75-03661

WATERSHED BEHAVIOR AFTER FOREST FIRE IN WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
J. D. Helvey.
Available from Pacific Northwest Forest and Range Experiment Station, PO Box 3141, Portland, Oregon 97208. In: Proceedings of the Irrigation and Drainage Division Specialty Conference, Fort Collins, Colorado, April 22-24, 1973, p 403-422.

Descriptors: *Forest fires, *Washington, Water temperature, Precipitation(Atmospheric), *Forest watersheds, Burning, *Water yield, Debris avalanches, Vegetation, Watersheds(Basins), Measurement, Evapotranspiration.
Identifiers: Wildfire, Debris torrents.

More than 120,000 acres of forested land in North-Central Washington were burned in 1970, including the 4,620-acre Entiat Experimental Forest where hydrologic measurements began in 1961. Water yield increased 50% the first year after the fire because of reduced evapotranspiration losses. Stream temperature increased by as much as 10F. Record precipitation amounts, combined with minimal vegetative cover during the second post-fire year, triggered debris torrents which destroyed two stream gaging stations, but 27 inches of runoff were measured at the gaging station which survived. This was 360% of maximum annual runoff during calibration and 260% of yield during the previous year. (Forest Service)
W75-03820

FIRT YEAR VEGETATION AFTER FIRE, RESEEDING, AND FERTILIZATION ON THE ENTIAT EXPERIMENTAL FOREST,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-03823

4D. Watershed Protection

HYDROLOGIC SIMULATION OF A COMPLEX WATERSHED,
Washington State Univ., Pullman. Coll. of Engineering.
For primary bibliographic entry see Field 2A.
W75-03325

OPPORTUNITIES FOR WATERSHED MANAGEMENT IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst.
P. A. Rechard.
In: Proceedings of the Irrigation and Drainage Division Speciality Conference, Fort Collins, Colorado, April 22-24, 1974, p 423-448. 9 fig, 21 ref. OWRT B-021-WYO(1).

Descriptors: *Wyoming, Water vapor, Precipitation(Atmospheric), *Rainfall-runoff relationships, Weather modification, *Watershed management, *Water yield improvement, Water supply, *Alternative water use, Management.

On an average day about 5 million acre-feet of water pass over the State of Wyoming in the form of water vapor. This amounts to almost 2 billion acre-feet per year. Of this quantity, approximately 80 million acre-feet fall on the state as precipitation during an average year, and about 15 million acre-feet run off in the streams and rivers. Proportionately, these figures indicate that only 4 percent of the precipitable water in the atmosphere above Wyoming falls as precipitation and of that, about 20 percent becomes streamflow. Rough as these figures are, they indicate that there are sizable quantities of water which might be convertet to supply by various techniques. The Wyoming Water Planning Program (1971) recognizes several viable alternatives for water supply development. Among those identified are: weather modification, which attempts to improve the efficiency of the precipitation processes, and watershed management techniques, which attempt to increase the amount of water made available to beneficial uses after precipitation occurs. Presented are some approximate quantities of water supply that might be made available in Wyoming under some selected watershed management practices.
W75-03326

STUDY AND SURVEY OF LAKE MICHIGAN SHORE LINE,
For primary bibliographic entry see Field 6E.
W75-03357

EVOLUTION OF THE SMALL WATERSHED PROGRAM, CHANGES IN PUBLIC LAW 566--WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM, 1954-72,
Economic Research Service, Washington, D.C. National Resource Economics Div.
D. M. Lea, and C. D. Mattson.
Agricultural Economic Report No 262, June 1974. 58 p, 9 fig, 28 tab, append.

Descriptors: *Watershed Protection and Flood Prevention Act, *Evaluation, *Federal government, *Watershed management, *Small watersheds, Flood protection, Watersheds(Basins), Agricultural watersheds, Drainage, Drainage programs, Multiple-purpose projects, Local governments, Governmental interrelations, Water resources development, Irrigation, Recreation, Water policy, Water management(Applied), Administration, Non-structural alternatives, Water supply development, Industrial water, Municipal water, Wildlife, Management, Water supply, Governmental interrelations.
Identifiers: *Environmental policy, Administrative regulations.

The operation of the Small Watershed Program which provides federal technical and financial assistance for water management to local organizations is evaluated. From 1954 through 1972, the scope of the watershed program has expanded considerably, but flood protection for farm land remains its most significant feature. Congressional action during this time has expanded the program to include development of recreation, fish and wildlife resources, and municipal and industrial water supply. However, the watershed program has remained predominantly agricultural, with drainage and irrigation, as well as flood protection, comprising the most significant part of the program. Changes in the Small Watershed Program since its inception are identified and its varied emphases among different regions of the United States are measured. (Deckert-Florida)
W75-03483

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM AND RESOURCE CONSERVATION AND DEVELOPMENT PROGRAM--PROPOSED WATER QUALITY MANAGEMENT GUIDELINES.
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03491

SURVEY OF EROSION AND LAND USE WITHIN THE CATCHMENT AREA OF KEEPIT DAM (AUSTRALIA): PART 1 - CLIMATE, GEOLOGY, SOILS,
Soil Conservation Service of New South Wales, Sydney (Australia).
K. A. Emery.
Journal of the Soil Conservation Service of New South Wales, Volume 30, No 4, p 229-245, October 1974. 3 fig, 5 tab, 11 ref.

Descriptors: *Erosion, *Surveys, *Watersheds(Basins), *Australia, Sedimentation, *Reservoir silting, Soil surveys, Soil types, Rainfall disposition, Climatic data, Geological surveys, Geomorphology, Reservoirs, Silting, Silts.
Identifiers: *Keepit Dam(NSW), Namoi River(NSW).

Siltation of Keepit Dam, designed to regulate the annual discharge of water in the Namoi River, New South Wales, and of the watercourses within the catchment area, poses a threat to the economic viability of the Dam. A survey of erosion within the area was carried out in 1970-71 to allow for selection of sites for soil conservation treatment. The survey is discussed in terms of two physiographic regions of the catchment: a gently undulating area (Northern Tablelands) and an area of steeper, folded terrain (North Western Slopes). Detailed comparisons are provided of the climate, geology and soils of the two regions in relation to erosion hazard. The North Western Slopes, in particular, are characterized by gentle slopes rising abruptly to high ridges, the occurrence of high intensity storms during critical periods, and erodible soils. (Levick-CSIRO)
W75-03530

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. I. WATER YIELD RESPONSE AND EFFECTS ON OTHER RESOURCES,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W75-03572

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. II. AN ECONOMIC ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W75-03573

THE HYDROLOGY OF A SMALL CATCHMENT BASIN AT SAMARU, NIGERIA: III. ASSESSMENT OF SURFACE RUN-OFF UNDER VARIED LAND MANAGEMENT AND VEGETATION COVER,
Institute for Agricultural Research, Zaria (Nigeria).
For primary bibliographic entry see Field 4A.
W75-03765

WATERSHED BEHAVIOR AFTER FOREST FIRE IN WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-03820

STREAM CHEMISTRY FOLLOWING A FOREST FIRE AND UREA FERTILIZATION IN NORTH-CENTRAL WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2K.
W75-03822

FIRT YEAR VEGETATION AFTER FIRE, RESEEDING, AND FERTILIZATION ON THE ENTIAT EXPERIMENTAL FOREST,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
A. R. Tiedemann, and G. O. Klock.
Available from Library Pacific Northwest Forest and Range Expt. Sta., Box 3141, Portland, Ore. 97208. U.S.D.A. Forest Service Research Note PNW-195, March 1973. 5 fig, 3 tab, 17 ref. PNW 1601.

Descriptors: *Revegetation, *Vegetation regrowth, *Erosion control, *Forest fires, *Fertilization, Nitrogen, Sulfur, Orchardgrass, Fescues, Timothy, Perennial rye grass, Clovers, *Washington.
Identifiers: Entiat Experiment Forest(Wash).

To determine regrowth of native species and the success of erosion control seeding and fertilization, vegetative cover measurements were made on permanent belt transects during 1971 on four watersheds severely and uniformly burned in 1970 that received the following treatments: seeded and fertilized with 57 kilograms per hectare of nitrogen as ammonium sulfate; seeded and fertilized with 54 kilograms per hectare of nitrogen as urea; seeded only; and control (no seeding, no fertilizer). Erosion control seeding improved first-year vegetative cover by up to one-third. Of the seeded species, orchard grass, hard fescue, and timothy provided most of the first-year cover. Perennial rye and yellow sweetclover showed poor development. Fertilizer did not increase vegetative cover but did improve vigor of seeded species. (Forest Service)
W75-03823

ECOLOGY OF RIVER NARMADA UPPER CATCHMENT AREA IN CENTRAL INDIA: I. INTRODUCTION, SITUATION, TERRAIN, LITHOLOGY, CLIMATE, GENERAL FORESTS AND METHODS OF VEGETATIONAL ANALYSIS,
Saurashtra Univ., Rajkot (India). Dept. of Biosciences.
C. C. Pandeya, S. M. Pandya, and M. S. Murthy.
Indian Bot Soc. Vol 51, No 3/4, p 356-373, 1972.
Identifiers: *Catchments, Climates, Coefficients, Ecology, Forests, Growth, *India(River Narmada), Lithology, Methods, Phytosociology, Rivers, Statistics, Terrain, *Vegetational analysis.

A systematic ecological survey of the native vegetation of the River Narmada Upper Catchment Area was executed in 4 phases for flood control and soil conservation. The 1st phase consisted of ecological survey of only the forest vegetation in the area. It deals with the situation, terrain, lithology, climate, general vegetation and methods of vegetational analysis. Vegetation was analyzed for phytosociological characters by quantitative methods and in total 22 associations were arrived at by an objective method of statistical computation of coefficient of variation of density and cover and finally computed by an Index of relative growth (RGI).--Copyright 1974, Biological Abstracts, Inc.
W75-03826

STUDY OF DRAINAGE PATTERNS IN THE MAHANADI CATCHMENT (ABOVE HIRAKUD DAM),
Indian Agricultural Research Inst., Nagpur. All India Soil Land Use Survey.
N. K. Shende, R. M. Pofali, and V. S. Deshmukh.
J Indian Soc Soil Sci 21(3): 323-327, Illus. 1973.

Descriptors: Asia, *Drainage patterns(Geologic), *Watershed management, Management, *Water sheds(Basins), Dams, *Erosian control.
Identifiers: *India(Mahanadi catchment).

Drainage pattern analysis in different landscape units furnishes useful information for watershed management with special reference to erosional features. The Mahanadi catchment, comprising an area of 84,000 km2, was analyzed for drainage pattern and drainage texture studies which revealed that the catchment exhibits the development of trellis, annular, rectangular, pinnate phantom, radia, dendritic and braided drainage patterns having fine to coarse drainage textures. In areas having fine textured dendritic pattern, the streams are excessively loaded with finer material of silt while in areas with pinnate, phantom and radial drainage patterns, the streams are charged with coarser material in the form of sand and gravel. Both the areas are the sore spots of erosion and conservation measures to check silt and sand load are imperative.--Copyright 1974, Biological Abstracts, Inc.
W75-03835

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

SOURCES OF PHOSPHORUS INPUTS FROM THE ATMOSPHERE AND THEIR SIGNIFICANCE TO OLIGOTROPHIC LAKES,
De Paul Univ., Chicago, Ill. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-03304

GAS CHROMATOGRAPHY OF VOLATILE METAL CHELATES: APPLICATION OF A NEW TECHNIQUE TO METAL ANALYSIS IN NATURAL WATERS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
R. A. Minear, and S. Schneiderman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 626, $3.75 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No 94, 1974. 50 p, 15 fig, 7 tab, 32 ref. OWRT A-064-ILL(1). 14-31-0001-4013.

Descriptors: *Pollutant identification, *Analytical techniques, *Gas chromatography, Cadmium, Copper, Iron, Lead, Nickel, Zinc, Organic compounds, Water analysis, *Metals, Heavy metals, *Chelation.
Identifiers: *Metal chelates, Heavy metals analysis.

Originally, the application of commercially available monothiohexafluoroacetylacetone (HFAS) and its formation of volatile chelates with metals of environmental significance to rapid, multi-element analysis was under investigation. Inability to reproduce published results for the Nickel chelate led to critical examination of the chelating agent and ultimately to withdrawal of the compound from the commercial market when its identity and purity were found to be questionable. Independent synthesis of HFAS was unsuccessful and initial project objectives were abandoned. Project objectives were redirected to verification and extension of previous studies involving the lead chelate of 2,2,6,6-tetra-methylheptane-3,5-dione (PIV). Extraction studies were conducted using flameless atomization atomic absorption for analysis but are of questionable value as a result of analytical inconsistencies. Gas chromatographic studies indicated previously reported synthesis of Pb(PIV)2 had likely not been achieved. Both HFAS and PIV studies were unsuccessful and have resulted in programs of independent synthesis and continued research.
W75-03305

PESTICIDE ANALYSIS FROM URBAN STORM RUNOFF,
Nebraska Wesleyan Univ., Lincoln.
G. Dappen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 593, $3.75 in paper copy, $2.25 in microfiche. Addendum to Completion Report 'Water Quality Models for Urban and Suburban Areas', August 21, 1974, 40 p. OWRT A-025-NEB(2).

Descriptors: Water quality, *Urban runoff, Pesticides, *Storm runoff, *Pollutant identification, *Pesticide residues, Heptachlor, Chlorinated hydrocarbon pesticides, Rainfall.
Identifiers: Lindane, Dacthal.

Urban storm runoff was analyzed for pesticide content. Hexachlorobenzene (HCB), pentachloronitrobenzene (PCNB), heptachlor, heptachlor epoxide, lindane, and dacthal were identified and selected for monitoring. Lindane and dacthal were primarily used in the determination of the profile and runoff patterns during a rainstorm. Although pesticide concentrations were higher near the end of the runoff period, the largest amount of pesticide flushing from an area occurred during the maximum runoff period. Major rains, rains that followed periods of wet weather, or rains of longer duration produced higher quantities of pesticides running off than moderate rains of high intensity following dry periods. Much variation in the amount of pesticide running off was encountered. (See also W75-03311)
W75-03312

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS: A STAFF STUDY,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-227 113, $4.75 in paper copy, $2.25 in microfiche. Report January 1973. 92 p, 8 fig, 11 tab, 2 append.

Descriptors: *Long-term planning, Environmental engineering, Planning, *Monitoring, Data collections, *Nevada, *Remote sensing, *Comprehensive planning, Bioindicators, Pollutant identification.
Identifiers: *Las Vegas(Nev).

Results of a comprehensive examination of the future mission of the Environmental Protection Agency's Las Vegas Office of Research and Monitoring (ORM) are summarized. Officially designated a National Environmental Research Center in 1972, the laboratory's primary thrust has been environmental engineering with present programs including sampling and monitoring activities, aerial surveillance, and remote sensing for a number of agencies in addition to EPA. The history of the laboratory, its organization, administrative services, personnel, and facilities are reviewed. Present monitoring programs are discussed. Seven NERC project areas are identified which can best be performed at the Las Vegas site: (1) aerial surveillance support, (2) development and field testing of aerial remote sensing devices, (3) biological monitoring of the

environment, (4) development and field testing of noise monitoring instruments, (5) development and demonstration of monitoring networks, (6) development of data interpretation techniques, and (7) special staff studies. Project examples to implement each of these program areas are demonstrated. (Schroeder-Wisconsin)
W75-03347

THE NASA ROLE IN MAJOR AREAS OF HUMAN CONCERN.
Denver Research Institute, Colo.
Available from the National Technical Information Service, Springfield, Va. 22161, as N73-25426. $3.25 in paper copy, $2.25 in microfiche. NASA Report NASA-CR-133049, February 1973. 17 p, 42 ref. NASW-2362.

Descriptors: *Pollution abatement, *Pollutant identification, Chemical analysis, Analytical techniques, *Monitoring, Measurement, Weather forecasting, Energy, Satellites(Artificial), Aircraft, *Remote sensing, Environmental effects, *Monitoring.
Identifiers: Energy conservation, Solar energy cells.

Attempts to integrate space technology and information gathering systems into environmental planning are reviewed. Much of this integration centers on joint efforts to develop pollution monitoring equipment. NASA Lewis Research Center is assisting Cleveland in developing an air pollution monitoring system; NASA Langley and Ames Research Centers are assisting California in assessing the impacts of aerosols and in applying NASA sensing technology to environmental and safety problems (forest fire detecting). NASA Ames Research Center has also participated with the Coast Guard in a program for detecting and determining the size of oil slicks via sensing devices. Other NASA programs have aided in the study of weather forecasting and the impacts of pollution on the weather as well as in the discovery and development of new energy resources. (Schroeder-Wisconsin)
W75-03349

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974.
Los Alamos Scientific Lab., N. Mex.
Available from the National Technical Information Service, Springfield, Va. 22161, as Rept. No LA-5666-PR, $4.00 in paper copy, $2.25 in microfiche. Report No LA-5666-PR, July 1974. 27 p, 6 fig, 5 tab, append.

Descriptors: Management, *Radioactive waste, *Waste disposal, *Waste treatment, Waste storage, Transportation, Radioactivity effects, Corrosion, Corrosion control, Safety, Evaluation, Air pollution, Water pollution, Soil contamination, Public health.
Identifiers: Radiolysis, *Transuranics.

Progress is reviewed for three transuranic solid waste management research programs funded by the AEC Division of Waste Management and Transportation during the period of January-March 1974. The interim storage criteria for transuranic wastes have been redesignated as guidelines and will be issued as a Los Alamos Scientific Laboratory document after incorporation of final revisions. Studies of corrosion of mild steel in humid air have shown that Zinc Chromate Underseal, Chemical and Water-Resistant Restoleum Industrial Coating, and Rust Gard do not prevent corrosion. Analyses of the gaseous products of radiolysis of cellulosics contaminated with 1.2 mg 238Pu/g waste matrix have shown hydrogen and carbon dioxide to be the major products. Waste production is being evaluated on an individual process basis, and flowsheets are being prepared to show material input and waste output for each plutonium handling process. The Transuranic-Contaminated Solid Waste Treatment Development Facility has been redesigned to permit increased research ability and flexibility. The program to evaluate past burial practices has been redirected to emphasize local burial areas. Fluid dynamics computer codes are being evaluated for use in soil transport, atmospheric dispersion, and resuspension models. Agricultural and population data are being obtained for the areas surrounding Los Alamos. (Houser-ORNL)
W75-03420

COLLECTION AND ANALYSIS OF PUMP TEST DATA FOR TRANSMISSIVITY VALUES,
Battelle Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03421

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03422

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE: A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
L. Linnman, A. Andersson, K. O. Nilsson, B. Lind, and T. Kjellstrom.
Arch Environ Health, Vol 27, No 1, p 45-47, 1973, Illus.
Identifiers: *Absorption, *Atomic absorption, *Cadmium, *Neutron activation analysis, Nutrients, *Sewage sludge, *Wheat, Analytical techniques, Pollutant identification.

Wheat was grown in test pots at 4 different sewage sludge concentrations and 3 different pH levels in order to study the Cd uptake from sewage sludge. The sludge contained 10 ppm Cd, which is below the average Cd concentration in sludge from Swedish sewage sludge plants. The analysis of Cd in wheat was performed by 2 methods, atomic absorption and neutron activation analysis, and good agreement was found between results from the methods. The Cd uptake increases strongly with increasing sewage sludge concentrations. Cd from sewage sludge used as a plant nutrient source is resorbed by plants. The pH of the soil was of great importance for the uptake of Cd. Lower pH gave greater Cd uptake.--Copyright 1974, Biological Abstracts, Inc.
W75-03503

DETERMINATION OF MERCURY IN WATER AND PLANT MATERIAL BY FLAMELESS ATOMIC ABSORPTION,
Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen.
L. Kiekens, M. Verloo, and A. Dhaese.
Meded Fac Landbouwwet Rijksuniv Gent, Vol 38, No 1, p 9-14, 1973.
Identifiers: Alfalfa, *Atomic absorption, Corn(Field), Leaves, *Mercury, Spinach, Tobacco, Water pollution, Sampling, *Pollutant identification, Water analysis, *Analytical techniques.

The possibilities of flameless atomic absorption for the determination of Hg in water and plant material (spinach, corn leaves, tobacco leaves and alfalfa) are described. For the destruction of plant material a rapid digestion procedure at relative low temperature is described, using a mixture of concentrated nitric and sulfuric acid with V2O5 as a catalyst. The detection limit of the method is about 0.15 ppb for water samples and 0.1 ppm in the dry matter for plant material.--Copyright 1974, Biological Abstracts, Inc.
W75-03504

MONITORING 2,4-D RESIDUES AT LOXAHATCHEE NATIONAL WILDLIFE REFUGE,
Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.
D. P. Schultz, and E. W. Whitney.
Pestic Monit J, Vol 7, No 3/4, p 146-152, 1974, Illus.
Identifiers: Cassidix-mexicanus, Eichhornia-crassipes, Fish, *Florida(Loxahatchee National Wildlife Refuge), Gallinula-chloropus, *Monitoring, Mud, *National Wildlife Refuges, Pollution, Refuge, Weedicide, Wildlife, *2-4-D, *Pesticide residues, Water quality, *Pollutant identification, *Path of pollutants.

Over 7000 acres along the Hillsboro perimeter canal in Loxahatchee National Wildlife Refuge (NWR), Florida, were sprayed in 1971 with the dodecyl-tetradecyl amine salts of 2,4-D ((2,4-dichlorophenoxy) acetic acid) (DTA-2,4-D) at a rate of 4.48 kg acid equivalent (a.e.)/ha to control waterhyacinth (Eichornia crassipes). Three stations were established along the canal to collect samples of fish, water and mud for residue analysis and to monitor water quality. The initial application of 2,4-D, followed by spot treatments of DTA-2,4-D and/or the dimethylamine salt of 2,4-D (DMA-2,4-D) over a 4 mo. period, achieved excellent control of water hyacinth. The highest 2,4-D residue level measured in water (0.037 mg/l) was found on the day following the initial treatment. The highest levels in hydrosol (0.005 mg/kg) occurred 3-15 days after treatment. Among 60 samples of fish, 3 had herbicide residue levels greater than 0.010 mg/kg, 16 had less than 0.010 mg/kg, and the remainder had no detectable residue levels. Breast muscle and liver of common Florida gallinules (Gallinula chloropus) had residue levels of 0.30 mg/kg and 0.675 mg/kg, respectively, 1 day after spraying, and no detectable residues 4 days after spraying. The herbicide apparently caused no ill effects on hatching of boat-tailed grackle (Cassidix mexicanus) eggs or development of fledglings.--Copyright 1974, Biological Abstracts, Inc.
W75-03506

ACCUMULATION EXPERIMENTS WITH LINDANE IN A CULTURE OF DUNALIELLA FOR STANDARDIZATION OF AN ALGAE TEST. (AKKUMULATIONSVERSUCHE VON LINDEN IN EINER KULTER VON DUNNALIELLA SPEC. ZUR STANDARISIERUNG EINES ALGENTESTES),
Hamburg Univ. (West Germany). Institut fuer Hydrobiologie und Fischereiwissenschaft.
For primary bibliographic entry see Field 5C.
W75-03508

PHYSIOLOGICAL AND ECOLOGICAL SIGNIFICANCE OF THE CHEMICAL INSTABILITY OF THE URIC ACID AND RELATED PURINES IN SEA WATER AND MARINE ALGAL CULTURE MEDIUM,
Fisheries and Marine Service, Vancouver (British Columbia). Vancouver Lab.
For primary bibliographic entry see Field 5C.
W75-03512

MERCURY CONTENT OF FISH AND SHRIMPS CAUGHT OFF THE BELGIAN COAST,
Ministere de l'Agriculture, Ostend (Belgium). Sea Fisheries Research Station.
For primary bibliographic entry see Field 5C.
W75-03518

DISSOLVED OXYGEN REQUIREMENTS OF NEWLY-HATCHED LARVAE OF THE STRIPED BLENNY (CHASMODES BOSQUIANUS), THE NAKED GOBY (GOBIOSOMA

BOSCI), AND THE SKILLETFISH (GOBIESOX STRUMOSUS),
Muskingum Coll., New Concord, Ohio.
For primary bibliographic entry see Field 5C.
W75-03519

AUTOMATIC DOSAGE OF SULFATES BY AN IMPROVED NEPHELOMETRIC METHOD DOSAGE AUTOMATIQUE DES SULFATES PAR UNE METHODE NEPHELOMETRIQUE AMELIOREE),
nstitut d'Hygiene et d'Epidemiologie, Brussels (Belgium).
G. Verduyn, and A. Derouane.
Atmospheric Environment, Vol 8, No 7, p 707-715, July, 1974. 6 fig, 1 tab, 15 ref.

Descriptors: Automation, *Sulfates, Measurement, *Analytical techniques, Equipment, *Rain water, *Pollutant identification.
Identifiers: *Nephelometric methods.

An automatic nephelometric method for the determination of low concentrations of sulfate is described. It permits the determination of concentrations as low as 0.1 microgram per cu cm. Sulfate ions are precipitated by means of barium perchlorate and fifty samples can be analyzed in an hour. This method is applicable to the determination of sulfate amounts in rain water. The equipment used is a Technicon Auto Analyser, connected with a two monochromators spectrofluorimeter. (Prague-FIRL)
W75-03536

DETERMINATION OF N,N-DIALKYL DITHIOCARBAMATES IN WASTE WATER BY THIN-LAYER DENSITOMETRY,
anada Centre for Inland Waters, Burlington Ontario).
. I. Onuska.
nalytical Letters, Vol 7, No 5, p 327-334, 1974. 1 g, 2 tab, 20 ref.

escriptors: *Herbicides, *Waste ater(Pollution), Analytical techniques, Copper, Pollutant identification, *Thiocarbamate pesticides, Carbamate pesticides.
dentifiers: N-N-dialkyl dithiocarbamates, Densitometry.

he increasing awareness and importance of very nall amounts of various herbicides in waste ater has greatly stimulated refinement and exten-on of analysis pertaining to water media. The uantitative determination of N,N-dialkyl thiocarbamates tetramethylthiuram disulfide and tramethylthiuram monosulfide in waste water as studied by thin-layer densitometry of their pper complexes. A densitometer provides a sim-e and rapid means to quantify these compounds. ,N-dialkyl dithiocarbamates were analyzed in icrogram quantities using this method. (Prague-IRL)
75-03537

N AUTOMATED METHOD FOR DETERMINATION OF CHLORIDE AND SULFATE IN RESHWATER USING CATION EXCHANGE ND MEASUREMENT OF ELECTRICAL CONUCTANCE,
sheries Research Board of Canada, Winnipeg Manitoba). Freshwater Inst.
. P. Stainton.
mnology and Oceanography, Vol 19, No 4, p 7-711, July 1974. 2 fig, 5 tab, 6 ref.

escriptors: *Water analysis, *Chlorides, ollutant identification, *Sulfates, Freshwater, ation exchange, *Electrical conductance, Ion change, Water properties, Analytical chniques, Surface waters, Chemical analysis, trates, Fluorides, Iodides, Bromides, Halogens, ssolved solids, Salts.

A simple automated adaptation of Mackereth's manual method for determining chloride and sulfate in freshwater is described, using hydrogen ion-exchange to convert chloride and sulfate salts to their free acids with detection by electrical conductance. The use of silver-saturated exchange resin to precipitate chloride permits distinction between chloride and sulfate. Detection limit is good at 2 microequivalents/liter with excellent precision (plus or minus 1.5% at 200 microequivalents/liter). High levels of nitrate, orthophosphate, and fluoride gave positive interference for sulfate; bromide and iodide similarly interfere with chloride estimates. (Witt-IPC)
W75-03576

DETERMINATION OF TOTAL WATER HARDNESS BY CONDUCTOMETRIC TITRATION WITH COMPLEXING AGENTS (DETERMINAREA DURITATII TOALE A APEI PRIN TITRARI CONDUCTOMETRICE CU COMPLEXONI),
Institutul Politehnic, Iasi (Rumania).
N. Alelenei.
Buletinul Institutului Politehnic din Iasi, Sectia II: Chimie, Vol 20 (24), No 1-2, p 23-28, 1974. 3 fig, 1 tab, 8 ref. English summary.

Descriptors: *Water analysis, *Hardness(Water), *Water properties, *Analytical techniques, *Water chemistry, Volumetric analysis, Cations, Calcium, Magnesium, Iron, Aluminum, Copper, Manganese, Chelation, Nitrilotriacetic acid, Aqueous solutions.
Identifiers: Complexometry, Electroconductance, Conductometry, Chelating agents, Triethanolamine, Ethylenediaminetetraacetic acid, EDTA.

Triethanolamine, nitrilotriacetic acid, and the di- and tetrasodium salts of EDTA (ethylene-diaminetetraacetic acid) were used as complexing agents in low-frequency (50 Hz) conductometric titrations of total hardness in waters and dilute aqueous solutions. The tetra-sodium EDTA was buffered with sodium borate at pH 9-10. Triethanolamine permitted total hardness determinations in the presence of trivalent Fe and traces of divalent Cu and Mn. However, the presence of Al ions interfered with the titration of Ca and Mg. (Brown-IPC)
W75-03604

AUTOMATED PHOSPHATE ANALYSIS IN THE PRESENCE OF ARSENIC,
Canada Centre for Inland Waters, Burlington (Ontario).
P. D. Goulden, and P. Brooksbank.
Limnology and Oceanography, Vol 19, No 4, p 705-707, July, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Water analysis, *Phosphates, *Pollutant identification, *Colorimetry, *Arsenic compounds, Analytical techniques, Color reactions, Water properties, Inorganic compounds, Chemical analysis, Automation.

An automated method is described for eliminating arsenate interference in the determination of phosphate in natural waters by the molybdenum blue method. The arsenate is reduced to arsenite by thiosulfate in an acidic medium before the color-producing reagents are added. (Witt-IPC)
W75-03607

THE DETERMINATION OF ARSENIC BY NON-DISPERSIVE ATOMIC FLUORESCENCE SPECTROMETRY WITH A GAS SAMPLING TECHNIQUE,
Hitachi Ltd., Tokyo (Japan). Central Research Lab.
K. Tsujii, and K. Kuga.
Analytica Chimica Acta, Vol 72, No 1, p 85-90, September, 1974. 7 fig.

Descriptors: *Fluorescence, *Spectroscopy, *Arsenic compounds, *Analytical techniques, Metals, Testing procedures, Instrumentation, *Pollutant identification.

Arsenic was converted to arsine in a mixed acid medium containing iodide, tin (II) and zinc powder and was atomized in a hydrogen-argon-entrained air flame. A microwave-excited (2450 MHz) electrodeless arsenic discharge lamp, a solar-blind photomultiplier, and a lock-in amplifier were used. The burner slot configuration was shown to have an effect on the maximal fluorescence intensity. Three configurations were tried. The flame composition was not a critical factor regarding the fluorescence intensity when the argon flow rate was kept constant. However, the noise level was markedly affected by the flame composition, and the signal-to-noise ratio was improved with low flow rates of hydrogen. The burner height also had an effect on the fluorescence intensity. The detection limit of arsenic, defined as the quantity for which the signal-to-noise ratio was equal to 2, was 2 ng and the linear working range covered nearly 3 decades of concentration. (Pulliam-Vanderbilt)
W75-03612

A STUDY OF ADSORPTION CHARACTERISTICS OF TRACES OF CHROMIUM(III) AND (VI) ON SELECTED SURFACES,
Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
A. D. Shendrikar, and P. W. West.
Analytica Chimica Acta, Vol 72, No 1, p 91-96, September, 1974. 3 fig, 1 tab, 9 ref.

Descriptors: *Water sampling, *Chromium, *Heavy metals, Laboratory tests, *Adsorption, Chemical analysis, Reliability, *Analytical techniques, Sampling, *Pollutant identification.

The losses of chromium (III) and (VI) due to adsorption on the walls of containers of pyrex, flint-glass and polyethylene were investigated. These materials were selected since they are very commonly used for sample storage purposes. Chromium (III) or (VI) solutions were stored in beakers at different hydrogen ion concentrations, and losses due to adsorption were measured at various contact times by counting the gamma-ray activity from chromium-51 radiotracer. At pH 6.95, chromium (III) solutions showed the greatest instability. In polyethylene beakers, losses reached 25% of the initial metal concentration in 15 days. Similar results for flint glass and pyrex were 19% and 17% respectively. Losses during a contact time of 24 hours were negligible. Chromium (III) solutions in 0.5% nitric acid as well as at a pH of 3.1 showed losses of less than 0.5% at the end of 15 days. The behavior of chromium (VI) showed a completely different pattern from that of chromium (III). Losses of less than 1.0% were observed on all three materials at the end of 15 days at pH 6.95. (Pulliam-Vanderbilt)
W75-03613

THE OPENING UP OF INSOLUBLE OXIDES (TANTALUM, NIOBIUM, CHROMIUM, ALUMINIUM, AND OTHERS), WITH LIQUID SELENIUM DIOXIDE,
Philips Gloeilampenfabrieken N.V., Eindhoven (Netherlands).
B. J. Mulder.
Analytica Chimica Acta, Vol 72, No 1, p 220-222, September, 1974. 5 ref.

Descriptors: *Analytical techniques, *Oxides, *Metals, *Solvents, Separation techniques, Solvent extractions, Testing procedures, Laboratory tests, *Pollutant identification.

Liquid selenium dioxide is a useful solvent for a large number of 'insoluble' oxides. Details were given for Ta205, Nb205, Cr203 and Al203, with directions for the preparation of aqueous solutions. Pyroselenites were derived from the cor-

responding oxides by substituting Se205 for oxygen. Although most metal oxides rapidly dissolved in, or reacted with, liquid selenium dioxide, silica in the form of quartz glass was much less reactive. Pyrex glass was attacked at about the same rate as quartz glass, but gave rise to contamination by a larger number of elements. For Cr203, there seemed to be no alternative method that left the chromium in the trivalent state. The only 'undissolved' oxide of those investigated was Sn02. An attractive feature of selenium dioxide is its high vapor pressure which permits purification by sublimation. (Pulliam-Vanderbilt)
W75-03614

RARE EARTH ELEMENTS IN FERROMANGANESE NODULES AND OTHER MARINE PHASES,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-03615

MERCURY DETERMINATION AT THE MICROGRAM LEVEL BY A REDUCTION-AERATION METHOD OF CONCENTRATION,
Western Washington Research and Extension Center, Puyallup.
Y. Kimura, and V. L. Miller.
Analytica Chimica Acta, Vol 27, No 4, p 325-331, October, 1962. 1 fig, 3 tab, 9 ref.

Descriptors: *Mercury, *Analytical techniques, *Separation techniques, *Photometry, Aeration, Filtration, Tin, *Pollutant identification.
Identifiers: *Microanalysis.

A method for the determination of mercury using a concentrating aeration procedure at room temperature following digestion of the samples with sulfuric acid, hydrogen peroxide and potassium permangate was discussed. Its chief advantages were elimination of filtration, applicability to mercury solutions in sulfuric acid to 22N, nitric acid to 8N, and nitric and sulfuric mixtures to 4N and 8N respectively and ability to concentrate dilute mercury solutions during the process of mercury separation in order that the entire sample may be taken for analysis. Final analyses were made from solutions of constant composition and volume regardless of the original material and volume of the digest or solution. Mercury was concentrated during the separation and was determined by a direct photometric dithizone procedure. The technique was applicable for 0.10 microgram mercury per sample charge with a standard deviation for a single determination of 0.05 microgram mercury in the 0 to 0.5 microgram range. (Jernigan-Vanderbilt)
W75-03617

ATOMIC ABSORPTION SPECTROPHOTOMETRIC DETERMINATION OF MICROGRAM LEVELS OF CO, NI, CU, PB, AND ZN IN SOIL AND SEDIMENT EXTRACTS CONTAINING LARGE AMOUNTS OF MN AND FE,
Geological Survey, Denver, Colo.
T. T. Chao, and R. F. Sanzolone.
Journal of Research of the U.S. Geological Survey, Vol 1, No 6, p 681-685, November-December, 1973. 2 fig, 7 tab, 14 ref.

Descriptors: *Heavy metals, *Analytical techniques, *Soils, *Sediments, *Variability, Spectroscopy, Cobalt, Nickel, Copper, Lead, Zinc, Manganese, Iron, Instrumentation, *Pollutant identification.
Identifiers: Atomic absorption spectroscopy.

An atomic absorption spectrophotometric method was developed for the determination of seven metal ions in the hydroxylamine extract of soils and sediments. Mn, Fe, and Zn were directly determined in the aqueous extract upon dilution. Co, Ni, Cu, and Pb in a separate aliquot of the extract were chelated with APDC (ammonium pyrrolidine dithiocarbamate) and extracted into MIBK (methyl isobutyl ketone) before determination. Data were presented to show the quantitative recovery of microgram levels of Co, Ni, Cu and Pb by APDC-MIBK chelation-extraction from synthetic solutions containing as much as 2000 micrograms/ml Mn or 50 micrograms/ml Fe. Recovery of known amounts of the metal ions from sample solutions was equally satisfactory. Reproducible results were obtained by replicate analyses of two sediment samples for the seven metals. (Pulliam-Vanderbilt)
W75-03618

RADIORESPIROMETRY: RAPID TOXICOLOGICAL SCREENING OF ENVIRONMENTAL POLLUTANTS,
National Environmental Research Center, Cincinnati, Ohio. Environmental Toxicology Research Laboratory.
S. D. Lee, R. M. Danner, L. McMillan, W. Moore, Jr., and J. F. Stara.
News of Environmental Research in Cincinnati, October 11, 1974. 4p, 2 fig, 3 tab, 22 ref.

Descriptors: *Sulfur, *Analytical techniques, *Environmental effects, *Toxicity, *Mercury, Biochemistry, Metabolism, Respiration, Animal physiology, Laboratory animals, Testing procedures, *Pollutant identification.
Identifiers: *Radiorespirometry, Methylmercury.

The objective was to develop new techniques or to apply existing methods that are capable of detecting early biochemical lesions, before the appearance of overt toxic symptoms, resulting from low concentrations of environmental pollutants. Radiorespirometry is such a technique and was used to measure expired 14CO2 in a biological system metabolizing 14C-labeled compounds. CO2 excretion responds rapidly to changes in the metabolic alterations of the body. The effects of SO2 and methylmercury exposure on 14CO2 output were studied. Intragastric administration of methylmercury chloride 24hr before testing suppressed 14CO2 output following intravenous injection of 1-14C-glucose. These changes may or may not be detrimental to the animals; an alteration from the normal pattern of glucose catabolism was merely indicated. The main significance was that a biochemical change was detectable at low concentrations of 0.05 and 0.1 mg per kg levels, in vivo. (Pulliam-Vanderbilt)
W75-03619

SELECTIVE DETERMINATION OF IRON IN ALLOYS BY REACTION WITH 2,3-PYRIDINEDIOL AND RING COLORIMETRY,
M.M.H. College, Ghaziabad (India). Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-03623

DETERMINATION OF LEAD IN ATMOSPHERIC PARTICULATES BY FURNACE ATOMIC ABSORPTION,
Varian Instrument Div., Palo Alto, Calif.
J. F. Lech, D. Siemer, and R. Woodriff.
Environmental Science and Technology, Vol 8, No 9, p 840-844, September, 1974. 8 fig, 2 tab, 18 ref. NSF (GP28055).

Descriptors: *Lead, *Air pollution, *Analytical techniques, *Spectroscopy, Toxicity, Filters, Porous media, Trace elements, *Pollutant identification.
Identifiers: Atomic absorption.

The use of furnace atomic absorption along with porous graphite filtration for the determination of atmospheric lead was discussed. Using the Woodriff furnace as the atomization device and cups made of porous graphite, air samples were taken and the cups were inserted into the furnace for determination with no other chemical or physical treatment. The sensitivity of the determination based on a minimum detectable recorder deflection of 1% was 2.5 x 10 to the minus 12th power gram/sample, equivalent to 0.005 microgram/cu m for a 100-cc air sample. When a standard particulate generator was used, the porous graphite compared favorably with Millipore filters. Organic lead however, was not found to be retained by either type of filter. (Jernigan-Vanderbilt)
W75-03624

KINETIC-COULOMETRIC DETERMINATION OF MERCURY IN BIOLOGICAL SAMPLES,
Maryland Univ., College Park. Dept. of Chemistry.
T. J. Rohm, and W. C. Purdy.
Analytica Chimica Acta, Vol 72, No 1, p 177-182, September, 1974. 4 tab, 18 ref.

Descriptors: *Analytical techniques, *Mercury, *Colorimetry, *Heavy metals, *Bioassay, Fish, Water pollution, Testing procedures, *Pollutant identification.

Samples were destroyed in a sealed pressure bottle by strong oxidizing agents. The procedures ensured that no Hg was lost by volatilization. After most of the organic matter in the sample had been destroyed, the Hg was extracted with dithizone in toluene. Chloride and EDTA addition before extraction prevented Ag from being extracted and interfering in the kinetic-coulometric method. The Hg is then back-extracted into 5M hydrochloric acid for assay by the kinetic-coulometric procedure, which is sensitive to 10 ppb Hg. Catalysis of the kinetic reaction was dependent on the Hg activity in the sample, which is influenced by the chloride content of the test solution. In order to avoid errors in the assay procedure, the method of standard additions was employed to compensate for small changes in Hg activity due to changes in chloride concentration. Recoveries of Hg added to samples before analysis ranged from 94.0 to 107.5% of the added Hg. The amounts of Hg found in urine and fish samples analyzed by this method were in agreement with those levels determined by other procedures. (Pulliam-Vanderbilt)
W75-03627

SEPARATION OF COPPER (II) FROM URANIUM (VI) AND MANY OTHER ELEMENTS BY CATION-EXCHANGE CHROMATOGRAPHY IN ACETONE-HYDROBROMIC ACID MEDIA - IMPROVED SELECTIVE SEPARATION OF COPPER,
National Chemical Research Lab., Pretoria (South Africa).
F. W. E. Strelow, A. H. Victor, and C. H. S. W. Weinert.
Analytica Chimica Acta, Vol 69, No 1, p 105-110, March, 1974. 3 fig, 2 tab, 3 ref.

Descriptors: *Separation techniques, *Trace elements, *Cation exchange, *Chromatography, Copper, Uranium radioisotopes, Acids, Magnesium, Nickel, Manganese, Aluminum, *Pollutant identification.

Additional selectivity in a separation by ion-exchange chromatography can be obtained by changing from one eluting system giving a certain selectivity sequence to another system giving a different sequence. The procedure provided an excellent means for the selective separation of copper from all the elements retained together with it after the group forming more stable chloride complexes was eluted with 0.2M hydrochloric acid in 85% acetone. Elution of copper (II) was sharp and quantitative while U(VI), Co(II), Li, Na, Mg(II), Ni(II), Ti(IV), Be and Al were quantitatively retained by the column used. (Jernigan-Vanderbilt)
W75-03628

PHOTOMETRIC TITRATION OF BERYLLIUM(II) WITH 5-SULFOSALICYLIC ACID,
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
For primary bibliographic entry see Field 2K.
W75-03629

THE EXTRACTION OF NICKEL FROM VARIOUS SALT SOLUTIONS WITH OXINE IN CHLOROFORM,
Shizuoka Univ., Hamamatsu (Japan). Faculty of Engineering.
For primary bibliographic entry see Field 2K.
W75-03630

REMOTE SENSING OF ALGAL BLOOMS BY AIRCRAFT AND SATELLITE IN LAKE ERIE AND UTAH LAKE,
National Environmental Satellite Service, Hillcrest Heights, Md.
A. E. Strong.
Remote Sensing of Environment, Vol 3, No 2, p 99-107, 1974. 7 fig, 8 ref.

Descriptors: *Remote sensing, *Eutrophication, *Circulation, Satellites(Artificial), Aircraft, Lake Erie, Utah, Photography, Wavelengths, Monitoring.
Identifiers: *Utah Lake(Utah), ERTS-1.

As aircraft flights were being made over Lake Erie on October 15, 1972, underflying the Earth Resources Technology Satellite (ERTS-1), a long dark streamer was observed. The phenomena of such algal blooms, characterizing eutrophic conditions, have been noticed on other shallow lakes using ERTS-1. The concentration of the algae into long streamers provides additional information on surface circulations. To augment the ERTS Multispectral Scanner Subsystem (MSS) data of Lake Erie an aircraft was used to obtain correlative thermal-IR and additional multiband photographs. The algal bloom is highly absorptive in the visible wavelengths but reverses contrast with the surrounding water in the near-IR bands. The absorption of shortwave energy heats the dark brown algal mass, providing a hot surface target for the thermal-IR scanner. Bloom of Aphanizomenon flos-aquae observed in Utah Lake together with recent bloom history in Lake Erie is used to verify the Great Lakes bloom. Although most Great Lake algae blooms can be expected to be on a scale barely resolved by the ERTS system, a careful interpretation and some judicious computer processing and image enhancement should reveal many algae bloom situations that would otherwise go unnoticed. (Jones-Wisconsin)
W75-03760

ULTRAVIOLET ABSORPTION/SALINITY CORRELATION AS AN INDEX OF POLLUTION IN INSHORE SEA WATERS,
University Coll. of North Wales, Manai Bridge. Marine Sciences Lab.
P. Foster.
N Z J Mar Freshwater Res 7(4): 369-379, 1973.
Identifiers: *Fiji Islands, Inshore, *Pollution indices, *Salinity, Sea water, Streams, *Ultraviolet absorption, *Pollutant identification.

UV absorption spectra of fresh and marine waters along the southern coast of Viti Levu, Fiji, are recorded. Variations in the magnitude of the absorption from streams devoid of human influence limit the use of such measurements as a sensitive index of organic pollution. However, where there is a significant difference between the absorption magnitudes of adjacent streams, these can be individually identified in coastal waters by concurrent absorption and salinity measurements. Such measurements characterize water masses in inshore waters, and indicate the origin of their freshwater components. Consequently the method has particular relevance in sea areas influenced by fresh waters with enhanced UV absorbance due to organic pollution.--Copyright 1974, Biological Abstracts, Inc.
W75-03767

CHEMICAL ANALYSES FOR WATER QUALITY - TRAINING MANUAL.
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-224 212, $10.25 in paper copy, $2.25 in microfiche. Report No EPA-430/1-73-003, February 1973. 398 p, 184 ref.

Descriptors: *Analytical techniques, *Chemical analysis, *Water quality, *Training, Ammonia, Biochemical oxygen demand, Carbon, Chemical oxygen demand, Chlorine, Dissolved oxygen, Hardness(Water), Iron, Flame photometry, Manganese, Nitrates, Spectrophotometry, Nitrites, Legal aspects, Laboratory tests, Pesticides, Phenols, Phosphorus, Conductivity, Surfactants, Trace elements, Spectroscopy, Chromatography, Infrared radiation, Remote sensing, Data collections, *Pollutant identification.
Identifiers: *Training manuals, Atomic absorption spectrophotometry, EPA-NTC Course 100.

This manual is a supplement to the training program which provides specialized instruction in the field of water pollution control enabling application of new research findings through updating of skills of technical and professional personnel, and to train new employees recruited from other professional or technical areas in the special skills required. It provides an overview of the nature, causes, prevention, and control of water pollution. Better management of the water resource and more engineering research are urgently needed. The statistical methods deal with the presentation and analysis of numerical data from samples. Methods deal with analytical reactions (standard solutions), acidity, alkalinity, pH, and buffers. Relative to dissolved oxygen determination, factors affecting DO concentration in water and the analytical method background are given. Many determinations for nutrients, nitrogen, carbon are presented, among them: sources and analysis of organic nitrogen, laboratory procedure for total hardness, determination of phosphorus in the aqueous environment. Principles of emission spectroscopy, flame photometry, principles of absorption spectroscopy, and atomic absorption spectrophotometry, other instrumentations, and organic analyses with laboratory procedures are included. Legal procedures in which water quality evidence may be used, followed by case preparation and courtroom procedure are detailed. (Jones-Wisconsin)
W75-03785

ON THE LEAD CONTENT OF HUMAN HAIR (1871-1971),
Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.
W. Lockeretz.
Science, Vol 180, p 1080, 1973. 8 ref.

Descriptors: *Lead, *Testing procedures, *Temporal distribution, Analytical techniques, Human physiology, *Pollutant identification.
Identifiers: *Human hair.

A recent report showed that the lead content of human hair was much lower in 1971 than between 1871 and 1923 (Weiss, et al, Science Vol 178, p 69, 1972). The assumption made by Weiss that this finding demonstrates that overall intake of lead has decreased despite an increase in atmospheric lead levels is disputed. Because the study showed the 1871-1923 children's hair samples to contain 164 ppm and adults' samples to contain 93 ppm of lead (both much greater than levels of workers with overt lead intoxication), the lead content of these antique hair specimens is not a valid indicator of lead intake. The reason for the discrepancy seems to be that Weiss, et al, did not distinguish between lead incorporated into the growing hair (endogenous) and lead subsequently acquired from external sources (exogenous). (Jernigan-Vanderbilt)
W75-03789

GRAVIMETRIC ESTIMATION OF SILVER AS DIAMMINESILVER (I) TETRAISOTHIOCYANATODIANILINECHROMATE (III),
Lucknow Univ. (India). Dept. of Chemistry.
S. K. Bhargava, P. K. Mathur, and R. Gopal.
Current Science, Vol 43, No 13, p 408-409, July 5, 1974. 2 ref.

Descriptors: *Analytical techniques, *Silver, *Metals, Gravimetric analysis, Estimating, Bromine, Chlorine, *Pollutant identification.

Silver(I) can be estimated by tetraisothiocyanatodianilinechromate(III) anion in presence of Cl- and small amount of Br- ions as diamminesilver(I)-tetraisothiocyanatodianilinechromate(III). Freshly prepared alcoholic solution of (aniline) H (Cr(NCS)4 (aniline)2) with Ag (NH3)2 Cl solution gave a rose precipitate, (Ag(NH3)2) (Cr(NCS)4(aniline)2) which was insoluble in water and common organic solvents and was easy to wash. The high molecular weight (m.w. = 612) of the precipitated compound rendered it possible to estimate silver (I) in minute quantities. The ratio of silver and the precipitated compound was 1:5.67. A number of experiments involving solutions containing varying amounts of silver and several metal ions confirmed the reliability of the method. (Pulliam-Vanderbilt)
W75-03790

METHOD FOR DETERMINATION OF SELENIUM, ARSENIC, ZINC, CADMIUM, AND MERCURY IN ENVIRONMENTAL MATRICES BY NEUTRON ACTIVATION ANALYSIS,
National Bureau of Standards, Washington, D.C. Activation Analysis Section.
E. Orvini, T. E. Gills, and P. D. LaFleur.
Analytical Chemistry, Vol 46, No 9, p 1294-1297, August 1974. 6 tab, 6 ref.

Descriptors: *Heavy metals, *Analytical techniques, *Radioisotopes, *Neutron activation analysis, Selenium, Zinc, Cadmium, Mercury, Standards, Testing procedures, Separation techniques, Trace elements, *Pollutant identification, Chemical analysis.

The problem of selecting a suitable matrix for the determination of As, Se, Zn, Cd, and Hg by neutron activation analysis was discussed. The most sensitive and useful (n, gamma) reactions involve short half-lived isotopes of As, Zn, Cd, and Hg, thus requiring chemical separation of these elements from the activated matrix. Most separation methods reported involved dissolution of the matrix, often requiring different methodology for each different matrix. A combustion technique was modified and extended to separate quantitatively As, Zn, Cd, Hg and Se from different biological materials and materials of environmental interest. The quantitative recovery of Se, As, Zn, Cd and Hg through the proposed separation procedure was checked initially using long lived isotopes of these elements added to non-irridiated matrices. The activity recovered was compared with the activity of a like quantity of tracer counted in the same standard geometry. After those preliminary tests, the method was checked by analyzing some previously certified standard reference materials, for which the concentrations of the elements determined covered a wide range. (Jernigan-Vanderbilt)
W75-03792

DETERMINATION OF MERCURY IN FLUORSPAR MINING SURVEY SAMPLES,
British Steel Corp., Sheffield (England).
J. Davey, and M. M. Nicholson.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-225 716, $3.25 in paper copy, $2.25 in microfiche. October 1973. 5 p, 3 fig, 3 tab, append.

Descriptors: *Mercury, *Mining, *Analytical techniques, *Rocks, *Spectroscopy, Pollutants, Industrial wastes, Mining industry, Exploration, *Pollutant identification, Surveys.
Identifiers: *Fluorspar, Fluorite, Absorption spectra.

The development of a method for the determination of mercury at the trace level in fluorspar mining survey samples was described. The method utilized a cold vapor atomic absorption technique. The effect of possible interfering elements was examined; results obtained when applied to typical samples were described. The method developed provided a simple, quick and reliable way of determining trace level amounts of mercury in siliceous, shale and calcareous materials. No serious interferences were detected. Because of the level of contents being determined, high purity reagents were used and blank values were determined. A limit of detection of 0.03 microgram Hg was possible for a 10cm pathlength gas cell. (Jernigan-Vanderbilt)
W75-03794

DETERMINATION OF THE COMPOSITION AND THE STABILITY CONSTANTS OF COMPLEXES OF MERCURY (II) WITH AMINO ACIDS,
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
W. E. Van Der Linden, and C. Beers.
Analytica Chimica Acta, Vol 68, No 1, p 143-154, January, 1973. 5 fig, 1 tab, 9 ref.

Descriptors: *Mercury, *Amino acids, Chemistry, Organic compounds, Ions, Stability, Hydrogen ion concentration, Metals, *Pollutant identification, *Chemical analysis.
Identifiers: *Complexes(Mercury), Mercury compounds.

The complex formation of mercury (II) with twenty of the most important amino acids was investigated, and the corresponding stability constants were reported. Calculations were based on simultaneous pH and pM measurements of solutions containing the amino acid in excess with respect to mercury. It was shown that most amino acids form mononuclear monoligand complexes as well as mononuclear biligand complexes. A different behavior was observed for histidine and methionine, for which the complexes become strongly protonated at lower pH values. (Jernigan-Vanderbilt)
W75-03798

BACTERIOPHAGES AS VIRAL POLLUTION INDICATORS,
Technion - Israel Inst. of Tech., Haifa. Environmental Engineering Lab.
Y. Kott, N. Roze, S. Sperber, and N. Betzer.
Water Research, Vol 8, p 165-171, March, 1974. 7 tab, 10 ref.

Descriptors: *Analytical techniques, *Bioindicators, *E coli, *Enteric bacteria, *Bacteriophage, *Viruses, Water pollution sources, Coliforms, Pollutant identification.
Identifiers: Coliphages.

The use of bacteriophages as viral pollution indicators was investigated. f2 Phage, attenuated Polio I (LSC) strain introduced daily to a 350 liter experimental oxidation pond showed no decrease in bacterial viruses 2 or other coliphages or Polio I strain. Ratios of coliphages to human enteric viruses ranged in flood waters from concentrations as low as 1:1 to as high as 10,000:1; in wastewater at various seasons the ratio was 1,000,000:1; in trickling filter effluents in winter 100,000:1; in spring 1,000,000:1, in summer and fall 100,000:1; in oxidation pond effluents in winter 10,000:1, in spring 100,000:1, and in summer and fall 10,000:1. In three epidemics in small communities caused by failure of water supply, coliphages were found. At the same time only two samples were postivie human enteric viruses (the third was contaminated with yeasts). Chlorination experiments using the experimental oxidation pond showed that f2 was most resistant. MS2 was very resistant, and coliphages were more resistant than attenuated Polio I virus. Experiments with the oxidation pond effluents showed that coliphages were at least as or even more resistant to chlorine than human enteric viruses. For the purposes of routine microbiological examinations the use of E. Coli B bacteriophages provides an adequate measure of the viral quality of water. (Murphy-FIRL)
W75-03816

EVALUATION OF TOLERANCE LIMITS OF SOME TOXIC SUBSTANCES IN INDUSTRIAL WASTE WATERS BY THE ICHTHYO TOXICITY TEST, (IN ITALIAN),
Camerino Univ. (Italy). Istituto di Igiene.
M. Guerra, and N. Comodo.
Boll Soc Ital Biol Sper 48(22): 989-901, 1972(1973).
Identifiers: Alburnus-albidus, Alkyl benzenesulfonate, Ammonia, Carassius-auratus, Chlorides, Chromates, DDT, *Industrial wastes, Mercury, Phenols, Potassium, Salmo-irideus, Toxic wastes, *Toxicity, Waste waters, *Lethal limit, *Pollutant identification.

The icthyotoxicity test was evaluated for its usefulness in assessing the permissible limit of single toxic substances in liquid industrial waste. Toxic substances frequently present in ground water, i.e. mercury chloride, potassium bichromate, ammonia, phenol ABS (alkyl benzene sulfonate) and DDT, were tested on 3 species of fish (Carassius auratus, Alburnus albidus and Salmo irideus) of different sensitivity to industrial poisons. S. irideus was the most sensitive. The effect of the poisons on the fish was evaluated by mortality rates after 48 h exposure to the pollutants. This method is not suitable for the evaluation of the presence of quantities of toxic substances in liquid waste larger than the maximal permissible quantities. The method is not sensitive enough in the case of individual toxic substances, but it is of value in the case of mixtures of toxic substances present in industrial effluents.--Copyright 1974, Biological Abstracts, Inc.
W75-03821

HEAVY METAL CONTENTS IN TAIWAN'S CULTURED FISH,
Academia Sinica, Taipei (Taiwan). Inst. of Zoology.
S. S. Jeng, and Y-W. Huang.
Bull Inst Zool Acad Sin (Taipei), Vol 12, No 2, p 79-85, 1973.
Identifiers: Cadmium, Carp, Copper, *Cultured fish, Food, Grass carp, *Heavy metals, Lead, Mercury, Milkfish, Nickel, Oysters, Silver carp, *Taiwan, Tilapia, Zinc, *Pollutant identification.

In order to find out whether fish around the waters of Taiwan are safe as to heavy metal contents, 119 fish of Tilapia, common carp, grass carp, silver carp and milkfish, and 240 oysters from the fish pond were analyzed for concentrations of Cd, Cu, Pb, Hg, Ni and Zn. Most of the fish surveyed have a concentration of Hg less than 0.08 ppm and none of them over 0.2 ppm. The Pb level of fish muscle is 0.1 ppm, and 0.5 ppm for oyster. The Cd in fish muscle and oyster is 0.02 ppm and 0.2 ppm, respectively. The contents of Cu, Zn, and Ni studied are at ordinary levels. The heavy metal concentrations of Taiwan's cultured fish do not appear to constitute a hazard for consumers.--Copyright 1974, Biological Abstracts, Inc.
W75-03850

5B. Sources Of Pollution

SOURCES OF PHOSPHORUS INPUTS FROM THE ATMOSPHERE AND THEIR SIGNIFICANCE TO OLIGOTROPHIC LAKES,
De Paul Univ., Chicago, Ill. Dept. of Chemistry.
T. J. Murphy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 625, $4.25 in paper copy, $2.25 in microfiche. Research Report No 92, 1974. 45 p, 10 tab, 35 ref. OWRT A-065-ILL(2). 14-31-0001-4013.

Descriptors: *Phosphorus, *Precipitation(Atmospheric), *Lake Michigan, Nutrients, Smoke, *Air pollution, Eutrophication, *Illinois, Water pollution sources, *Path of pollutants, Lakes, Pollutant identification.
Identifiers: Particulate matter, Oligotrophic lakes, *Chicago(Ill), Orthophosphates.

Precipitation in the Chicago area was analysed and found to contain .034 mg/l of phosphorus with about one half of this present as ortho phosphate. Because of the small amounts of phosphorus needed to stimulate the growth of organisms in bodies of water which are phosphorus limited, these inputs from the atmosphere are important to many natural bodies of water. From one-fifth to one-third of the phosphorus going into Lake Michigan is from precipitation. The sources of this phosphorus were investigated; almost all sources were found to be of particulate matter. With the exception of emissions from the fertilizer industry these were found to contain a relatively consistent 0.1 percent phosphorus. Since the discharge of particulates to the atmosphere is being controlled, contributions of phosphorus to bodies of water from the atmosphere would also be controlled.
W75-03304

CHANGES IN THE ECONOMY AND ECOLOGY AT PROPOSED LAKE SITES IN THE SALT RIVER BASIN, KENTUCKY, DURING EARLY CONSTRUCTION OF THE DAM FOR TAYLORSVILLE LAKE,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 5C.
W75-03309

POLLUTIONAL ASPECTS AND CROP YIELDS RESULTING FROM HIGH MANURE APPLICATIONS ON SOIL,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
O. E. Cross.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 562, $3.25 in paper copy, $2.25 in microfiche. Technical Paper 74-4059 presented at the 1974 Annual Meeting of the American Society of Agricultural Engineers, Oklahoma State Univ., Stillwater, June 23-26, 1974. 29 p, 21 fig, 1 tab, 13 ref. OWRT B-012-NEB(3). 14-31-0001-3610.

Descriptors: Water quality control, *Water pollution sources, Nitrogen, Sodium, Potassium, *Farm wastes, *Crop production, *Rates of application, Application methods, Crop response, *Agricultural runoff, Potable water.
Identifiers: Nitrate nitrogen.

Beef feedlot manure has been applied to cultivated and irrigated crop land for four years. Research variables were: four rates of manure application, three depths of plowing and three plant populations. Results reported are relative to the pollutional aspects of the surface runoff water and the underground aquifer as well as crop response. Nitrate nitrogen displacement in the runoff water exceeded the potable water allowable of 10 ppm only during the first 90 minutes of the first irrigation on the heavily manured plots. The concentration of sodium in the runoff, even under the most

adverse conditions, did not exceed the maximum allowable for potable water--1,000 ppm. Potable water quality relative to potassium has been set at a maximum of 10 ppm. The highest potassium concentration runoff was 120 ppm. However, this runoff is acceptable as reuse irrigation water. Relative to crop yield, only the manure treatment indicated a statistically significant increase. Over the 4-year period, crop yield, in general, has not decreased. Plant population and plow depth had no significant effect on yield. The underground water, after 4 years and 9 months of testing, has retained its potable quality.
W75-03310

WATER QUALITY MODELS FOR URBAN AND SUBURBAN AREAS.
Nebraska Univ., Lincoln.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 622, $5.25 in paper copy, $2.25 in microfiche. Completion Report, August 1, 1974. 108 p, 2 fig, 1 tab, 3 ref, 3 append. OWRT A-025-NEB(2).

Descriptors: *Water quality, *Urban runoff, Runoff, *Model studies, Cities, Suburban areas, *Storm runoff, *Simulation analysis, *Hydrograph analysis, Computer models, Water pollution sources.

Urban storm runoff was sampled and analyzed for various pollutional parameters. Data obtained were used in the development of modeling techniques for simulating the quantity and quality of runoff. A hydrograph simulation model developed by the Department of Computer Science at the University of Nebraska was used to generate flow hydrographs comparable to observed runoff data. Modeling techniques similar to those used in the EPA Storm Water Management Model were used for modeling COD, BOD and solids. Data were also obtained relative to concentrations of nitrogen, phosphorus, pesticides and bacteria in the runoff. Data generally confirmed the 'flush effect' of pollutants at the start of the runoff period. These data also showed that urban storm water may contain significant amounts of pollutants. (See also W75-03312) (Andersen-Nebraska)
W75-03311

MOBILITY AND DEACTIVATION OF HERBICIDES IN SOIL-WATER SYSTEMS,
Nebraska Univ., Lincoln. Water Resources Research Inst.
T. L. Lavy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 632, $3.75 in paper copy, $2.25 in microfiche. Completion Report, June 1974. 30 p, 11 tab, 13 ref. OWRT A-024-NEB(1).

Descriptors: Water quality, *Herbicides, *Degradation(Decomposition), Adsorption, *Mobility, Resins, Soil water, *Nebraska, Soil profiles, *Path of pollutants, Aqueous solutions, 2-4-D, Bioassay, Soil analysis, Colloids.
Identifiers: Charcoal, Exchange resins, Atrazine, Butylate, Column leaching studies, Alachlor, Picloram.

The objectives were: (1) to investigate methods which could be used to deactivate or remove herbicides present in aqueous systems; and (2) to measure the mobility of four herbicides (alachlor, atrazine, butylate and picloram) in three Nebraska soil profiles. Charcoal and exchange resins were effective in removing as much as 99% of the 1.2 ppmw herbicide present in an aqueous solution. In a degradation study, the presence of soil colloids and other soil constituents markedly enhanced the breakdown rate of atrazine, alachlor and 2,4-D in a 24-week storage study. A cucumber bioassay was used to detect herbicides remaining in the solution while a soil bioassay using soybeans and millet was effective in monitoring for herbicides in the soil. Studies to determine if degradation of herbicides occurs in samples of groundwater incubated at 10 and 25C for periods up to 15 months showed picloram was more stable than atrazine or alachlor. Considerably less degradation occurred at the lower temperature (which is comparable to field conditions). A field leaching study showed that mobility becomes more rapid as the herbicide moves farther from the surface. Picloram was more mobile than atrazine or butylate under irrigated sandy soils.
W75-03314

INFLUENCE OF FERTILIZER PRACTICES ON WATER AND THE QUALITY OF THE ENVIRONMENT (PHASE II),
Nebraska Univ., Lincoln. Water Resources Research Inst.
R. A. Olson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 624, $4.75 in paper copy, $2.25 in microfiche. Completion Report, June 15, 1974. 82 p, 30 fig, 15 tab, 21 ref. OWRT B-022-NEB(3). 14-31-0001-3908.

Descriptors: *Water quality, Fertilizers, *Groundwater, *Nitrogen, Crop production, Management, *Nebraska, Soil analysis, Path of pollutants, Irrigation practices, Nitrates, Loess, Sands.
Identifiers: Nitrate-nitrogen.

Comparison of deep soil cores taken under various crop management systems with adjacent native pasture indicates that generally fertilizer is contributing only minimal amounts of nitrogen to the groundwater (with non-irrigated agriculture) in Nebraska. Under irrigated conditions, nitrogen is leaching to the water table with the greatest amount occurring on sandy soils with shallow water table. An additional threat to the groundwater exists in southwestern Nebraska where the deep loess soils on the table lands are being put under irrigation and the loess beneath contains several tons of NO3-N per acre of natural or 'geologic' origin. Average nitrate-nitrogen in the groundwater of Nebraska has increased 25 percent during the past decade. Rapid increases with present high levels are found in several areas with intensive irrigation of sandy soils. Nutrients in Nebraska's surface water are primarily of natural origin or from industrial and sewage wastes of cities. Nutrients tend to accumulate in reservoirs with subsequent deterioration of the reservoir and improvement of the emergent stream. The results indicate a need for improved fertilizer and water efficiency under irrigated conditions and further investigation into the environmental hazards associated with extensive irrigation development on the table lands of high subsurface nitrate.
W75-03315

MERCURY LEVELS IN FISHES FROM SOME MISSOURI LAKES WITH AND WITHOUT KNOWN MERCURY POLLUTION,
Missouri Univ., Columbia. Environmental Trace Substance Center.
S. R. Koirtyohann, R. Meers, and L. K. Graham.
Environmental Research, Vol 8, No 1, p 1-11, August 1974. 4 fig, 5 tab, 20 ref. OWRT A-054-MO(2). 14-31-0001-3525.

Descriptors: *Mercury, Fish, *Missouri, Lakes, Pollution, *Fungicides, *Path of pollutant, *Bass, Bioindicators, Water pollution sources.
Identifiers: *Golf greens drainage, Mercury compounds.

Mercurial fungicides used in golf greens maintenance can lead to elevated levels of mercury in fish, from lakes receiving greens drainage. Of the species tested, the largemouth bass was the most sensitive indicator with levels ranging from 1 to 7 g Hg/g of wet tissue in fish taken from lakes which receive drainage from treated greens. Background mercury levels in largemouth bass from impoundments in central Missouri are 0.1 - 1.2 ppm depending on size and other factors. Many lakes with no known source of mercury contamination produce bass which contain significantly more than 0.5 ppm of mercury.
W75-03323

EPIDEMIOLOGIC RELATIONSHIPS BETWEEN HUMAN AND ANIMAL SALMONELLA CARRIERS AND THEIR ENVIRONMENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE, (IN GERMAN),
Institut fuer Medizinisches Mikrobiologie Kantons Sankt Gallen (Switzerland).
For primary bibliographic entry see Field 5C.
W75-03330

STUDY OF THE HYDROGRAPHIC AND CHEMICAL CONDITIONS IN THE WATER OF THE LAGOON OF TACARIGUA, (IN SPANISH),
Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
B. R. Gamboa-G., A. J. Garcia, J. Benitez-A., and T. Okuda.
Bol Inst Oceanogr Univ Oriente Cumana, Vol 10, No 2, p 55-72, 1971. English summary.
Identifiers: *Chemical studies, *Hydrographic studies, Influx, Inversion, Lagoons, Nitrogen, Organic matter, Oxygen, River, Seasonal, Temperature, Venezuela(Tacarigua Lagoon), Water pollution sources.

Hydrographical and chemical observations were carried out in Tacarigua Lagoon, Venezuela, from April, 1967-Dec., 1969. Due to the shallow water depth (1.0-1.38 m in average), the temperature variation and distribution were affected as much by seasonal change (dry and rainy season) as by daily changes. Vertical inversions of temperature were occasionally noted on the western part (A--zone) and the central area (C--zone). Local and seasonal salinity variations were influenced by river-influx and sea-water penetration, especially on the western side (A and B zones). Salinity variations in the mideastern area were less noted. In general, the O2 content showed little monthly and yearly change in the mid-western area. Phosphate, silicates, nitrates and nitrites showed pronounced monthly and yearly fluctuations. They showed highest values in the western area. Conversely, the high values of ammonia and organic N were observed in the eastern area and the lowest values on the western side.--Copyright 1974, Biological Abstracts, Inc.
W75-03335

CHEMISTRY OF SOME SEDGELAND WATERS: LAKE PEDDER, SOUTH-WEST TASMANIA,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
R. T. Buckney, and P. A. Tyler.
Aust J Mar Freshwater Res Vol 24, No 3, p 267-273, 1973.
Identifiers: *Australia, Biotic communities, *Chemistry, Lakes, Peat, Rainfall, Salinity, *Sedgeland waters, *Tasmania(Lake Pedder), Hydrogen ion concentration.

Surface waters of the Lake Pedder (Tasmania, Australia) area are characterized by low salinity, low pH, high color and a relative major-ion composition near that of seawater. Factors determining this composition are predominance of inert rocks, a covering of sedgeland peat isolating waters from rock contact and a high rainfall brought by prevailing oceanic winds. Frequency and intensity of rainfall appear to determine the pattern of chemical variation. Salinity, bicarbonate and pH may change rapidly during periods of high rainfall. Humic acids are important chemical constituents of the waters and probably determine the type of biotic community which inhabits them.--Copyright 1974, Biological Abstracts, Inc.
W75-03390

SOLAR RADIATION MEASUREMENTS IN THE ENTERPRISE RADIATION FOREST,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-03404

ARGONNE NATIONAL LABORATORY, WASTE MANAGEMENT PROGRAMS QUARTERLY REPORT, OCTOBER-DECEMBER 1973,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-03415

CONSOLIDATION TECHNIQUES FOR FUEL CLADDING HULLS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-03416

SALVAGE OF ALPHA-CONTAMINATED METALS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-03417

STORAGE OF TRITIUM AND NOBLE GASES,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-03418

COLLECTION AND ANALYSIS OF PUMP TEST DATA FOR TRANSMISSIVITY VALUES,
Battelle Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
K. L. Kipp, and R. D. Mudd.
Available from NTIS, Springfield, Va 22161, as Rept No BNWL-1709; $5.45/copy, $2.25/microfiche. Report No BNWL-1790, 1973. 84 p, 40 fig, 4 tab, 16 ref, append.

Descriptors: *Transmissibility, Hydrology, *Aquifer characteristics, *Well data, *Data collections, *Subsurface investigations, Thesis equation, Analytical techniques, Model studies, Aquifers, Hydrologic data, Flow, Subsurface flow, Flow measurement, Flow profiles, Model studies.
Identifiers: Boulton model, Dagan model.

Described is the analysis of well pump tests performed in 1969 to determine the field measured transmissivity values used in 'The Transmissivity Iterative Calculation Routing - Theory and Numerical Implementation,' BNWL-1706. Previously accumulated pump test transmissivity values which were also used as input data are included for completeness and the analytical models employed for pump test analyses are described. A sensitivity study was performed on the pertinent variables and procedures of the pump test analyses. Tables of transmissivity results and the graphs used to obtain them are included. (Houser-ORNL)
W75-03421

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
R. C. Routson, and R. J. Serne.
Available from NTIS, Springfield, Va 22161, as Rept No BNWL-1719; $5.45/copy, $2.25/microfiche. Report No BNWL-1719, 1972. 76 p, 7 fig, 24 tab, 20 ref, 2 append. AEC AT(45-1)-2130.

Descriptors: Water pollution, *Soil contamination, *Radioactivity, *Path of pollutants, *Model studies, *Transport, Movement, Flow, Hydrologic models, Absorption, Ion exchange, Calcium, Sodium, Hydrogen ion concentration, Percolation, Filtration, Centrifugation, Transmissibility, Groundwater.

A group of support studies conducted during development of a transport model for the Radionuclides in Soils Program is described. Measurement studies for sorption parameters concluded that: (1) small calcium experiments are more useful than batch experiments for measuring the Kd of trace solutes which are sorbed by ion-exchange, unless the batch system is prewashed several times with influent prior to measuring the Kd; (2) the decrease in Kd often reported with an increasing soil-to-solution ratio is the result of the reaction of the soil solid phase with the influent solution; (3) batch and small column Kds will agree if the equilibrium chemical environment is equivalent; and (4) the number of regression equations required to adequately define sorption in soil column work is a determinable function for each soil. (Houser-ORNL)
W75-03422

CHARACTERIZATION OF ACTINIDE BEARING SOILS: TOP SIXTY CENTIMETERS OF 216-Z-9 ENCLOSED TRENCH,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
L. L. Ames.
Available from NTIS, Springfield, Va 22161, as Rept No BNWL-1812; $5.45/copy, $2.25/microfiche. Report No BNWL-1812, February 1974. 141 p, 3 fig, 25 tab, 7 ref, append. AEC AT(45-1)-2130.

Descriptors: *Waste disposal, *Nuclear wastes, *Soil contamination, *Path of pollutants, Plutonium, Sites, Locating, Soil investigations, Earth materials, Rocks, Minerology, Minerals, Radioactivity, Chemical reactions, Analysis, Evaluation, Safety, *Washington.
Identifiers: Trench disposal, Hanford site(Wash), *Actinides.

Under pre-1965 waste disposal practices at Hanford, certain actinide-bearing solutions were discharged to the soil in covered trench facilities. The soil response to the influx of acidic, actinide-bearing solutions has pertinence to the present and future locations of the actinides. In order to understand present and future soil-actinide relationships, the following tasks were investigated: (1) Identification of the soil minerals and soil rock types; (2) Location of the actinides; (3) Determination of the present actinides form; (4) Characterization of the soil-solution chemical reactions that resulted in the present form and location of the actinides. Results are presented of work on the above tasks through examination of samples from the upper 60 centimeters of the 216-Z-9 covered trench. (Houser-ORNL)
W75-03423

POTENTIAL CONTAINMENT FAILURE MECHANISMS AND THEIR CONSEQUENCES AT A RADIOACTIVE WASTE REPOSITORY IN BEDDED SALT IN NEW MEXICO,
Oak Ridge National Lab., Tenn.
H. C. Claiborne, and F. Gera.
Available from NTIS, Springfield, Va, 22161 as Rept No ORNL-TM-4639; $4.00/copy, $2.25/microfiche. Report No ORNL-TM-4639, October 1974. 89 p, 5 fig, 13 tab, 71 ref, append.

Descriptors: *Radioactive waste disposal, Solids, *Waste treatment, *Waste disposal, Mining, Hazards, Safety, Technology, Nuclear explosions, Faults(Geologic), Earthquakes, Aquifers, Leaching, Leakage, *New Mexico.
Identifiers: *Salt mines, *Waste repository, Meteorites.

Potential containment failure mechanisms are examined and their probabilities and consequences are estimated, when possible, for a hypothetical waste repository located in bedded salt in southeastern New Mexico. The primary conclusion is that a serious breach of containment for such a repository, either by human action or natural events, is only a very remote possibility and falls into the category of least likely occurrences which affect society. A sealed repository 600 m underground would be virtually sabotage proof; even the surface burst of a 50-megaton nuclear weapon could not breach the containment. Accidental drilling of boreholes through the disposal horizon could cause relatively minor local contamination. (Houser-ORNL)
W75-03425

A ONE-DIMENSIONAL NUMERICAL MODEL OF PRECIPITATION SCAVENGING WITH APPLICATION TO RAINOUT OF RADIOACTIVE DEBRIS,
California Univ., Livermore. Lawrence Livermore Lab.
C. R. Molenkamp.
Available NTIS, Springfield, Va, 22161 as Rept No UCRL-51627; $4.00/copy, $2.25/microfiche. Report No UCRL-51627, July 1974. 39 p, 25 fig, 2 tab, 20 ref.

Descriptors: *Model studies, *Climatic data, *Precipitation(Atmospheric), Mathematics, Height, Clouds, Convection, Suspended solids, Radioactivity, Dusts, Water pollution, Drops(Fluids), Evaporation, Suspension, Measurement, *Radioactive wastes.
Identifiers: *Scavenging, *Debris.

A one-dimensional, time-dependent, entrainment model of cumulus convection has been modified to include a calculation of precipitation scavenging. The primary method of scavenging is postulated to be collection of suspended debris in cloud droplets during condensation nucleation and the subsequent inertial capture of these polluted droplets by falling raindrops. Other possible collection mechanisms are neglected, including inertial capture of debris particles by falling raindrops and attachment of debris to droplets or drops because of phoretic, diffusive, or electrical forces. Resuspension of debris because of evaporation of droplets and drops is modeled. Calculations are described for scavenging by a typical cumulus cell. Parameter studies are performed to examine the dependence of debris deposition on the initial height of debris in the atmosphere and on the fraction of debris passing through the condensation nucleation activation zone that serve as condensation nuclei. (Houser-ORNL)
W75-03427

EFFECT OF FLUID CONTENT ON THE MECHANICAL PROPERTIES OF WESTERLY GRANITE,
California Univ., Livermore. Lawrence Livermore Lab.
A. G. Duba, H. C. Heard, and M. L. Santor.
Available from NTIS, Springfield, Va, 22161 as Rept No UCRL-51626; $4.00/copy, $2.25/microfiche. Report No UCRL-51626, July 1974. 23 p, 6 fig, 13 ref.

Descriptors: *Mechanical properties, *Rock properties, *Rock mechanics, Rocks, Crystalline rocks, *Granites, Physical properties, Pressure, Pores, Porosity, Pore water, Porous media, Strength, Stress, Strain, Compressive strength, Confined water, Compressibility.

Jacketed samples of Westerly granite with water concentrations ranging from 0 to 20% total volume were loaded to failure under conditions of uniaxial stress up to 600 MPa confining pressure. Unjacketed samples, exposed directly to the pressure medium, were tested similarly. The volume and viscosity of fluid available to the intergranular porosity in the granite during uniaxial stress loading significantly influenced the compressive strength. Dry and saturated specimens (0.8% water) were loaded to 700 MPa confining pressure under conditions of uniaxial strain. Large differences in loading paths were observed between the saturated and dry granite. The pressure-

volume curves determined to 300 MPa indicate only slightly less compression for the saturated granite (0.8% water) than for the dry material. Under axial load, the saturated material exhibited less volume decrease than the dry. This difference in compression during axial loading is attributed to water distribution in the cracks of the rock. (Houser-ORNL)
W75-03428

A GEOLOGICAL AND SEISMOLOGICAL INVESTIGATION OF THE LAWRENCE LIVERMORE LABORATORY SITE,
California Univ., Livermore. Lawrence Livermore Lab.
L. H. Wight.
Available from NTIS, Springfield, Va, 22161 as Rept No UCRL-51592; $4.00/copy, $2.25/microfiche. Report No UCRL-51592, June 1974. 43 p, 20 fig, 6 tab, 51 ref, append.

Descriptors: Geology, Geologic formations, *Geologic investigations, *Sites, *Faults(Geologic), *Seismology, *Earthquakes, Seismic design, Seismic properties, Seismic studies, Geologic history, Geomorphology, *California, Hazards.
Identifiers: *Tesla fault(Calif), Seismic history, Livermore Valley(Calif), Response spectrum.

In response to an AEC request for Safety Analysis Reports for all critical structures on the Lawrence Livermore Laboratory site, the seismic hazard at LLL was examined. The geology and seismology of the Livermore Valley and surrounding regions are reviewed and all the active faults in the region are identified based on seismic history, geomorphology and geodetic data. After carefully estimating the accelerations that the site would experience from maximum magnitude earthquakes on each active fault, it is concluded that the Tesla fault has the most potential for doing damage at the LLL site. The response spectrum is derived. (Houser-ORNL)
W75-03429

THE DISSOLUTION OF PU-238 IN ENVIRONMENTAL AND BIOLOGICAL SYSTEMS,
Los Alamos Scientific Lab., N. Mex.
J. H. Patterson, G. B. Nelson, and G. M. Matlack.
Available from NTIS, Springfield, Va 22161, as Rept No LA-5624, $4.00 in paper copy, $2.25 in microfiche. Report No LA-5624, July 1974. 6 p, 2 tab, 24 ref.

Descriptors: *Plutonium, *Solubility, Ecosystems, *Chemical properties, *Stable isotopes, Isotope studies, Aqueous solutions, Water, Distillation, Saline water, Chemical reactions, Ions, Physical properties, Radioactivity, *Radioisotopes, Environmental effects.

Results from experiments on dissolution rates of 238PuO(sub 2) and 239PuO(sub 2) in distilled water and normal saline solution were compared with rates calculated from data in the literature on various PuO(sub 2) dissolution experiments. The initial comparatively rapid dissolution rates were found to vary widely, even between experiments performed ostensibly under the same conditions. In contrast, the lower rate of dissolution, which began a few hours after contact of the oxide with the aqueous medium, was constant and fell within a range of 1 to 6 ng/sq m's under widely varying conditions. (Houser-ORNL)
W75-03431

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POLLUTION AND TRANSFER RELATIONSHIPS,
Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships.
H. Baker.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-229 782, $4.25 in paper copy, $2.25 in microfiche. Final report (partial). September 1973. 50 p, 11 tab, 15 fig, 31 ref. GI-33369.

Descriptors: *Estuaries, Water pollution, *Mathematical models, *Pollution abatement, *Water pollution control, Delaware River, Delaware River Basin Commission, *Water quality, Water pollution sources, Delaware, Mathematics, Water supply, Water demand, Water consumption, Water control, Water policy, Water management, *Water quality control, Water utilization, Water supply development, Water resources, Water resources development, Recreation, Water chemistry, Water Quality Act.
Identifiers: *Delaware River Estuary.

Environmental problems and situations are outlined and interim suggestions for remedial action are given. As of July 1973, of the 103 listed dischargers involved in the pollution abatement program, 41 had completed facilities, 12 were in compliance with their schedules, 29 were not meeting their schedules and 21 had yet to submit approvable abatement schedules. Delaware River Basin Commission (DCRB) feels that its 10-year plan to clean up the estuary is proceeding on schedule. Research on the River by DCRB, U.S. Geological Survey and the Philadelphia Water Department is described. Mathematical modeling was employed to prepare a comprehensive program for improvement and maintenance of water quality and to determine relationships between pollution and water quality. Format for initial model was one-dimensional, steady-state, finite-differenced. Improvements on the model resulted in several computer programs briefly described. Areas around the Delaware Estuary are expanding rapidly; most projections show population doubling in 40 years. To supply water for this increase, an assessment of future pollution loads must be available now. Power companies located on the Delaware River must submit a master siting study of any generating plants. Municipal and industrial waste loads must be projected and then managed. Another important factor in pollution abatement is control of rural and urban runoff. At the same time this pollution is occurring, water demand will increase at a similar rate, and as more leisure time is created, there will be greater demand for water for recreation. The future state of the Delaware River depends on how well the future is predicted, plus successful pollution strategy designed to cope with future pollution loads. (See also W75-03441) (Grden-North Carolina)
W75-03440

INVESTIGATIONS ABOUT POPULATION DYNAMICS AND NUTRITIONAL ASPECTS ON THE SIMULID-LARVAE OF A MOUNTAIN STREAM POLLUTED BY ORGANIC WASTE WATER, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
R. Gloetel.
Arch Hydrobiol Supplementb. Vol 42, No 3/4, p 406-451, 1973. English summary.
Identifiers: Feeding, Filters, Growth rates, *Larvae foods, Mountain, Nutrition, Organic matter, *Population dynamics, *Self purification, Sewage, *Simuliid larvae, Stream, Waste waters, Water pollution sources.

In a stream into which organic matter is introduced, the environmental conditions for the organisms living in it change fundamentally. The effect of this change can be seen on the filter-feeding simuliid larvae, which feed mainly on suspended particulate matter. A short distance below the outlet of the waste water on the number of species of simuliid is reduced. On the other hand a small number of species shows a considerable increase in growth and population. Parallel to the process of self-purification, the number and growth of those species more resistant to change of ecological conditions decrease, whereas the number of the less resistance species increase again. At the end of the polluted stretch, where self-purification is nearly finished, the same species in approximately the same number as above the introduction of the sewage, can be found.--Copyright 1974, Biological Abstracts, Inc.
W75-03479

ACCUMULATION, DISTRIBUTION, TRANSFORMATION AND ELIMINATION OF DDT-14C IN SOLEA SOLEA (PISCES: SOLEIDAE), (IN GERMAN),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
For primary bibliographic entry see Field 5C.
W75-03494

ORGANOCHLORINE INSECTICIDE RESIDUES IN SEDIMENT AND FISH TISSUES, ONTARIO, CANADA,
Ontario Ministry of Agriculture and Food, Guelph. Pesticide Residue Lab.
For primary bibliographic entry see Field 5C.
W75-03495

NONBIODEGRADABLE AND OTHER RECALCITRANT MOLECULES,
Cornell Univ., Ithaca, N.Y. Lab. of Soil Microbiology.
M. Alexander.
Biotechnol Bioeng, Vol 15, No 4, p 611-647, 1973.
Identifiers: Environmental studies, Microorganisms, *Molecules(Nonbiodegradable), Pollution, Soils, Toxicology, Water pollution, *Biodegradation, *Synthetic chemicals, *Chemical wastes.

Many natural products show remarkable durability in natural ecosystems, and some of these substances are of practical concern. A variety of synthetic compounds (e.g., pesticides, polychlorinated biphenyls, synthetic polymers, surfactants, nitrogen compounds, industrial wastes) are also persistant in nature, and this resistance is important because of the large amounts of such chemicals now manufactured and their effects in a variety of environments. The degradation of synthetic chemicals results mainly from microbial activity, and attempts to minimize soil and water pollution would be facilitated by adequate information on why many pollutants are so refractory. Fifteen possible mechanisms of recalcitrance in natural systems are discussed. Biodegradability of a compound often can be increased by appropriate structural modifications. Manufacturing costs may be increased, but if society wishes to enjoy the benefits of synthetic chemicals and yet have an environment free of toxic or offensive materials, it must accept the additional cost.--Copyright 1974, Biological Abstracts, Inc.
W75-03497

DISTRIBUTION OF POTENTIAL MOSQUITO VECTORS IN THE IMPERIAL VALLEY, CALIFORNIA, 1971-1972,
Walter Reed Army Inst. of Research, Washington, D.C. Dept. of Entomology.
For primary bibliographic entry see Field 5G.
W75-03498

MONITORING 2,4-D RESIDUES AT LOXAHATCHEE NATIONAL WILDLIFE REFUGE,
Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.
For primary bibliographic entry see Field 5A.
W75-03506

PRELIMINARY EXPERIMENTS ON THE EFFECT OF THIODAN AND ENDRIN ON FISH CULTURE IN INDONESIA,
Inland Fisheries Research Inst., Bogor (Indonesia).
For primary bibliographic entry see Field 5C.
W75-03515

GROUND-WATER QUALITY STUDY,
Colorado State Univ., Fort Collins.
N. F. White, and D. K. Sunada.
Journal of the Irrigation and Drainage Division, Proceedings of ASCE, Vol 100, No IR3, p 277-292, Septembr, 1974. 6 fig, 4 tab, 9 ref.

Descriptors: *Groundwater, Hydrologic aspects, Basins, Drainage, Aquifers, Data analysis, Evapotranspiration, Irrigation, Dissolved solids, *Colorado, *Water quality, *Water pollution sources.
Identifiers: *Severance Basin(Colo).

Groundwater contamination was studied at Severance Basin in Colorado. Water quality was analyzed for both geologic and hydrologic detail. Increasing contamination in the basin was attributed to leaching of applied fertilizer, drainage from silage pits and feed lots, percolation of contaminants from oil field brine pits, and geologic contamination of the aquifer. Data limitations made it difficult to isolate sources of groundwater contamination. Major causes of contamination in this aquifer were concluded to be a combination of a high rate of evapotranspiration and the relatively low surface and groundwater outflow from the basin. This resulted in total dissolved solids in the basin increasing at the rate of 170 ppm per year. When irrigation was accompanied by high evapotranspiration rates, mechanism of pollution proved to be a major cause of aquifer contamination. (Prague-FIRL)
W75-03534

MIXING AND TRANSPORT, (LITERATURE REVIEW),
Delaware Univ., Newark. Dept. of Civil Engineering.
J. D. Ditmars.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1591-1604, June, 1974. 126 ref.

Descriptors: *Reviews, *Bibliographies, *Mixing, *Transport, Streams, Rivers, Lakes, Reservoirs, Bays, Estuaries, Coastal areas, Dispersion, Open channel flow, Current, Water pollution, Waste water treatment, Jets, Plumes.
Identifiers: Sinuous channel geometry, Longitudinal dispersion, Transverse turbulent diffusion, Dissolved oxygen.

Dispersion and mixing in open-channel flow were reviewed. The theoretical bases for the one-dimensional, cross-sectiolly averaged concentration equation and the longitudinal dispersion coefficient were also investigated. Laboratory and field data were provided for both vertical and transverse turbulent mixing coefficients. The effect of sinuous channel geometry on longitudinal dispersion was explored experimentally along with the relationships between the bulk flow and channel geometry parameters and the longitudinal dispersion coefficient using laboratory and natural stream data. The dispersion coefficient increased with increases in stream radius of curvature and decreased with increases in bend length and mean depth. Solutions were found to the convective-diffusion equation for point and line sources in rivers. Integral transform techniques were used to arrive at the solution, and accounted for the presence of surface, bottom, and bank boundaries, assuming constant values for the longitudinal vertical, and lateral turbulent diffusion coefficient, and for the longitudinal current. (Leibowitz-FIRL)
W75-03554

SOLUTION, DIFFUSION AND SORPTION IN UPPER LAYER OF LAKE SEDIMENTS: III. CHEMICAL AND PHYSICAL CONDITIONS IN SEDIMENT-WATER TRANSITION ZONE OF MEROMICTIC BOG LATE (URSEE) AND ITS RELATION TO ACCUMULATION OF VIVIANITE, (IN GERMAN),
Freiburg Univ. (West Germany). Limnoloaisches Institut.
U. Tessenow.
Arch Hydrobiol Supplementb, Vol 42, No 3/4, p 273-339, 1973. English summary.
Identifiers: Bogs, Chemical studies, Diffusion, Lakes, Meromictic bogs, Migration, Physical studies, Precipitation(Atmospheric), Sediments, Sorption, Vivianite, *Iron, *Phosphates, *West Germany(Lake Ursee), *Lake sediments, Sediment-water transition zones.

The recent accumulation of Fe (Mn) and phosphate in the sediment of Lake Ursee (West Germany) is directly correlated with vertical and horizontal concentration gradients in the permanently anaerobic deep water and in the interstitial water of the sediment. The small sharply limited area of the highest Fe and phosphate contents in the particulate and dissolved phase of the sediment results from the very sharp concentration gradients in the overlying water and from the morphometry of the monilimnion. The formation of vivianite takes place in the deepest region of the lake (10.55-10.60 m), where the highest concentrations of dissolved Fe and phosphate (35-40 and 4.5-5.5 mg/l respectively, pH = 6.3) exist. The conditional solubility product of vivianite there amounts to (Fe2+)3.(PO43-)2 = 2-4.10-32 (mol)5. The accumulation of vivianite is the result of internal migration of Fe and phosphate from the sediments of lake depths down to about 10.5 m to the sediments of the very deepest region of the lake. Processes of solution, transport and precipitation, especially in the boundary-zones of the anaerobic deep water participate in this migration.—Copyright 1974, Biological Abstracts, Inc.
W75-03571

WATER: ITS QUALITY OFTEN DEPENDS ON THE FORESTER,
Food and Agriculture Organization of the United Nations, Rome (Italy).
S. H. Kunkle.
Unasylva, Vol 26, No 105, p 10-16, Summer 1974. 3 fig, 1 tab, 44 ref.

Descriptors: *Water pollution sources, *Forest management, *Herbicides, *Lumbering, *Pesticides, Weed control, *Water pollution control, Streams, Forests, Forestry, Chemicals, Solid wastes, Wood wastes.

Careless logging, especially clearcutting, indiscriminate use of chemicals, such as herbicides, and other ill-planned forest projects may cause stream pollution. Some guidelines are given regarding proper use of insecticides and herbicides and control of forest debris and litter. (Sykes-IPC)
W75-03589

A STUDY OF NITRILOTRIACETIC ACID (NTA) DEGRADATION IN A RECEIVING STREAM,
Department of the Environment, Ottawa (Ontario). Wastewater Technology Centre.
E. E. Shannon, P. J. A. Fowlie, and R. J. Rush.
Environmental Protection Service, Technology Development Report EPS 4-WP-74-7, August 1974. 34 p, 9 fig, 3 tab, 15 ref.

Descriptors: *Nitrilotriacetic acid, *Biodegradation, Natural streams, *Water pollution sources, Detergents, *Canada, Kinetics, Water properties, Water analysis, Water temperature, Water pollution, Temperature, Seasonal, Monitoring, Tracers, Fluorometry, Harbors, *Path of pollutants.
Identifiers: Grindstone Creek(Ontario), Hamilton Harbor(Ontario).

Nitrilotriacetic acid (NTA) levels in Grindstone Creek (the receiving water for the Waterdown, Ontario, waste water treatment plant) were monitored to determine the degree of NTA degradation under summer and winter extremes of water temperature. Sampling stations were established at 6 points over the 5 mile stretch of stream between Waterdown and Hamilton Harbor. Samples were collected under two influent waste water NTA loading conditions (16-20 mg/liter and 8-16 mg/liter) during summer and winter. Stream flow and temperature were closely monitored. Fluorometric tracer studies were integrated with the monitoring program. During the summer period when NTA removal through the treatment plant was in excess of 95%, dilution and degradation combined to given downstream NTA concentrations consistently less than 10 micrograms/liter. In the winter when stream temperatures were 0.5-3.0 C and NTA removal through the plant was less than 45%, downstream NTA concentrations as high as 125 micrograms/liter were encountered. At the same time, levels at the mouth of Grindstone Creek in Hamilton Harbor averaged 40-50 micrograms/liter. There was evidence of in-stream biodegradation at low water temperatures (this was confirmed by laboratory studies). First-order degradation rate coefficients were determined from the laboratory data. (Witt-IPC)
W75-03601

THE INFLUENCE OF A PAPER MILL WITH ADJACENT COATING PLANT ON THE BIOLOGICAL OXYGEN DEMAND OF THE RECEIVING STREAM (DER EINFLUSS EINER PAPIERFABRIK MIT ANGESCHLOSSENER STREICHEREI AUF DEN BIOLOGISCHEN SAUERSTOFFVERBRAUCH DES VORFLUTERS),
Zdruzene Papirnice, Ljubljana-Vevce (Yugoslavia).
B. Iglic, Z. Valentincic, and T. Herfort-Michieli.
Wochenblatt fuer Papierfabrikation, Vol 102, No 7, p 243-245, 248, 250, April 13, 1974. 4 fig, 5 tab, 4 ref.

Descriptors: *Water pollution sources, *Water pollution effects, *Water quality, Waste water(Pollution), *Pulp wastes, Europe, *Pulp and paper industry, Discharge(Water), Effluents, *Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Hydrogen ion concentration, Water properties, Temperature, Water temperature, Streams.
Identifiers: *Yugoslavia, Coated papers, Groundwood pulp, Paper machines, White water.

An integrated Yugoslavian pulp and paper mill which operates a groundwood plant, four paper machines, and an off-machine paper-coating plant is described. The mill discharges its effluent into a stream. The effects of these discharges have been studied for a year. Water quality variations (stream temperature, suspended solids, pH, COD, and BOD) have been sampled at three points below the mill outfall and compared with stream parameters above the outfall. The discharge was shown to have noticeable effects on stream quality as far as 2.5 km downstream. (Speckhard-IPC)
W75-03605

KINETICS OF MERCURY ADSORPTION AND DESORPTION IN SEDIMENTS,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
R. S. Reimers, and P. A. Krenkel.
Journal Water Pollution Control Federation, Vol 46, No 2, p 352-365, February, 1974. 17 fig, 3 tab, 20 ref.

Descriptors: *Mercury, *Adsorption, *Sediments, Soil types, Sands, Inorganic compounds, Sediment transport, Hydrogen ion concentration, Chlorides, *Path of pollutants.

The sorption characteristics of clays, sands and sediment organics with varying pH values, chloride concentrations and mercury species and compounds, including differing mercury concentration were observed, and the potential for inhibition of mercury methylation in the sediments was determined. At a constant pH value, the adsorption of inorganic mercury was definitely affected by increased chloride concentration with a 20 to 100 percent loss in capacity, depending on the constituents of the sediment. Because inorganic mercury binds with sands, clays, and various organics, the contention that mercury pollution is transported in water system by sediments was supported. (Jernigan-Vanderbilt)
W75-03610

DIFFUSION OF IONS IN SEA WATER AND IN DEEP-SEA SEDIMENTS,
Eidgenossische Technische Hochschule, Zurich (Switzerland).
Y-H, Li, and S. Gregory.
Geochimica et Cosmochimica Acta, Vol 38, No 5, p 703-714, May 1974. 5 fig, 1 tab, 28 ref.

Descriptors: *Sea water, *Sediments, *Diffusion, *Ions, *Mathematical studies, Anions, Cations, Tracers, Radioisotopes, *Path of pollutants.

The tracer-diffusion coefficients of a given ion in water Dj degrees and in sea water Dj* differ no more than 0-8 per cent, so for the first approximation, Dj degrees values can be safely used as Dj* in sea water. The temperature and pressure dependence of Dj and viscosity, n, of solution are closely related. Since pressure effect on n is small, one can assume the same for Dj. Under the restriction of electro-neutrality, the average diffusion coefficient a Dj* of major cations are greater but of major anion, smaller than their respective Dj* and Dj. But for ions with very low concentration, a Dj* = Dj*. The tracer diffusion coefficient of ions in deep-sea sediment, Dj. sed. and in sea water Dj*, are related by the simple equation: Dj.sed. = Dj* alpha/theta squared. The factor alpha/theta squared of sediment can be determined easily by measuring the tracer diffusion coefficient of Cl- or SO42- in the sediment with the technique described. (Pulliam-Vanderbilt)
W75-03611

RARE EARTH ELEMENTS IN FERROMANGANESE NODULES AND OTHER MARINE PHASES,
Washington Univ., Seattle. Dept. of Oceanography.
D. Z. Piper.
Geochimica et Cosmochimica Acta, Vol 38, No 7, p 1007-1022, July, 1974. 8 fig, 2 tab, 41 ref.

Descriptors: *Trace elements, *Marine geology, *Path of pollutants, *Neutron activation analysis, Distribution patterns, Metals, Sediments, Oceans, Seawater, Shales, Transfer, Pacific Ocean, Iron, *Pollutant identification.
Identifiers: Rare earth elements.

The concentrations of rare-earth elements (REE) have been measured in 31 ferromanganese nodules from the Pacific and Indian Oceans and vary by almost a factor of 5. Too few nodules have been analyzed to define possible regional trends. The shale-normalized patterns, however, permit division of nodules into two groups: those from depth greater than 3000-3500 m and those from less depth. The factors that determine this change in the relative concentration of REE may be related to the mineralogy of manganese phases and/or the transport of REE to the deep ocean by particulate matter. Comparison of the REE patterns of nodules with those of phillipsite, phosphorite, clays, CaC03 and seawater suggests that the patterns of these phases reflect fractionation from an initial pattern closely resembling that of shale. By assuming that the accumulation rate of REE in clays, CaCO3 and nodules is represented by that for surface sediments, it has been possible to estimate an accumulation rate of phillipsite in pelagic sediments of the Pacific of 0.02 mg/sq cm/yr. (Pulliam-Vanderbilt)
W75-03615

SELENIUM BIOCHEMISTRY,
National Heart and Lung Inst., Bethesda, Md.
For primary bibliographic entry see Field 5C.
W75-03620

ON THE SPRING MAXIMUM OF THE CONCENTRATION OF TRACE CONSTITUENTS IN ATMOSPHERIC PRECIPITATION,
Institute for Atmospheric Physics, Budapest (Hungary).
E. Meszaros.
Tellus, Vol 26, No 3, p 402-407, 1974. 3 fig, 6 ref, append.

Descriptors: *Trace elements, *Precipitation(Atmospheric), *Troposphere, Gases, Calcium, Data collection, Sampling, Ions, Chlorides, Oxidation, Laboratory tests, Europe, *Air pollution.
Identifiers: *Hungary.

A possible reaction between ozone and other trace gases was postulated on the basis of the annual variations of the concentration of different soluble components in precipitation waters collected in Hungary and in different parts of Europe. For five years, four stations installed in a rural area in Hungary collected monthly precipitation samples. Dry fallout was also included in the samples. From the samples, the pH and electrical conductivity of the water as well as the concentrations of sulfate, nitrate, ammonium, calcium and chloride ions were determined. On the basis of observations from the samples and laboratory experiments, it was concluded that stratospheric ozone plays an important part in the chemistry of tropospheric trace constituents and more exactly in the oxidation and removal of sulfur and nitrogen dioxide. (Jernigan-Vanderbilt)
W75-03621

MERCURY IN TUNAS: A REVIEW,
Inter-American Tropical Tuna Commission, LaJolla, Calif.
For primary bibliographic entry see Field 5C.
W75-03622

THE APPLICATION OF REPRO-MODELING TO THE ANALYSIS OF A PHOTOCHEMICAL AIR POLLUTION MODEL,
Technology Service Corp., Santa Monica, Calif.
A. Horowitz, W. S. Meisel, and D. C. Collins.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 667, $5.25 in paper copy, $2.25 in microfiche. Report No EPA-650/4-74-001, December 1973. 99 p, 17 fig, 16 tab, 9 ref, 1 append. EPA 68-02-1207.

Descriptors: *Air pollution, *Mathematical models, *Computer programs, *California, Climatic data, Data processing, Evaluation, Analytical techniques, Ozone, Pollutants, Oxides, *Path of pollutants.
Identifiers: *Repro-modeling, Photochemical air pollution, Carbon monoxide, Nitric oxide, Nitrogen dioxide, *Los Angeles basin(Calif), Reactive hydrocarbons, Unreactive hydrocarbons.

Several physical models which simulate the impact of emissions and meteorology on the creation and dispersion of photochemical smog have been developed. Characteristics of most of these models are that they are highly computational and require a great deal of input data; hence, it is generally difficult to systematically explore the implications of the models or to use them in a planning context where many model runs are required. 'Repro-modeling' and the analysis and replication of the input/output characteristics of the model were explored as a means of meeting these objectives. A study of the applications of repro-modeling to the Systems Applications, Inc. (SAI) model developed for the Los Angeles Basin was described. The major objectives were: (1) a feasibility test of the repro-modeling approach; (2) a limited interpretation of the implications of the model; and (3) an efficient repro-model program which duplicates input/output relationships of the original model. The repro-model developed was analyzed in a particular application context (i.e., transportation emission control policy evaluation) and its general implications were discussed. Examples of use of the repro-model, which requires orders of magnitude less computer time than the original model, were provided. An appendix contains a Fortran listing of the repro-model program. (Humphreys-ISWS)
W75-03633

SALTWATER INTRUSION INTO A FLOWING STREAM,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2L.
W75-03634

GREAT LAKES WATER QUALITY, 1973 ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5G.
W75-03640

EFFECTS OF OIL UNDER SEA ICE,
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
For primary bibliographic entry see Field 2C.
W75-03646

GROUND-WATER QUALITY MODELING,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Hydrology.
L. W. Gelhar, and J. L. Wilson.
Ground Water, Vol 12, No 6, p 399-408, November-December 1974. 6 fig, 3 tab, 22 ref.

Descriptors: *Water quality, *Groundwater, *Water pollution sources, *Model studies, *Parametric hydrology, Water-table aquifers, Land management, Inflow, Discharge(Water), Storage, *Massachusetts, Highway icing, Deicers, Septic tanks, Nitrates, Recharge, Water balance, Water table, Dupuit-Forchheimer theory, Numerical analysis, Salts.
Identifiers: Lumped-parameter models, *Linear reservoirs, Phreatic aquifers.

A generalized lumped parameter groundwater model was developed based on simultaneous water and solute balances for a phreatic aquifer. The basis for the lumped parameter approach was established by comparison with theoretical analyses of water and solute dynamics in a distributed aquifer model. The basic behavior of the model is characterized by two response times, one associated with the hydraulics and the other with the solute. The model was applied to simulate the impact of highway deicing salts on groundwater quality in eastern Massachusetts. The results, obtained by digital computer simulation, were in reasonable agreement with observed trends over a 15-year period. The effects of various highway deicing alternatives were simulated and the dependence on the aquifer parameters was demonstrated. The application of this basin-wide modeling technique to the case of highway deicing salts demonstrated that this procedure can provide a reasonable basis for long-term evaluation of groundwater pollution. With adequate data on the inputs and aquifer parameters for a given locality,

this general technique can be used to guide regulatory procedures and land use decisions that can be applied at the local, regional, or state level to protect groundwater resources. (Visocky-ISWS)
W75-03661

HYDROCARBON DISPERSION IN GROUND WATER: SIGNIFICANCE AND CHARACTERISTICS,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
J. O. Osgood.
Ground Water, Vol 12, No 6, p 427-436, November-December 1974. 6 fig, 1 tab, 6 ref.

Descriptors: *Water pollution sources, *Organic compounds, *Path of pollutants, Pollution abatement, Groundwater, Gasoline, *Oil spills, Pipelines, Storage tanks, *Pennsylvania, Water table, *Dispersion, *Groundwater movement, Wells, Permeability, Porosity, Unconsolidated aquifers, Fractures(Geologic), Carbonate rocks, Gases, Secondary recovery(Oil), Costs, Leakage.

Groundwater contamination resulting from hydrocarbon spills is a significant problem that has received little attention. Over two hundred spills to the ground were investigated during the last two and a half years. The hydrogeologic characteristics at the spill site are critical in determining dispersion once the hydrocarbon has reached the water table. The hydrocarbon is largely contained on top of the water table. In unconsolidated deposits or in fill material, the shallow groundwater flow system and the direction of hydrocarbon dispersion will coincide. In sedimentary rocks, the orientation of the rock becomes critical. Dispersion will parallel the strike of the rock in more steeply dipping rocks rather than the major groundwater flow direction. Lateral movement will be controlled by jointing and fracturing. Solution channels and fractures exert the major controlling influence on heavily cemented soluble limestones. In tightly cemented clastics, crystalline rocks, and less soluble carbonates, contaminants flow on top of the water table in fractures. Recovery costs for most hydrocarbon spills are expensive and complete removal is extremely time-consuming. Better maintenance and emergency response plans must be developed. (Visocky-ISWS)
W75-03662

NITROGEN BUDGETS OF GREAT PLAINS IMPOUNDMENTS,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-03758

WATER POLLUTION RESEARCH IN CANADA 1973,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W75-03770

A STUDY OF POLLUTION LOADINGS FROM URBAN RUNOFF,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
J. P. Hartt.
In: Water Pollution Research in Canada 1973, Vol 8, p 16-25, 1 fig, 6 tab, 11 ref.

Descriptors: *Water pollution sources, *Urban runoff, Storm water, Winter, Flow, Annual, Phosphates, Coliforms, Biochemical oxygen demand, Suspended solids, Chlorides, Nitrates, Sulfates, Nitrogen.
Identifiers: *Pollution loading, Quantification, Orthophosphates.

The qualitative values, ranges of values, and mean values, on a seasonal and annual basis for 19 physical, chemical, and bacteriological parameters in urban storm water runoff at a 89-acre subdivision in Windsor, Ontario were investigated. The rainfall and runoff quantities were recorded and thence the quantities of the pollutants in pounds per acre per season were determined. To explain the reason for the great difference in pollutional loadings from season to season when rainfall and pollutant concentrations changed very little, runoff coefficients were calculated from rainfall records and storm runoff data collected at the site. The pollutional loadings generated by a given rainfall in a particular season probably are more significant than the concentration of a particular pollutant at a given time, in attempts to quantify the pollution reaching a receiving water on a seasonal or annual basis. The large seasonal runoff coefficient differences that occurred in this study (0.84 in winter and 0.14 in fall) is a most important factor in explaining why the winter portion of the annual pollution load is so high. It is increasingly evident that storm runoff loadings are probably greater pollution sources to receiving waters than effluents from municipal secondary sewage treatment plants. (See also W75-03770) (Auen-Wisconsin)
W75-03772

BOUNDARY EFFECTS ON DILUTION OF BUOYANT JETS,
Memorial Univ. of Newfoundland, St. John's. Faculty of Engineering and Applied Science.
For primary bibliographic entry see Field 8B.
W75-03780

HYDROMETALLURGY,
Pennsylvania State Univ., University Park. Metallurgy and Mineral Processing Sections.
For primary bibliographic entry see Field 3E.
W75-03793

DETERMINATION OF MERCURY IN FLUORSPAR MINING SURVEY SAMPLES,
British Steel Corp., Sheffield (England).
For primary bibliographic entry see Field 5A.
W75-03794

DETERMINATION OF MERCURY IN COMMERCIALLY IMPORTANT AQUATIC ORGANISMS,
Puerto Rico Dept. of Agriculture, Santurce.
R. Y. Ting, O. H. Wheeler, and E. Robles de Irizarry.
Report No COM-74-10086, January 1973. 36 p, 1 fig, 3 tab, 5 ref.

Descriptors: *Mercury, *Data collections, *Aquatic animals, *Distribution patterns, Fish, Pollutants, Invertebrates, Heavy metals, Aquatic life, Sampling, Animal physiology, Analytical techniques, *Puerto Rico, Pollutant identification, *Path of pollutants.

The levels of concentration of mercury in the flesh of the majority of fish and invertebrates commonly taken for consumption in Puerto Rico were below the maximum permissible level set by the Federal Food and Drug Administration. However, the flesh of larger pelagic carnivorous fish such as the great barracuda, blue marlin, and kingfish often exceeded the 0.5 ppm level. The mercury concentrations in the flesh of a group of fish sampled in the same location and at the same time varied to a significant degree, but those of different weight classes under 400 g were not significantly different. In general, kidneys, livers and gall bladders contained higher levels of mercury than flesh. Fat tissues generally contained a very low amount of mercury. Dark flesh contained lower levels of mercury than white flesh. There were indications that the fish sampled from the waters adjacent to industrial and population centers had higher levels than those sampled from relatively isolated areas; systematic sampling is required for verification. Herbivorous fish, in general, contained less mercury than carnivorous fish of comparable weight. (Jernigan-Vanderbilt)
W75-03796

SNAIL POPULATION IN RUNNING WATER,
Universidade Federal de Pernambuco, Recife (Brazil). Instituto de Biociencias.
For primary bibliographic entry see Field 2I.
W75-03803

EVALUATING WELL CONSTRUCTION, (PART II),
Agricultural Research Service, Beltsville, Md.
E. E. Jones, Jr.
Journal of Environmental Health, Vol 26, No 6, May-June, 1974. 7 p, 3 fig, 4 tab.

Descriptors: Water wells, *Groundwater, Water pollution, Soil contamination, Sampling, Hydraulics, Boreholes, Strength of materials, Public health, Coliforms, Pesticide residues, Soils, Oil wastes, Organic wastes, Organic matter.
Identifiers: *Well construction, Well bore, Contaminated wells, United States Geological Survey, State Ground Water Resources Agency.

Information is presented on contaminant characteristics and the behavior of contaminants in soil and water. The information can help plan sampling programs to provide better information for evaluation of well construction. A good well is known by the good water of reasonably uniform quality that it produces. As no well is contaminated the same amount at all times, indication of rapid changes in water quality with time after the initiation of pumping can be used to differentiate between contamination entering the well and poor groundwater quality. Entry of the contaminant involves three factors: (1) the contaminant source, (2) a transmission path, and (3) a transmitting fluid. Many factors are involved in the residual contaminant concentration in a well water sample. Knowledge of the nature and behavior of the contaminant can provide important clues to the path of entry and aid in determining the deficiencies in the sanitary protection of the well. (Campbell-NWWA)
W75-03813

MANURE STACK FLY BREEDING DEPENDS ON THE AMOUNT OF MANURE ADDED DAILY,
Wisconsin Univ., Madison.
W. L. Gajmerac.
Hoard's Dairyman, Vol 117, No 12, p 747, June 25, 1972. 1 fig.

Descriptors: *Breeding, *Farm wastes, *Waste disposal, *Waste storage, *Dairy industry, Agricultural runoff, Waste treatment.
Identifiers: *Manure stock, *Flies.

Recent work on a 40 head Wisconsin dairy farm showed that the daily summer addition of all manure from a dairy herd will cause an increase in housefly population. To help control fly population, it is suggested that the dairymen stack all the manure during the winter and spring, hold the stacked manure until fall, then spread it and plow it under immediately. This lets the dairymen haul the manure in the fall when they have more free time and it cuts down on polluted runoff into waterways. It is believed that beneficial insects and mites inhabit the old stacks and eat the fly eggs and maggots. If only small amounts of manure are added daily during the fly breeding season these beneficial insects manage to keep fly population low. However, if large amounts of fresh manure are added daily, these insects cannot keep up with the fly reproduction. It is suggested that local health officials be contacted concerning their opinion toward flies before new manure handling facilities are developed. (Lee-East Central)
W75-03815

STREAM CHEMISTRY FOLLOWING A FOREST FIRE AND UREA FERTILIZATION IN NORTH-CENTRAL WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2K.
W75-03822

PHYTOPLANKTON WHICH ARE POLLUTION INDICATORS IN LAKES, (IN SWEDISH),
Vandkvalitetsinstitut, Soborg (Denmark).
K. Olrik.
Vatten Vol 29, No 3, p 290-301, 1973. English summary.
Identifiers: Attheya, Ceratium-hirundinella, *Denmark(Zealand lake system), Dinobryon, Lakes, Mallomonas, Microcystis, Peridinium, *Phytoplankton, Pollution, Primary production, Seasonal, Stephanodiscus, Synura, *Bioindicators, Water pollution sources.

A brief review is given of the methods for qualitative and quantitative investigations of freshwater phytoplankton (Nygaard's compound quotient and Utermohl's counting technique). The seasonal variation of the phytoplankton as well as the changes in quality and quantity of the phytoplankton in an alkaline lake, as a result of increasing nutrient contents of the water is illustrated by an example from a lake system in North Zealand (Denmark). The clean water diatom Attheya is the 1st to disappear, several species of the dinophycean genus Peridinium and the chrysophycean genera Dinobryon, Mallomonas, and Synura disappear next and last the dinophycean species Ceratium hirundinella disappears; whereas the blue-green algal genus Microcystis and the diatom genus Stephanodiscus increase greatly. The methods give a good supplement to the ecological knowledge of the lake, gained by measurements of primary production and water chemistry.--Copyright 1974, Biological Abstracts, Inc.
W75-03828

CONTENT OF CHEMICAL SUBSTANCES IN FARM CROPS GROWN ON SOIL IRRIGATED WITH WASTE WATERS OF COKE BY-PRODUCT PLANTS, (IN RUSSIAN),
Kiev Inst. of Nutritional Hygiene (USSR). Physicochemistry Lab.
N. M. Barabanova, L. R. Polishchuk, and L. A. Stempkovskaya.
Vopr Pitan, Vol 32, No 5, p 76-79, 1973.
Identifiers: *Ammonia, *Byproducts, Chemicals, *Chlorides, Coke, Corn(Field), *Crops, Farm, Irrigated soils, *Nitrates, Nitrites, Potatos, Soil, *Sulfates, Waste waters, Industrial wastes, Water pollution sources.

Potatoes and corn were grown on soil irrigated with waste waters of coke by-product plants. Both crops accumulated nitrates, ammonia, sulfates and chlorides. In the potato tubers there was a high content of monatomic phenols and nitrites. Other organic substances (sulfides, cyanides and thiocyanates) were not found in the plants, probably because of their breakdown in the soil and plants.--Copyright 1974, Biological Abstracts, Inc.
W75-03846

5C. Effects Of Pollution

CHANGES IN THE ECONOMY AND ECOLOGY AT PROPOSED LAKE SITES IN THE SALT RIVER BASIN, KENTUCKY, DURING EARLY CONSTRUCTION OF THE DAM FOR TAYLORSVILLE LAKE,
Kentucky Water Resources Research Inst., Lexington.
L. A. Krumholz, and S. E. Neff.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 628, $3.75 in paper copy, $2.25 in microfiche. Research Report No 78, October 1974. 36 p, 1 fig, 6 tab, 16 ref. OWRT B-031-KY(1). 14-31-001-3891.

Descriptors: *Suspended solids, Benthos, *Caddisflies, Aquatic insects, Drift, Sediment, *Turbidity, *Ecology, Aquatic habitats, Limnology, Water quality, Environmental effects, *Kentucky, Economics, Natural resources, Benefits, Planning, Sites, Lakes, Early impoundment, *Pre-impoundment.
Identifiers: *Salt River basin(Kent).

Permanent collecting stations have been established at 67 sites throughout the Salt River, Beech Fork, and Chaplin River drainages. Turbidities increase quickly as flow and runoff increase, and subside quickly when the rain stops. Suspended solids range up to 1,700 mg/l in high turbidities and vary considerably as a result of local spates. Water chemistry generally reflects the limestone nature of the substrate and the physico-chemical characteristics of a typically healthy limestone stream. Bottom organisms are abundant and diverse, more than 300 different benthic organisms have been identified to date. Drift samples exhibit extremely high densities ranging from 0.1 to 28 organisms percubic meter of discharge, with as many as 315,000 organisms passing the same point during peak drift activity. Species diversity of caddisflies was calculated for 85 quantitative samples. The greatest numbers emerge at dusk with sex ratios about 1:1, and with production ranging from 4.3 to 24.3 mg/sq m. The amount of land needed for a recreational area is about 4,300 acres. (Grieves-Kentucky)
W75-03309

PURIFICATION OF APHANIZOMENON FLOS-AQUAE TOXIN AND ITS CHEMICAL AND PHYSIOLOGICAL PROPERTIES,
New Hampshire Univ., Durham. Dept. of Biochemistry.
M. Alam, M. Ikawa, J. J. Sasner, Jr., and P. J. Sawyer.
TOXICON, Vol 11, No 1, p 65-72, 1973. 2 fig, 3 tab, 14 ref. OWRT A-013-NH(7).

Descriptors: Algae, *Cyanophyta, Aquatic plants, Algal poisoning, *Algal toxins, *Eutrophication, Chemical properties, Biological properties, *New Hampshire.
Identifiers: *Aphanizomenon flos-aquae, *Kezar Lake(NH).

A toxin in chromatographically pure form has been isolated from natural blooms of the blue-green alga Aphanizomenon flos-aquae. The toxin is a strongly basin substance, which gives a positive ninhydrin reaction and appears to be a guanidine derivative. A dose of 2.7 micro g injected intraperitoneally into 20 g mice caused death in 4.9 min. The purified toxin reversibly blocks action potentials and tension development in amphibian nerve-muscle preparations without alteration of the resting potential. The toxin differs from saxitoxin in some of its chemical and physical properties, and some of its effects on neuromuscular systems.
W75-03324

SPECIFIC PRODUCTION OF AQUATIC INVERTEBRATES,
V. E. Zaika.
Halsted Press, a division of John Wiley and Sons: New York, NY, 1973. 154 p. Pr $19.75.
Identifiers: Age, *Aquatic animals, Growth, *Invertebrates, Reproduction, *Specific production, Temperature, *Productivity, Publications.

An analysis of the principles and patterns which determine the productivity level of aquatic invertebrate populations; the theoretical concepts and problems concerning the production process in biosystems; and the basic concepts and parameters, and mathematical expression of the basic quantities and relations between them are presented. A chapter dealing with animal growth and the relationship between growth and productivity and the correlation between maximal specific growth rates is included. A chapter on methods for calculating the production of animal populations, production of microorganisms and production of multi-cellular animals is represented. The 4th chapter discusses productivity of infusorians. The specific production of rotifers, annelids and monogenetic trematodes, crustaceans, aquatic larvae, insects, mollusks and echinoderms is dealt with. Comments are given on the results of the author's own investigations into principles determining the specific production of the population. An extensive list of references is included.--Copyright 1974, Biological Abstracts, Inc.
W75-03327

EPIDEMIOLOGIC RELATIONSHIPS BETWEEN HUMAN AND ANIMAL SALMONELLA CARRIERS AND THEIR ENVIRONMENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE, (IN GERMAN),
Institut fuer Medizinisches Mikrobiologie Kantons Sankt Gallen (Switzerland).
S. Pagon, W. Sonnabend, and U. Krech.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med, Vol 158, No 5, p 395-411, 1974. English summary.
Identifiers: Carriers, Environment, *Epidemiologic studies, Germany, Gulls, Lakes, Pollution, *Salmonella, Salmonella-bareilly, Salmonella-manchester, Sea, Sewage, Soil, Turtles, Vectors, *Switzerland(Lake of Constance), Waste water treatment.

In a 2-yr epidemiologic investigation (1969-1970) a correlation was demonstrated between salmonellae found in sewage in St. Gall and 59 registered human Salmonella excreters. With the exception of Salmonella bareilly, the Salmonella serotypes and phagotypes isolated from these patients were also isolated from sewage. In some cases, a relationship existed between Salmonella isolated from sewage and from certain animal excreters (seagulls and turtles) and foodstuffs. Of 46 different Salmonella serotypes demonstrated in sewage, 26 originated from these sources. The role of seagulls as a Salmonella vector on the shore of the Lake of Constance and the near vicinity was investigated. From 3 landings on the Lake of Constance (Romanshorn, Arbon and Rorschach) 996 samples of sea-gull droppings were collected and examined bacteriologically; 6.9% of the samples were positive for Salmonella. The seasonal migration of sea-gulls suggests that S. manchester was introduced from the coastal region of Northern Germany. Examination of sludge and clarified sewage water from the drainage systems of sewage treatment plants in St. Gall showed that neither an out-dated and over-worked sewage treatment plant nor a modern sewage treatment plant was able to remove the Salmonella from sewage. Salmonellae were returned to the environment in the clarified sewage water and in the sludge which was used as fertilizer.--Copyright 1974, Biological Abstracts, Inc.
W75-03330

INFLUENCE OF SALINITY ON THE EGGS AND LARVAE OF THE CALIFORNIA KILLIFISH FUNDULUS PARVIPINNIS,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
T. R. Rao.
Mar Biol (Berl), Vol 24, No 2, p 155-162, 1974.
Identifiers: *California killifish, Colonization, Eggs, Freshwater fish, Fundulus-parvipinnis, Larvae, Optimum, Physiological studies, *Salinity, Water pollution effects.

Incubation salinities over the range of 5-14% S (salt water) produced the shortest incubation period, maximum yolk-conversion efficiency, lar-

gest larval size at hatching and maximum viable hatch. Various morphometric measurements of the newly-hatched larvae were influenced significantly by incubation salinity. Fertilization salinity also affected certain development criteria; in general, lower fertilization salinities resulted in shorter incubation periods and larger larvae at hatching. A salinity range of 5-14% S is suggested as a physiological optimum and the known freshwater affinity of the species suggests that an eventual freshwater colonization by the California killifish is possible.--Copyright 1974, Biological Abstracts, Inc.
W75-03334

STUDY OF THE HYDROGRAPHIC AND CHEMICAL CONDITIONS IN THE WATER OF THE LAGOON OF TACARIGUA, (IN SPANISH),
Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-03335

COMMERCIAL OYSTER FISHERY DEVELOPMENT INVESTIGATION,
Hawaii State Dept. of Land and Natural Resources, Honolulu.
For primary bibliographic entry see Field 6C.
W75-03350

THE ECONOMIC EFFECTS OF THE 1971 FLORIDA RED TIDE AND THE DAMAGE IT PRESAGES FOR FUTURE OCCURRENCES,
Mote Marine Lab., Sarasota, Fla.
For primary bibliographic entry see Field 5G.
W75-03393

THE ENTERPRISE, WISCONSIN, RADIATION FOREST - PREIRRADIATION ECOLOGICAL STUDIES.
Atomic Energy Commission, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161, as Rept No TID-26113, $7.60 in paper copy, $2.25 in microfiche. TID-26113, June 1974. 157 p, 90 fig, 73 tab, 164 ref.

Descriptors: *Forests, *Great Lakes region, *Wisconsin, *Radioactivity effects, Genetics, Research and development, Research facilities, *Cesium, Populations, Animals, Plants, Census, Plant growth, Animal growth, Litter, Leaves, Density, Canopy, Biological communities, Surveys.
Identifiers: *Gamma radiation, *Enterprise radiation forest.

The research on which the papers in this volume are based is an expansion of radiation studies begun at the Institute of Forest Genetics in 1961. The information to be obtained would complement radioecological results obtained in studies of other types of forests, such as those on Long Island and in Puerto Rico. Plans were developed for a research program to extend over a 20-year period and to include irradiation of various northern forest types during different seasons of the year, as well as a 5-year exposure of one of the major northern forest types, namely, aspen. The papers in this volume are concerned with preirradiation studies on the first site chosen for irradiation. The information is largely descriptive of the physical and biological environments of the Enterprise Radiation Forest and is intended to supply reference and base-line information not only for evaluating the gamma-radiation impact but also on the ecology of some important northern forest types. (See W75-03402 thru W75-03414) (Houser-ORNL)
W75-03401

THE ENTERPRISE RADIATION FOREST RESEARCH FACILITY,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
T. D. Rudolph.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological studies, Report No TID-26113, p 1-16, June 1974. 14 fig, 1 tab, 10 ref.

Descriptors: *Forest management, *Ecology, *Radiation, *Radioactivity effects, *Cesium, Research and development, Research facilities, Natural resources, Great Lakes region, Irradiation, Genetics, Sites, Locating, Mapping.

A 1440-acre forest in northern Wisconsin which is being used for gamma-irradiation studies on various northern forest communities is described. A brief history of the area, which is typical of much of the upper Great Lakes forest region, is presented together with a description of its current condition. Development of the tract into a radiation research facility is described. A 10,000-Ci Cs-137 radiation source was used. Studies on each radiation site will include characterization of the pre-irradiation communities, changes occurring during irradiation, and postirradiation recovery. (See also W75-03401) (Houser-ORNL)
W75-03402

DESCRIPTION OF EXPERIMENTAL PLOT DESIGN OF SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
B. J. Salmonson, R. W. Blank, and R. L. Nelson.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 17-31, June 1974. 20 fig, 5 ref.

Descriptors: *Sites, Locations, *Explorations, *Habitats, *Radioactivity effects, *Mapping, Stations, *Phenology, Zoning, Management, Topography, Control, Forest management, Vegetation, Mammals, Soils, Climatology, Measurement, Sampling, Radioactivity, Meteorology, Rainfall.

Initial studies in the Enterprise Radiation Forest were begun in 1968, and the locations of radiation site 1 and the control area were selected in July 1969. Once the location of site 1 was determined, work was immediately begun to establish transects and sampling plots in site 1 and the control area. Weather stations established in 1968 have been maintained since that time. During August 1969 the ground vegetation was sampled and the species were identified. Also at that time the trees were numbered, measured for diameter at breast height, and identified. In June 1970 the exact locations of the trees relative to the center of site 1 were determined by transit. Small mammal trapping grids were also established in the spring of 1970, and a systematic live-trapping schedule was initiated. The dosimetry design was formulated in 1971, and the field work was completed early in 1972. A detailed description of the methods used in establishing the experimental-plot design in site 1 and the control area is presented. (See also W75-03401) (Houser-ORNL)
W75-03403

SOLAR RADIATION MEASUREMENTS IN THE ENTERPRISE RADIATION FOREST,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
J. Zavitkovski.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 33-45, June 1974. 6 fig, 7 tab, 19 ref.

Descriptors: *Forest management, Research and development, Radioactivity, *Radioactivity effects, Measurement, Genetics, *Birch trees, *Maple trees, *Solar radiation, Light, Meteorology, Hardwood, Canopy, Trees, Ecology, Genetics.
Identifiers: *Aspen trees.

Solar radiation was measured in the open and under canopies of several forest types in northern Wisconsin by means of a recording pyranograph and petroleum-ether chlorophyll extracts. Cumulative solar energy in the open was substantially higher in the generally sunny period from April to November 1970 than in the same period in 1971 and 1972, which in both years was cloudy. Depending on cloudiness, the average daily maxima may occur in May (471 langleys in 1972), June (441 langleys in 1971), or July (577 langleys in 1970). Compared with published averages for the Midwest, the measured solar energies were low, probably because of the excessive cloudiness in the Great Lakes region. The highest solar energies under canopies were determined in the aspen forest, followed in decreasing order by birch, maple-aspen-birch, and northern hardwood forest types. Highest absolute solar energies, about 2800 to 3000 langleys/month (or about 20 to 23% of the energy in the open), were determined in all four forest types in May, but relatively more energy (27 to 36%) reached the forest floor in November under leafless canopies. Very low relative values of 2.1, 3.2, 4.2, and 5.9% of the energy in the open were measured under canopies in leaf in the northern hardwood, maple-aspen-birch, birch, and aspen forest types, respectively. (See also W75-03401) (Houser-ORNL)
W75-03404

LICHENS OF THE ENTERPRISE RADIATION FOREST,
Michigan Technological Univ., Houghton.
F. H. Erbisch.
In: The Enterprise, Wisconsin, Radiation Forest-Preirradiation Ecological Studies, Report No TID-26113, p 47-53, June 1974. 10 fig, 3 tab, 14 ref.

Descriptors: *Forest management, Radioactivity, *Radioactivity effects, *Genetics, *Lichens, *Fungi, Sessile algae, Irradiation, Damages, Measurement, Plant growth, Environmental effects, Temperature.

The effects of both environmental change and gamma radiation on lichen thalli in their native habitats are questionable. This study attempts to determine both the macro- and microscopic effects of these two factors on lichen thalli at the Enterprise Radiation Forest. Measurements and observations of thallus growth, configuration, and coloration; substrate temperature; thallus internal structure; and transplanted thalli are being made before irradiation for comparison with measurements and observations after the radiation treatment. The drastic environmental change caused by irradiation of the higher plants and their subsequent death or growth retardation will also affect the lichens. Which will have the greater effect and what the combined effect will be is to be determined. (See also W75-03401) (Houser-ORNL)
W75-03405

FLORA OF THE ENTERPRISE RADIATION FOREST,
Nicolet Coll.-Technical Inst., Rhinelander, Wis.
J. Clausen.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 55-61, June 1974. 2 tab, 3 ref.

Descriptors: *Forest management, *Ecology, Radioactivity, *Radioactivity effects, *Vascular tissues, Plant tissues, Plant morphology, Vegetation establishment, Varieties, Genetics, Vegetation, *Plant groupings.

The 193 vascular plant species recorded in the Enterprise Radiation Forest are listed. Information on Longevity, abundance, and existence of voucher specimen is given for each species. The gound-cover flora of this forest most closely resembles that of the Wisconsin northern drymesic type described by Curtis (1959). The 193 species recorded within the transects of site 1 of

the radiation area are listed. (See also W75-03401) (Houser-ORNL)
W75-03406

DESCRIPTION AND CLASSIFICATION OF PLANT COMMUNITIES IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
J. Zavitkovski.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 63-84, June 1974. 1 fig, 23 tab, 13 ref.

Descriptors: *Forests, *Radioactivity effects, *Genetics, *Speciation, *Varieties, Surveys, Ecology, Sampling, Sites, Plant groupings, Biological communities, Plant growth, Forecasting, Projections, Birch, Density, Population.
Identifiers: *Aspen.

Nine forest and three logging-road plant communities were sampled in the Enterprise Radiation Forest in northern Wisconsin. These communities were quantitatively described by simple ecological indicators - frequency, density, and basal area or cover - and were classified by comparing them to standard cover types of three classification systems. Three forest communities were similar to the aspen cover type, three others to the aspen-paper birch cover type, and one each to the paper birch and sugar maple-basswood cover types. One community was transitional. Seven of the nine communities were in early and two in more-advanced successional stages. Paper birch, red and sugar maple, and quaking aspen headed the list of important species, followed by beaked hazel, Carex pensylvanica, and large-leaved aster. Among the top 23 species were 11 trees, 2 shrubs, and 10 herbs. The future composition of the nine stands is predicted on the basis of the relative representation of young tree, sapling, and tree-seedling species. (See also W75-03401) (Houser-ORNL)
W75-03407

PHYSICAL CONDITION AND DIMENSIONS OF TREES IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
J. Zavitkovski.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 85-95, June 1974. 23 fig, 6 tab, 11 ref.

Descriptors: *Forests, Ecology, Radioactivity, *Radioactivity effects, *Trees, *Surveys, *Measurement, Physical properties, Size, Dimensions, Graded, Shape, Research and development, Biological communities.

Physical conditions of trees composing nine forest communities of the Enterprise Radiation Forest are described and relationships between their age, size, and crown dimensions are established. The trees, mostly of vegetative origin, were reasonably healthy and free of serious mechanical damage. They varied widely in age, size, and crown dimensions, but for individual species good relationships existed among these variables. The trees and the nine forest stands provide suitable and biologically interesting study material for a pilot study on the effects of ionizing radiation on natural forest ecosystems. (See also W75-03401) (Houser-ORNL)
W75-03408

PROPERTIES OF THE TREE FLORA IN THE FOREST TRANSITION FROM ASPEN TO MAPLE-BIRCH TYPE,
Michigan State Univ., East Lansing.
P. G. Murphy, and R. R. Sharitz.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 97-104, June 1974. 4 fig, 6 tab, 12 ref.

Descriptors: *Forests, Ecology, Biological communities, *Canopy, Trees, *Aspen trees, Ecological distribution, Comparative productivity, *Birch trees, *Maple trees, Environmental effects, Foliar, Radioactivity effects, Mortality, Epidemiology, Forecasting, Projections.

Five belt transects were used to study certain properties of the tree flora in a zone of transition between an aspen-dominated area and a maple-birch-dominated area in the Enterprise Radiation Forest. The properties studied included tree-species composition of the canopy, sapling, and seedling strata; population densities; species importance values; species diversity; and leaf-area index. On the basis of known ecological characteristics of the dominant species, leaf-area index, species diversity, and an analysis of similarity between canopy and understory three-species composition, the ecotone appears to include forest types representing three stages of maturity, from the least mature aspen area to the most mature, although still successional, maple-birch area. Because of a complicated and undocumented history of disturbance in the area, the ecotone is not assumed to represent a typical forest sere for undisturbed succession at the Enterprise site. It is predicted that the aspen area will experience the greatest aboveground tree mortality in response to chronic gamma irradiation but that this area will also be the quickest to recover to an approximate preirradiation condition. The overall ecological effect in all areas along the transition will be a setback in successional status, which will be evidenced by changes in the parameters documented in this study. (See also W75-03401) (Houser-ORNL)
W75-03409

PREDICTED EFFECTS OF CHRONIC GAMMA IRRADIATION ON NORTHERN FOREST COMMUNITIES,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
J. Zavitkovski, T. D. Rudolph, and E. O. Bauer.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 137-144, June 1974. 7 tab, 30 ref.

Descriptors: Radioactivity effects, *Forecasting, Biological communities, *Radiation, *Cesium, Genetics, *Forests, *Plant growth, *Great lakes region, Environmental effects, Vegetation, Trees, Density, Population, Census, Shrubs, Damages, Ecosystems, Chromosomes, Cytological studies, Revegetation.
Identifiers: *Radioactivity damage.

A prediction of the effects of gamma radiation (growing-season exposure) on natural northern forest communities has been developed based on vegetation survey, determination of interphase chromosome volumes (ICV) of the most important plant species, and reported relationships between ICV and radiosensitivity. The ICV's of angiosperm tree, shrub, and ground-vegetation species ranged from about 1.5 to 7.3 cubic micron, and those of gymnosperm trees from 30.2 to 52.0 cubic micron. Lichens and bryophytes are common and because of their high radio-resistance should survive in the innermost zone. A Carex zone with some Lycopodiaceae should develop around this innermost zone; this should be followed by a zone dominated by Corylus cornuta and several species of Ericaceae. The transition between the third and fourth zone may be very diverse, with Corylus and Amelanchier, some Polypodiaceae, and perhaps some resistant tree genera such as Tilia, Fraxinus, and Prunus. (See also W75-03401) (Houser-ORNL)
W75-03410

TEMPORAL AND SPATIAL PATTERNS OF PRETREATMENT LITTER PRODUCTION IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
T. R. Crow.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 105-113, June 1974. 7 fig, 7 tab, 6 ref.

Descriptors: *Litter, *Forests, *Genetics, Ecology, *Trees, *Temporal distribution, *Ecological distribution, *Leaves, Migration patterns, Distribution, Spatial distribution, Radioactivity effects.
Identifiers: *Litter fall.

Between August 1969 and May 1972, year-round collections of litter fall were obtained in aspen, birch, and northern hardwood communities in site 1 and similar communities in the control area of the Enterprise Radiation Forest. In both areas total litter production was greatest in the northern hardwood forest type, intermediate in birch, and lowest in aspen. The differences proved statistically significant in the control area but not in site 1. Differences among years were also significant in terms of total litter production but were not significant for leaf-litter production. Because of its spatial and temporal (on an annual basis) uniformity relative to other litter components, leaf litter should provide the best indicator of perturbation related to chronic gamma irradiation. (See also W75-03401) (Houser-ORNL)
W75-03411

LEAF-LITTER PRODUCTION IN THE ASPEN AND MAPLE-BIRCH FOREST TYPES AND THE CONTRIBUTION BY INDIVIDUAL TREE SPECIES,
Michigan State Univ., East Lansing.
P. G. Murphy, R. R. Sharitz, and A. J. Murphy.
In: The Enterprise, Wisconsin, Radiation, Forest - Preirradiation Ecological Studies, Report No TID-26113, p 115-118, June 1974. 1 fig, 3 tab, 9 ref.

Descriptors: *Litter, Leaves, *Productivity, Annual turnover, Comparative productivity, *Maple trees, *Birch trees, *Radioactivity effects, Ecology, Canopy, Biomass, Speciation, Biological communities, Environmental gradient, Latitudinal studies, Dominant organisms, Ecotypes.
Identifiers: *Aspen trees, *Leaf-litter, Foliage.

Immediately following leaf fall in 1971, leaf-litter samples were collected from two forest types, aspen and maple-birch, and from an intervening zone of transition. Only leaves that fell in 1971 were collected. Leaf-litter fall for trees averaged 134 kg/m sq of basal area in the aspen area and 142 kg/m sq in the maple-birch area. Total tree and shrub leaf-litter fall was estimated to be 2.32 tonnes/ha in the aspen area and 2.63 tonnes/ha in the maple-birch area. Shrub leaf-litter fall was greatest in the aspen area, 5.4% of total leaf-litter fall. The relation between relative basal area and relative leaf-litter biomass for tree species was approximately 1:1. Diversity values computed on the basis of number of leaves per species or on biomass of leaves per species indicated that the maple-birch foliage was not diverse and the aspen foliage least diverse. (See also W75-83401) (Houser-ORNL)
W75-03412

VERTEBRATES OF THE ENTERPRISE FOREST: A GENERAL SURVEY,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
R. R. Buech.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 119-122, June 1974. 5 tab, 4 ref.

Descriptors: *Animal populations, *Surveys, *Census, *Wildlife, *Forests, Genetics, Amphibians, Reptiles, Birds, Mammals, *Radioactivity effects, Research and development, Ecology, Ecosystems, Speciation, Nests, Morbidity, Habitats, Wildlife habitats, Behavior.
Identifiers: *Vertebrates, Aves.

Studies of the effects of gamma radiation on northern forest ecosystems are in progress at the Enterprise Forest in northern Wisconsin. A separate species list is presented for four classes of vertebrates, Amphibia, Reptilia, Aves, and Ammalia, found in the radiation forest. The lists will benefit people with specific interest in suitable study material for subsequent radiation experiments as well as those with a general interest in the vertebrate fauna of the area. The lists range from accurate for mammals to incomplete for avian forms. (See also W75-03401) (Houser-ORNL)
W75-03413

SMALL-MAMMAL POPULATIONS IN SITE 1 AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
R. R. Buech.
In: The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies, Report No TID-26113, p 123-135, June 1974. 4 fig, 3 tab, 28 ref.

Descriptors: *Small animals(Mammals), *Census, *Mammals, *Small game, *Wildlife, Animal groupings, Animal populations, *Cesium, *Radioactivity effects, Ecology, Genetics, Biological communities, Distribution patterns, Trapping, Reproduction, Animal physiology, Weight, Mortality, Breeding, Snow cover.

A live-trap study of small-mammal populations and their response to gamma radiation is in progress in the Enterprise Radiation Forest near Rhinelander, Wisconsin. Trapping in northern forest communities has been conducted on a monthly basis since May 1970, along two grids totaling 8.9 ha in size. Data gathered from the two grids before radiation treatment were combined to present information concerning the trappability, populations, reproduction, and body weight of the most prominent species. Species studied are the red-backed vole (Clethrionomys gapperi), the short-tailed shrew (Blarina brevicauda), the eastern chipmunk (Tamias striatus), the meadow vole (Microtus pennsylvanicus), the woodland deer mouse (Peromuscus maniculatus gracilis), and the white-footed mouse (P. leucopus). (See also W75-03401) (Houser-ORNL)
W75-03414

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.
W75-03420

TEMPERATURE EFFECT ON BRAIN GLYCOGEN OF FISH,
Universitaet Hohenheim (Landwirtschaftliche Hochschule) (West Germany). Zoological Inst.
H. Breer, and H. Rahmann.
Brain Research, Vol 74, No 2, p 360-365, July 12, 1974. 3 fig, 19 ref.

Descriptors: Investigations, *Temperature, *Fish physiology, *Thermal stress, Seasonal, *Water pollution effects, Water temperature.
Identifiers: *Goldfish, Brains, Livers, Fish CNS, Glycogen levels.

Investigations were undertaken to determine possible seasonal changes of the concentration of brain glycogen and to study the influence of temperature, one of the critical factors in the life of aquatic poikilotherms, on the glycogen metabolism and fish CNS. The experiments were performed on Scardinus erythrophtalmus and on Carassius auratus. Results show that there are very different responses of both brain and liver organs under thermal stress. In the liver, glycogen levels are constant, whereas in the brain, glycogen levels are influenced by the water temperature. Also, the intensified accumulation of glycogen in cold-acclimatized goldfish brains is an adaptation process which starts immediately after the temperature changes; it is particularly intensive during the first hours but can be observed for over several weeks. Contrary to the results of the experimental temperature test, under natural conditions there was an accumulation of glycogen, in brain as well as in liver, during cold seasons. It could not be shown from these findings which subcellular compartments are responsible for the increased glycogen storage in the cold. (Sandoski-FIRL)
W75-03447

SUBACUTE TOXICITY OF METHYLMERCURY IN THE ADULT CAT,
Food and Drug Directorate, Ottawa (Ontario). Food Research Labs.
S. M. Charbonneau, I. C. Munro, E. A. Nera, R. F. Willies, and T. Kuiper-Goodman.
Toxicology and Applied Pharmacology, Vol 27, No 3, p 569-581, March, 1974. 6 fig, 3 tab, 22 ref.

Descriptors: *Toxicity, *Mercury, Fish, *Canada, Pollution, Animal pathology, Food chains, Fish dieases, Water pollution effects.
Identifiers: *Cats, *Methylmercury, Methylmercuric chloride.

Some species of edible fish from Canadian waters contained hazardous levels of methylmercury. A guideline for sale of fish was set at 0.5 ppm Hg. Since fish represents the major source of dietary methylmercury, studies for assessing toxicity of fish in polluted waters were conducted. Cats were used because their clinical and pathological features are similar to humans who consumed toxic quantities of food containing methylmercury. A dose of 0.25 mg Hg/kg/day was administered to two groups of cats for 12-14 weeks, either as pure methylmercuric chloride or as methylmercury-contaminated fish. A control group received a diet containing uncontaminated fish. Clinical signs of methylmercury intoxication consisting of ataxia, intention tremor and impaired righting reflex and convulsions developed between 55 and 96 days in both treated groups, at which time the total dose received was between 14 and 24 mg Hg/kg. Tissue mercury content was similar in both groups of treated animals, as were the pathologic changes. Lesions were found in the cerebellar vermis and the cerebral cortex. The changes consisted of loss of nerve cells with replacement by reactive and fibrillary gliosis. Chromosome studies of terminal bone marrow samples showed no abnormalities. (Prague-FIRL)
W75-03448

ADVISORY REPORT ON HEALTH EFFECTS OF NITRATES IN WATER.
Illinois Inst. for Environmental Quality, Chicago.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161 as PB-229 500, $3.75 in paper copy, $2.25 in microfiche. Report IIEQ 74-5, January 1974. 39 p, 2 fig, 7 tab, 54 ref.

Descriptors: *Nitrates, *Evaluation, *Illinois, *Water pollution effects, *Water supply, Planning, Environmental effects, Water quality, Water pollution sources, Water policy, Water pollution, Municipal water, State governments, Water demand, Water pollution control, Water quality standards, Water treatment, Water pollution treatment, Water quality control, Water supply development, Water management(Applied), Water allocation(Policy).
Identifiers: *Hazardous substances(Pollution), Non-point sources(Pollution), Environmental policy, State policy.

Possible adverse health consequences of continued use of waters with elevated nitrate levels as drinking water supplies are discussed. Data gathered by the Illinois Environmental Protection Agency indicated that several surface water supplies and public well water supplies in Illinois had often exceeded the U.S. Public Health Service Drinking Water Standard for nitrates. The following recommendations were made: (1) The present limit of 10 ppm nitrate-nitrogen should be maintained. (2) Certain populations which might be more susceptible to the effects of elevated nitrate levels than the average population should be protected. (3) Epidemiologic studies should be undertaken. (4) Research into the reactions with other substances in the water should be undertaken. (5) Available treatment methods for the removal of nitrates from water supplies should be used. (Deckert-Florida)
W75-03484

ACCUMULATION, DISTRIBUTION, TRANSFORMATION AND ELIMINATION OF DDT-14C IN SOLEA SOLEA (PISCES: SOLEIDAE), (IN GERMAN),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
W. Ernst, and H. Goerke.
Mar Biol (Berl), Vol 24, No 4, p 287-304, 1974, Illus.
Identifiers: Bacteria, *DDT-Carbon-14, *Distribution, Elimination, Flora, Gut, *Insecticides, Pisces, *Solea-solea, Soleidae, Transformation, *Absorption.

Common soles S. solea (L.) are extremely suitable for studying the fate of pesticides in marine fish by means of laboratory experiments involving small-sized, accurately controlled, closed aquarium systems. In 5 different experiments on 16 fishes the decreasing accumulation percentages with increasing doses, i.e., with longer application periods, were found to be due to elimination during the application period. During a period of 2 mo. in pesticide-free water, S. solea eliminated 62% of the DDT-14C which it had accumulated after feeding with 17 micrograms DDT-14C over a period of 4 wk. The gastrointestinal tract is assumed to be a major route of DDT elimination. Independent of dosage, there was a characteristic distribution pattern of accumulated DDT: brain, liver and gastrointestinal tract ranked highest, while the concentration in skeletal muscle was lowest. Even during the elimination period the pattern was unchanged. DDE, DDD and a polar component occurred as metabolites, but in all organs more than 80% of the accumulated DDT remained unchanged. Percentages of metabolites were high in liver and gastrointestinal tract than in skeletal muscle. Prolonged exposure to DDT in the diet induced DDT transformation in the gastro-intestinal contents, most probably in the bacterial flora of the gut.–Copyright 1974, Biological Abstracts, Inc.
W75-03494

ORGANOCHLORINE INSECTICIDE RESIDUES IN SEDIMENT AND FISH TISSUES, ONTARIO, CANADA,
Ontario Ministry of Agriculture and Food, Guelph. Pesticide Residue Lab.
R. Frank, A. E. Armstrong, R. G. Boelens, H. E. Braun, and C. W. Douglas.
Pestic Monit J, Vol 7, No 3/4, p 165-180, 1974, Illus.
Identifiers: Biological studies, *Canada(Ontario), Chlorodiphenyl, DDE, *DDT, *Dieldrin, Ethane, *Insecticides, Invertebrates, Plankton, Sediments, Soils, *Pesticide residues, *Fish tissue, Lake sediments.

River and lake sediments and several species of fish were collected from 4 study areas in the Province of Ontario. These consisted of 1 agricultural, 2 mixed agricultural-recreational, and 1 recreational study area. Large volumes of DDT and dieldrin were used in the 1st area, small quantities were used in the mixed areas, and insignificant quantities were used in the recreational area. The agricultural and mixed areas were located on deep alluvial soils; the recreational area was located on bare-to-thinly-covered Precambrian

rock. Metabolites, DDE and TDE (tetrachlorodiphenylethane) were predominate over the parent DDT. Residues of DDT and dieldrin in fish tissues tended to depend on feeding habits, fat content and age of the fish. Residues increased in the low-fat piscivores, were slightly higher in the high-fat feeders, and were highest in the high fat piscivores. The concentration of DDT and dieldrin in the tissues and extractable fat and the actual quantity accumulated per fish increased as size and weight of any 1 species increased. The increase in total DDT or dieldrin concentration from lowest to highest tissue residues of all fish species was of the order of 100-500 times; the increase in body load was of the order of 1000-10,000. Higher concentrations in fish tissue were correlated with the higher sediment levels of the Precambrian recreational area. The use of even minute quantities of persistent chlorinated hydrocarbons in rocky Precambrian watersheds has a profound effect on sediment and biota contaminants.--Copyright 1974, Biological Abstracts, Inc.
W75-03495

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE: A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5A.
W75-03503

DATA ON SUBSTANTIATION OF THE MAXIMUM ALLOWABLE CONCENTRATION OF BUTYPHOS IN WATERS, (IN RUSSIAN),
Uzbekskii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
Yu U. Khasanov, and R. A. Akhmedova.
Gig Sanit, Vol 38, No 8, p 92-93, 1973.
Identifiers: Blood, *Butyphos, Cholin, Esterase, Guinea-pig, Liver, *Maximum allowable concentration, Mouse, Rabbit, Rat, Taste, Tests, *Lethal limit, *Toxicity, Water pollution effects, Organoleptic properties.

The toxicity of this defoliant was determined on white mice, rats, guinea pigs and rabbits with a single administration into the gastrointestinal tract. Its cumulative properties, cholinesterase activity in the blood and biochemical indices characterizing liver function were investigated. On the basis of its weak cumulative properties and the large gap between the toxicological threshold dose and the threshold concentration with respect to the taste of water (about a million-fold), 0.0003 mg/l was taken as the maximum allowable concentration in bodies of water on the basis of an organoleptic index of acceptability.--Copyright 1974, Biological Abstracts, Inc.
W75-03505

PHYSIOLOGICAL EFFECTS OF A SUBLETHAL CONCENTRATION OF PHENOL IN THE PIKE (ESOX LUCIUS L.) IN PURE BRACKISH WATER,
Helsinki Univ. (Finland). Dept. of Zoology.
R. Kristoffersson, S. Broberg, and A. Oikari.
Ann Zool Fenn, Vol 10, No 2, p 392-397, 1973, Illus.
Identifiers: Amino acids, Brackish water, Metabolism, *Phenols, Physiological studies, *Pikes, *Sublethal limit, Water pollution effects, Toxicity.

The effect of phenol on pike (E. lucius) living in brackish water of relatively stable salinity, 5-6%, was studied in continuous-flow aquarium experiments. The highest concentration for survival for at least 1 wk was 5 ppm of phenol at a water temperature of 10C. Longer periods were not tested. This concentration produced the typical effects of phenol on activity, which lasted for the 1st 2-3 days. After 1 wk exposure the test fish were still in good condition, as judged from their external appearance. No differences could be demonstrated between the control and phenol-affected groups in blood Hb, hematocrit, total plasma protein, Na+, K+, Ca2+, Mg2+ or Cl- values. The total amount of plasma free amino acids was slightly increased in the phenol-affected group. Significant changes in individual amino acids are reported but their value as indicators of phenol action remains obscure. No clearly destructive histopathological changes in the gill lamellae or liver structures of the phenol-affected group could be detected.--Copyright 1974, Biological Abstracts, Inc.
W75-03507

ACCUMULATION EXPERIMENTS WITH LINDANE IN A CULTURE OF DUNALIELLA FOR STANDARDIZATION OF AN ALGAE TEST. (AKKUMULATIONSVERSUCHE VON LINDEN IN EINER KULTER VON DUNNALIELLA SPEC. ZUR STANDARISIERUNG EINES ALGENTESTES),
Hamburg Univ. (West Germany). Institut fuer Hydrobiologie und Fischereiwissenschaft.
V. K. Lillelund, and L. Wehrmann.
Berichte der Deutschen Wissenschaftlichen Kommission fur Meeresforschung, Vol 23, No 3, p 317-325, 1974. 6 fig, 7 ref.

Descriptors: *Food chains, *Pesticide residues, Pesticides, *Algae, Path of pollutants, Standards, Plankton, Biomass, Water quality standards, Tests, Absorption, Water pollution effects, Pollutant identification.
Identifiers: *Lindane, *Bioaccumulation, *Dunaliella.

Experiments were made with Lindane in a standing water culture of Dunaliella to develop a standard test for the accumulation of pesticides in marine food chains. The degree to which the level of accumulation depends on the pesticide concentration in the culture medium and on the density of cells was determined. (Katz)
W75-03508

TOXICITY OF 2-(DIGERANYLAMINO)-ETHANOL, A CANDIDATE SELECTIVE FISH TOXICANT,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
L. L. Marking.
Transactions of the American Fisheries Society, No 4, p 736-742, 1974. 1 fig, 8 tab, 21 ref.

Descriptors: *Toxicants, *Selectivity, *Toxicity, *Bioassay, *Carp, *Temperature, *Fish control agents, Bass, Sunfishes, Laboratory tests, Warmwater fish, Cold-water fish, Hydrogen ion concentration, Hardness(Water), Invertebrates, Salmonids.
Identifiers: 2-(Digeranylamino)-ethanol, Selective toxicants, Micropterus dolomieui, Lepomis macrochirus, Lepomis cyanellus, Carassius auratus.

The chemical, 2-(digeranylamino)-ethanol, was tested in the laboratory and in outdoor plastic pools to determine the toxicity to a variety of cold- and warm-water fish. An interesting aspect is that the toxicant is more toxic to carp than to other warm-water fish. The 96-hr LC50 for carp is 0.0507 mg/liter, whereas that value for centrarchids ranges from 0.237 mg/liter for small mouth bass (Micropterus dolomieui) to 0.720 mg/liter for bluegill (Lepomis macrochirus). The toxicant is significantly less toxic to bluegill in cold water (12C) than in warmer water (17 and 22C), and it is more toxic in hard water than in soft water. Toxicity tests with green sunfish (Lepomis cyanellus) show that the toxicant is significantly more toxic in high pH water (pH = 9.0) than in low pH water (pH = 6.0), and that the toxicant detoxifies at a faster rate in pH 9.0 than in lower pH water. Some aquatic invertebrates are more resistant than fish to the toxicant. The chemical is a good candidate selective toxicant, but additional studies are needed to support a registration for its use. (Katz)
W75-03509

TEMPERATURE EFFECTS ON GROWTH AND RESPIRATION RATES OF DOLANIA AMERICANA (EPHEMEROPTERA),
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
R. S. Harvey.
Presented at Thirty-fifth Annual Meeting of the Association of Southeastern Biologists, Savannah, Georgia, April 18-20, 1974. 6 p, 7 fig, 4 ref.

Descriptors: Temperature, *Mayflies, *Respiration, *Growth rates, Aquatic insects, Invertebrates, Benthic fauna, Juvenile growth stage, Methodology, Laboratory tests, *Georgia, *Water temperature, Lethal limit.
Identifiers: *Sublethal effects, *Dolania americana, Three Runs Creek(Geo).

Long range studies are being made to determine the effects of nonlethal elevations in water temperature on the ecology of stream organisms. The Mayfly is being studied to determine the effects of seasonal changes in temperature on population growth rates, and the effects of slight elevations in water temperature on the respiration rates of maturing individuals. Growth and respiration rates of the populations increased with temperature until the 2-year - old nymphs emerged in June and July. Throughout the previous year, respiration rates increased with body weight and water temperature. (Katz)
W75-03510

CHRONIC CADMIUM TOXICITY TO THE BLUEGILL (LEPOMIS MACROCHIRUS RAFINESQUE),
National Water Quality Lab., Duluth, Minn.
J. G. Eaton.
Transactions of the American Fisheries Society, No 4, p 729-735, 1974. 1 fig, 4 tab, 11 ref.

Descriptors: *Toxicity, *Lethal limit, Bioassay, *Cadmium, *Sunfishes, Immature growth stage, Juvenile fish, Spawning, Reproduction, Water pollution sources, Metals, Mortality, Spectrophotometry, Analytical techniques, Regression analysis, Hardness(Water), Water pollution effects.
Identifiers: *Bioconcentration, Tissue.

Nine out of 18 adult bluegills exposed for 11 months during a chronic bioassay including reproduction were killed at 80 micrograms/liter of cadmium in water of 200 mg/liter (as CaCO3) hardness. Progeny exposed for 30 days were killed at 90 micrograms/liter. Adult fish spawned at 239 micrograms/liter and at 2,140 micrograms/liter, but most larvae were severely crippled 6 days after hatching at these concentrations. No effects on survival, development, or reproduction were attributable to cadmium at 31 micrograms/liter. The highest tissue residues were found in liver, intestine and caecum, and kidney. Cadmium concentrations increased with exposure concentration in gill liver, and intestine and caecum, but not in kidney. At least until more information is available on cadmium toxicity in different water types, chronically toxic and 'just safe' continuous exposure concentrations probably can be estimated better by relatively short-term exposures of embryos and larvae than by the use of application factors. (Katz)
W75-03511

PHYSIOLOGICAL AND ECOLOGICAL SIGNIFICANCE OF THE CHEMICAL INSTABILITY OF THE URIC ACID AND RELATED PU-

RINES IN SEA WATER AND MARINE ALGAL CULTURE MEDIUM,
Fisheries and Marine Service, Vancouver (British Columbia). Vancouver Lab.
N. J. Antia, and A. F. Landymore.
Journal of the Fisheries Research Board of Canada, Vol 31, No 8, p 1327-1335, August 1974. 3 fig, 3 tab, 26 ref.

Descriptors: *Chemical degradation, *Nitrogen compounds, *Chemical reactions, *Phytoplankton, *Marine microorganisms, *Chemical analysis, Spectrophotometry, Analytical techniques, Water analysis, Hydrogen ion concentration, Nitrogen cycle, Plant growth substances, Methodology, Kinetics, Trace elements, Pollutant identification.
Identifiers: *Uric acid, *Purines.

The chemical instability of uric acid and related purine bases in a seawater phytoplankton culture medium was evaluated spectrophotometrically from concentration changes incurred in aseptic incubation at about 20 C under cool-white light or complete darkness. Uric acid showed slow degradation in darkness, which was increased severalfold by illumination. Xanthine showed a small degree of degradation only from illumination, but adenine, guanine, and hypoxanthine appeared to be stable under both test conditions. The degradation of uric acid was traced to three factors differing in intensity of effect: (1) pH of sea water (minor effect), (2) photolysis (additional minor effect), (3) trace-metal cation content of sea water (major effect), whereas that of xanthine could be traced only to photolysis. These results cast doubt on previous reports of utilization of uric acid as N-source for phototropic growth of marine planktonic algae in that the compound actually utilized may be degradation product(s) rather than the intact purine. Ecologically, the results signify that uric acid could undergo rapid chemical turnover, without biological intervention, in the marine environment. (Katz)
W75-03512

HEAVY METAL TOLERANCE IN TYPHA LATIFOLIA WITHOUT THE EVOLUTION OF TOLERANT RACES,
Syracuse Univ., N.Y. Biological Research Labs.
S. J. McNaughton, T. C. Folsom, T. Lee, F. Park, and C. Price.
Ecology, Vol 55, No 5, p 1163-1165, Late Summer 1974. 3 tab, 15 ref.

Descriptors: *Adaptation, *Ecotypes, *Heavy metals, *Soil contamination effects, Environmental effects, *Zinc, *Cattails, Soils, Environment, Cadmium, Lead, Aquatic plants, Soil analysis, Bioassay, Industrial wastes.
Identifiers: *Typha latifolia.

Clones of the broad-leaved cattail and soil samples were obtained from near a zinc smelter and from a control location. In the smelter location, soil, zinc concentration was 385 times higher, cadmium content 37 times higher and lead content 16 times higher than for the control. No evidence for the evolution of heavy metal tolerant races could be detected in experiments in which genotypes from both locations were grown on both soils. Growth of genotypes from both localities was inhibited on the heavy metal soil, but not to the extent that would be expected from previous studies of heavy metal effects. It is apparent that some peculiarity of the physiology of Typha confers a general resistance to heavy metal tolerance. This may be a cell wall metal precipitation mechanism. (Katz)
W75-03513

THE USE OF POLLUTANTS FOR AQUACULTURE - CONDITIONING OF WASTES FOR AQUACULTURE,
Papua and New Guinea Univ., Port Moresby (New Guinea).
For primary bibliographic entry see Field 5D.
W75-03514

PRELIMINARY EXPERIMENTS ON THE EFFECT OF THIODAN AND ENDRIN ON FISH CULTURE IN INDONESIA,
Inland Fisheries Research Inst., Bogor (Indonesia).
A. Hardjamulia, and S. Kusumadinata.
In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 56-64. 10 ref, 5 tab.

Descriptors: *Pesticides, *Aquiculture, *Toxicity, *Endrin, *Fish farming, *Path of pollutants, Fishkill, Environmental effects, Insecticides, Organic pesticides, Bioassay, Lethal limit, Mortality, Pesticide residues.
Identifiers: *Thiodan, Rice fields, Cyrpinus carpio, *Indonesia.

Experiments on the acute lethal effects of Thiodan and Endrin applications to fish in rice fields have been performed. Investigations on the effects of the subsequent movement of Endrin with irrigation water to downstream rice fields has been carried out. A potential hazard of insecticide residue carried by river systems to brackish water and coastal aquaculture areas has also been examined. (Katz)
W75-03515

RECENT DEVELOPMENTS IN THE NEW ZEALAND ROCK OYSTER FARMING INDUSTRY (1970-72) AND PROBLEMS REGARDING AQUATIC POLLUTION,
Ministry of Agriculture and Fisheries, Auckland (New Zealand).
L. Curtin.
In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 51-55. 1 tab.

Descriptors: *Aquiculture, *Oysters, *Shellfish, Farming, *Water quality, *Commercial shellfish, Water pollution, Competing uses, Leases, Recreation, Public health, E. coli, Aquatic animals.
Identifiers: *New Zealand.

Recent developments in the New Zealand rock oyster farming industry are reviewed and problems regarding pollution, leasing of suitable waters and conflicts with recreational uses of coastal areas are considered in relation to the future development of the industry. Lack of prescribed standards for determining the quality of cultured oysters and the resulting interpretations by various concerned agencies of the methods used for this purpose has become a major problem for the industry. A possible change of the present concept of determining oyster quality by examination of the meat to one based on water quality is of serious concern to farmers in view of the high standards set for waters of SA quality. Recommendations for suitable water quality standards, control of coastal pollution and multiple use of coastal areas are given. (Katz)
W75-03516

ENVIRONMENTAL ASPECTS OF FIN EROSION AND TUMORS IN SOUTHERN CALIFORNIA DOVER SOLE,
Southern California Coastal Water Research Project, El Segundo.
A. J. Mearns, and M. Sherwood.
Transactions of the American Fisheries Society, No 4, p 799-810, 1974. 2 tab, 9 fig, 25 ref.

Descriptors: *Fish diseases, *Municipal wastes, *Water pollution effects, Domestic wastes, Waste disposal, *California, Laboratory tests, Environmental effects, Water pollution sources, Industrial wastes, Microscopy, Analytical techniques, Fish behavior.
Identifiers: *Dover sole, Microstomus pacificus, *Fin erosion, Tumors.

Between 1969 and 1972, a number of Dover sole (Microstomus pacificus) with eroded fins and skin tumors were collected in a series of trawls off the coast of southern California. Field and laboratory observations suggest that the two diseases were distinct syndromes operating at different growth stages in the life cycle of the Dover sole. Specimens with fin erosion were concentrated in the vicinity of the major municipal waste-water discharge site in the southern California area. Histological observations showed the disease to be external in nature: The distribution of the diseased fish and the patterns of erosion of the various fins suggest that the disease was brought on by contact with the sediments around the wastewater outfall. Tumor-bearing specimens were more evenly distributed throughout the southern California coastal waters, and the presence of the anomaly appeared to be a function of fish size (usually occurring in specimens of less than 150 mm standard length). The spatial and temporal distributions of tumor-bearing Dover sole suggest that initiation of the disease was not related to wastewater discharges. (Katz)
W75-03517

MERCURY CONTENT OF FISH AND SHRIMPS CAUGHT OFF THE BELGIAN COAST,
Ministere de l'Agriculture, Ostend (Belgium). Sea Fisheries Research Station.
R. De Clerck, R. Vanderstappen, and W. Vyncke.
Ocean Management, Vol 2, No 2, p 117-126, September 1974. 7 fig, 3 tab, 21 ref.

Descriptors: *Mercury, *Shrimps, *Commercial fish, Heavy metals, Coast, Age, Size, Methodology, Regression analysis, Crustaceans, Commercial shellfish, Pollutant identification, Water pollution effects.
Identifiers: Plaice, Cod, Whiting, Tissue analysis, *Belgium.

Mercury was determined in 800 samples of plaice, whiting, cod, sprat, and shrimps caught off the Belgian coast during a one year period. The greater portion of values were situated below 0.250 ppm with the highest frequencies occurring between 0.100 and 0.250 ppm. Significant regressions between length of the fish and mercury content were found for male and female whiting and for male cod only. Neither season nor fishing ground had a significant influence on the mercury content of shrimps. (Katz)
W75-03518

DISSOLVED OXYGEN REQUIREMENTS OF NEWLY-HATCHED LARVAE OF THE STRIPED BLENNY (CHASMODES BOSUIANUS), THE NAKED GOBY (GOBIOSOMA BOSCI), AND THE SKILLETFISH (GOBIESOX STRUMOSUS),
Muskingum Coll., New Concord, Ohio.
V. P. Saksena, and J. B. Edwin.
Chesapeake Science, Vol 13, No 1, p 23-28, March, 1972. 4 tab, 2 fig, 9 ref.

Descriptors: *Dissolved oxygen, *Lethal limit, Estuarine fisheries, *Bioassay, Marine fish, Immature growth stage, *Mortality, Estuarine environment, Water pollution effects.
Identifiers: *TL50, Chasmodes bosquianus, Gobiosoma bosci, Gobiesox strumosus, *Striped blennie, *Skillet fish, *Naked gobies.

Newly hatched larvae of the striped blenny, the naked goby and the skillet fish were exposed for 24 hours to varying concentrations of dissolved oxygen obtained by purging York River water with pre-purified grade nitrogen. The experimental apparatus is described. The striped blennies and the naked gobies had 24 - hour TL50 of 2.50 mg/l and 1.30 mg/l respectively. The TL 50 for skilletfish was not calculated, but apparently lies between 0.72 mg/l and 1.23 mg/l. (Katz)
W75-03519

EFFECT OF NITROGEN SUPERSATURATED WATER ON COHO AND CHINOOK SALMON,
Bureau of Sport Fisheries and Wildlife, Seattle, Wash. Western Fish Disease Lab.
R. R. Rucker, and P. M. Kangas.
The Progressive Fish-Culturist, Vol 36, No 3, p 152-156, July 1974. 6 fig, 9 ref.

Descriptors: *Dissolved oxygen, *Salmonids, Supersaturation, *Chinook salmon, *Nitrogen, *Fry, Juvenile fish, Bioassay, Fish eggs, Gases, Mortality, Water pollution effects, Laboratory tests, Pathology.
Identifiers: *Gas bubble disease, *Coho salmon, Oncorhyncus kisutch, Oncorhynchus tshawytscha.

The eggs and fry of coho and chinook salmon were raised in water with varying levels of supersaturation. Eggs were not found to be affected by concentrations of 128 percent N2 + Ar and O2 in water. Different manifestations of gas bubble disease were observed in coho and chinook fry after 10 and 20 days respectively. These results indicate that air or nitrogen supersaturated waters up to 128 percent saturation do no harm to chinook or coho eggs and that it seems safe to rear the fry for about a week in waters containing this level of saturation. (Katz)
W75-03520

TIDAL AQUARIUM FOR LABORATORY STUDIES OF ENVIRONMENTAL EFFECTS ON MARINE ORGANISMS,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
R. C. Clark, Jr., and J. S. Finley.
The Progressive Fish-Culturist, Vol 36, No 3, p 134-137, July 1974. 2 fig, 1 ref.

Descriptors: *Laboratory tests, *Aquaria, Equipment, Technology, Design, *Marine animals, Bioassay, Methodology, Oil spills, Oil pollution, Water pollution effects, *Environmental effects, Organic compounds.
Identifiers: *Sublethal effects.

A laboratory test chamber for studying the effects of an oil slick on intertidal organisms was developed to determine the uptake of sub-lethal levels of paraffinic hydrocarbons from crude oils and petroleum products by marine organisms. The system consists of four major components - a test and control tank to hold the organism, a siphon assembly, a pump assembly and an aeration system. The components are described in detail and operation is explained. (Katz)
W75-03521

THE TOXICITY OF TNT AND RELATED WASTES TO AN AQUATIC FLOWERING PLANT, LEMNA PERPUSILLA,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
C. D. Schott, and E. C. Worthley.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 158, $3.25 in paper copy, $2.25 in microfiche. Edgewood Arsenal Technical Report EB-TR-74016, April 1974. 18 p, 2 tab, 2 fig, 2 ref.

Descriptors: *Phytotoxicity, *Industrial wastes, *Toxicity, *Phytoplankton, *Water pollution effects, Water pollution sources, Growth rate, Herbicides, Bioassay, Hydrogen ion concentration, Flowering.
Identifiers: *Lemna perpusilla, *TNT.

Some products of TNT manufacture, and one transformation product, 4-amino-2 nitrotoluene were assessed for phytotoxicity in order to determine if TNT wastes are potentially hazardous. The herbicide 2,4-dichlorophenoxyacetic acid was used as the positive control for comparative purposes. 2,4-Dichlorophenoxyacetic acid depressed colony growth of Lemna perpusilla at a concentration of 0.1 ppm, whereas 2,4 dinitrotoluene depressed colony growth at a concentration of 0.5 ppm. At pH 6.3, the highest no-effect concentration range for each compound is: 2,4-dichlorophenoxyacetic acid, 0.01 to 0.1 ppm; 2,4-dinitrotoluene, 0.1 to 0.5 ppm; 2,4,6 trinitrotoluene, 0.5 to 1.0 ppm; 4-amino-2-nitrotoluene, 10 to 50 ppm; and 0-nitrotoluene, 10 to 100 ppm. (Katz)
W75-03523

SEWAGE AND AQUACULTURAL PRODUCTION,
Victoria Univ., Wellington (New Zealand).
For primary bibliographic entry see Field 5D.
W75-03524

EFFECT OF SALT WATER INGESTION ON PREGNANCY IN THE EWE AND ON LAMB SURVIVAL,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Nutritional Biochemistry.
For primary bibliographic entry see Field 3C.
W75-03529

INVESTIGATIONS ON AEROBIC PECTOLYTIC BACTERIA IN AN EUTROPHIC LAKE, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Institut.
H. Guede.
Arch Hydrobiol Supplementb, Vol 42, No 3/4, p 483-496, 1973, English summary.
Identifiers: *Aerobic bacteria, Bacteria, *Cytophaga, Epilimnion, *Eutrophication, Lakes, Pectolytic bacteria, Strain, Yeast extract, *West Germany(Constance), Water pollution effects.

For a period of 7 mo. the aerobic pectolytic bacteria of a eutrophic lake near Constance (West Germany) were counted on pectate gel plates. Most of the pectolytic bacteria were found in the epilimnion. Bacteria of the genus Cytophaga were the most frequent pectin decomposers. In experiments with an isolated strain of that genus it could be shown that pectin degradation by these bacteria was reversibly repressed by yeast extract.--Copyright 1974, Biological Abstracts, Inc.
W75-03538

EFFECT OF BOD(5) LOADS AND CARBOHYDRATE CONCENTRATION ON WASTE WATERS ON THE DEVELOPMENT OF FILAMENTOUS BACTERIA (VLIYANIE NAGRUZOK PO BPK(5) I KONTSENTRATSII UGLEVODOV V STOCHNYKH VODAKH NA RAZVITIE NITCHATOI BAKTERII),
For primary bibliographic entry see Field 5D.
W75-03583

THE INFLUENCE OF A PAPER MILL WITH ADJACENT COATING PLANT ON THE BIOLOGICAL OXYGEN DEMAND OF THE RECEIVING STREAM (DER EINFLUSS EINER PAPIERFABRIK MIT ANGESCHLOSSENER STREICHEREI AUF DEN BIOLOGISCHEN SAUERSTOFFVERBRAUCH DES VORFLUTERS),
Zdruzene Papirnice, Ljubljana-Vevce (Yugoslavia).
For primary bibliographic entry see Field 5B.
W75-03605

RENAL CONCENTRATION OF CITRATE AS A NEGATIVE MODULATOR OF DIURETIC RESPONSE TO MERCURIALS,
Medical Coll. of Ohio, Toledo. Dept. of Pharmacology and Therapeutics.
V. Nigrovic, and E. J. Cafruny.
Nature, Vol 247, No 5440, p 381-383, February 1974. 2 tab, 11 ref.

Descriptors: *Mercury, *Animal physiology, Mammals, Organic compounds, Laboratory tests, Laboratory animals, Chemical reactions, Transfer.

The hypothesis that alkalosis increases and acidosis decreases the renal concentrations of an endogenous metabolite which is capable of complexing mercury was tested. In the kidneys the partition of mercuric ions between the diuretic receptor and the hypothetical ligand would then depend on the relative affinity for mercury. To test the hypothesis, conditions were chosen which would alter the renal concentration of citrate with or without inducing concomitant changes in acid-base status. Two series of experiments were performed on anesthetised dogs of either sex. The first series of experiments was intended to determine whether the citrate concentration in the kidneys is altered in the desired direction in dogs infused with hydrochloric acid or sodium hydroxide for 2 hours, or injected with sodium fluoroacetate. In the second series, the dogs were treated as in thefirst series. At the end of the 2 hour pretreatment period, mercury-cysteine complex was injected intravenously. There was a slight decrease in the glomerular filtration rate in dogs pretreated with acid alone and a larger decrease in acidotic dogs treated with uranyl benzoate, in alkalotic dogs, and in fluoroacetate pretreated dogs. The results were in agreement with and furnished experimental support for the hypothesis. (Jernigan-Vanderbilt)
W75-03616

SELENIUM BIOCHEMISTRY,
National Heart and Lung Inst., Bethesda, Md.
T. C. Stadtman.
Science, Vol 183, No 4128, p 915-922, March, 1974. 2 tab, 78 ref.

Descriptors: *Biochemistry, *Enzymes, *Animal metabolism, Oxidation, Reduction(Chemical), Metals, Nutrition, Reviews.
Identifiers: *Selenium.

The biochemical characteristics of selenium were discussed. Proteins containing selenium are essential components of certain bacterial and mammalian enzyme systems. Only three enzyme-catalyzed reactions have been shown to require the participation of a selenium-containing protein. These are the reactions catalyzed by (1) formate dehydrogenase of bacteria (2) glycine reductase of clostrida, and (3) glutathione peroxidase of erythrocytes. They are all oxidation-reduction reactions. The form in which selenium occurs in these selenoproteins is unknown. Identification of the chemical nature of selenium in proteins participating in electron transport processes should enable us to determine selenium's specific role and to understand the basic defects in certain cardiac and skeletal muscle degenerative diseases which are selenium-deficiency syndromes. (Jernigan-Vanderbilt)
W75-03620

MERCURY IN TUNAS: A REVIEW,
Inter-American Tropical Tuna Commission, LaJolla, Calif.
C. L. Peterson, W. L. Klawe, and G. D. Sharp.
Fishery Bulletin, Vol 71, No 3, p 603-613, July, 1973. 1 fig, 2 tab, 35 ref.

Descriptors: *Mercury, Fish, *Tuna, Food, *Distribution patterns, Aquatic life, Oceans, Organic compounds, Food chains, Public health, Toxicity, Human pathology, Sea water, Variability, *Reviews.
Identifiers: *Methylmercury.

Mercury in the aquatic environment comes from both natural processes and industrial activities. The latter probably have not significantly altered the mercury content of the high seas where most tunas are captured. Mercury compounds enter

aquatic organisms through the food web and/or by direct extraction from solution. The relative importance of these pathways in tunas is unknown. Mercury occurs in tuna principally in the form of methylmercury. Generally, tunas appear to have higher mercury levels than those fish species which occupy a lower level in the food chain. Mercury content of tunas varies according to fish size. However, other factors such as area of capture, differential growth rates, varying analytical techniques, and different sampling methods may account for some of the observed variation. The U.S. Food and Drug Administration has established an in-house standard of 0.5 ppm of mercury for fishery products sold in the United States. Other countries have established limits as high as 1.0 ppm. (Jernigan-Vanderbilt)
W75-03622

OBSERVATIONS ON THE ECOLOGY OF LACRUSTRINE POPULATIONS OF THE THREESPINE STICKLEBACK (GASTEROSTEUS ACULEATUS L., 1758) IN THE MATAMEK RIVER SYSTEM, QUEBEC,
Ottawa Univ. (Ontario). Dept. of Biology.
Brian W. Coad, and G. Power.
Nat Can (Que) Vol 100, No 5, p 437-445, 1973.
Identifiers: Brooks, *Canada(Matamek River), *Ecology, Feeding, Gastrosteus-aculeatus, Growth, Insects, *Lacustrine populations, Plankton, Quebec, Rivers, Schistocephalus-solidus, Spawning, *Three-spined stickleback, Trout, Zooplankton.

Lacrustrine populations of the threespine stickleback in the Matamek River System, Quebec (Canada), were studied during 1970-1971. Examination of otoliths and length-frequency histograms showed three age groups to be present. Growth was slower in the lake populations compared to a marine population. Spawning occurred in July of the 3rd year of life but females parasitized with plerocercoids of Schistocephalus solidus did not breed. The mean number of parasites/fish was 1.93 for the 1 + age group and 2.97 for the 2 + age group and infestation levels often approached 100%. Mean number of eggs was 88 and mean diameter was 1.56 mm. The diet of young sticklebacks was chiefly zooplankton while larger sticklebacks also fed on drift insects in competition with brook trout.--Copyright 1974, Biological Abstracts, Inc.
W75-03625

INFLUENCE OF SALINE DRINKING WATER ON MINERAL BALANCES IN SHEEP,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Nutritional Biochemistry.
For primary bibliographic entry see Field 3C.
W75-03637

INVESTIGATIONS ON THE INCORPORATION OF DIFFERENT ALGAE BY SOME ZOOPLANKTON-SPECIES, (IN GERMAN),
A. Infante.
Arch Hydrobiol Supplementh, Vol 42, No 3/4, p 340-405, 1973, English summary.
Identifiers: *Algae, Asterionella-formosa, *Carbon-14 tracers, Cryptomonas-ovata, Cyclops-vicinus, Daphnia-longispina, Daphnia-pulex, Eudiaptomus-gracilis, Eurycercus-lamellatus, Nitzschia-actinastroides, Plankton, Scenedesmus-acuminatus, Sida-crystallina, *Absorption, Staurastrum-sp, Stichococcus-minutissimus, *Zooplankton.

A study was made of the rate of incorporation (assimilation) of 6 algae species (Asterionella formosa, Nitzschia actinastroides, Scenedesmus acuminatus, Stichococcus minutissimus, Staurastrum sp., Cryptomonas ovata) by 6 zooplankton species (Daphnia pulex, Daphnia longispina, Sida crystallina, Eurycercus lamellatus, Eudiaptomus gracilis, Cyclops vicinus) during 24 h, using 14C as tracer.--Copyright 1974, Biological Abstracts, Inc.
W75-03643

AGRICULTURE'S POLLUTION SOLUTION FOR LAKE APOPKA,
C. Woods.
In: Sunshine State Agricultural Research Report for September-October, 1973, p 8-11. (1973). 4 illus.

Descriptors: *Water pollution sources, *Eutrophication, *Water pollution control, *Agricultural runoff, *Drainage engineering, Water pollution, Pollution abatement, Phosphates, Nitrates, Nutrients, Water management(Applied), Recreation, Lakes, Impoundments, Farm ponds, Impounded waters, Agriculture, Data collections, Waste treatment.

After years of controversy over who is responsible for the pollution of Lake Apopka in Florida, a concerted effort is now being made to restore the lake so it can again be used for fishing and recreation. During the past 25 years a steady infusion of nutrients, particularly phosphates and nitrates, has caused the lake to become highly eutrophic. The major sources of these nutrients have been effluents from municipal sewage, drainage from muck farms, wastes from citrus processing plants, decaying hydrophytes and aquatic animals. Of all pollution control efforts now underway, the most ambitious involves 33 farmers around the northeast shore of Lake Apopka. Their objective is to retain their nutrient-rich irrigation water in holding ponds instead of pumping it back into Lake Apopka. Data obtained from the project will be used to develop an abatement system for polluted drainage water from organic soils. The system is expected to serve as a model for similar pollution control systems elsewhere in the United States. (Ritchie-Florida)
W75-03686

CHRONIC FLUORIDE INTOXICATION FROM DRINKING WATER: PRELIMINARY REPORT,
H. T. Petraborg.
Fluoride, Vol 7, No 1, p 47-52, 1974.
Identifiers: Chronic toxicity, Fluorides, Gastrointestinal symptoms, Human diseases, Neurological symptoms, *Wisconsin(Milwaukee), Polydipsia, *Toxicity, *Potable water, Water pollution effects.

Seven individuals in the Milwaukee, Wisconsin, area presented a history of intolerance to fluoridated water. They experienced mainly gastrointestinal and neurological symptoms, polydipsia and increasingly severe general disability. This progressive disease began when they moved into a fluoridated city or shortly after fluoride was added to the water supply to their community. It cleared up promptly when they moved their residence to nonfluoridated communities or upon substituting spring water with little or no fluoride. During their illness they had not been aware that their water supply was fluoridated.--Copyright 1974, Biological Abstracts, Inc.
W75-03695

HUMBOLDT HARBOR AND BAY JETTIES AND DREDGING, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W75-03706

ALGAL NUTRIENT LIMITATION IN LAKE ONTARIO AND TRIBUTARY WATERS,
Wisconsin Univ., Madison. Dept. of Civil Engineering.
N. Sridharan, and G. F. Lee.
Preprint (1974). 35 p, 10 fig, 5 tab, 1 ref. EPA R 800537.

Descriptors: *Algae, *Nutrients, *Lake Ontario, Limiting factors, Tributaries, Plankton, Analytical techniques, Phosphorus, Nitrogen, Bioassay, Eutrophication, Nutrient removal.
Identifiers: Selenastrum capricornutum.

In nutrient-spiking studies of Lake Ontario and its tributary rivers of Niagara, Black, Genesee, and Oswego waters both nitrogen and phosphorus were required for stimulation of cultured and 'natural' algae growth. Samples of the Genesee and Oswego Rivers generally showed nitrogen stimulation. Also, many of the samples from these rivers demonstrated stimulation due to the addition of micronutrients; however care must be exercised in interpreting micronutrient stimulation as the micronutrient solution contained EDTA, a strong complexing agent, which can eliminate toxic elements in the water. Essentially all lake water samples showed phosphorus limitation. It is possible that phosphorus removal at domestic wastewater treatment plants located in these areas could be sufficient to cause phosphorus to be limiting. It is also possible that advanced waste treatment could reduce the concentration of the apparent toxicants in these rivers which would stimulate algae growth in the rivers and nearshore lake waters due to excess of phosphorus present. Even though the potential impact of phosphorus removal cannot be predicted for these rivers and nearshore Lake Ontario waters, it is clear that such a practice will be of some benefit in reducing and possibly reversing the excessive eutrophication trend. (Auen-Wisconsin)
W75-03757

NITROGEN BUDGETS OF GREAT PLAINS IMPOUNDMENTS,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
D. W. Toetz.
In: Man Made Lakes: Their Problems and Environmental Effects, American Geophysical Union, Washington, D.C. 1973, p 567-571. (Geophysical Monograph Series Vol 17). OWRT A-023-OKLA(3).

Descriptors: *Nitrogen, *Impoundments, *Great Plains, Cycling, Reservoirs, Influent streams, Precipitation(Atmospheric), Groundwater, Nitrogen fixation, Nitrates, Runoff, Cyanophyta, Benthos, Sediments, Aquatic plants, Denitrification, Eutrophication.
Identifiers: *Nitrogen sources.

Nitrogen in a biologically unstable form can enter a lake in influents, as precipitation, or as gas on the surface, in groundwater, and by biological nitrogen fixation. Data on mean discharge and nitrate in 109 streams in the United States indicate that a close relationship exists between stream runoff and nitrate load on an areal basis. Seasonal variation can be expected. Groundwater may be an important source of N for certain reservoirs. Ammonia can be volatilized from feedlot operations and enter lakes from the atmosphere. Biological nitrogen fixation by certain algae, bacteria, and fungi may cause increases. Nitrogen losses from outlets of impoundments are probably more important in reservoirs than in natural lakes because of the higher rate of water exchange in reservoirs. Less is known of other losses: sediments as a sink, fish catch, aquatic macrophyte removal, and groundwater recharge. Denitrification prepresents an important nitrogen sink. Nitrate in density currents in the anoxichypolimnion of some reservoirs can be converted rapidly to nitrogen. Use of detritus and assimilation of dissolved organic matter by microbes may be more significant than algal production as a production process. (Jones-Wisconsin)
W75-03758

REMOTE SENSING OF ALGAL BLOOMS BY AIRCRAFT AND SATELLITE IN LAKE ERIE AND UTAH LAKE,
National Environmental Satellite Service, Hillcrest Heights, Md.
For primary bibliographic entry see Field 5A.
W75-03760

A CRITICAL REVIEW OF VOLLENWEIDER'S NUTRIENT BUDGET MODEL AND OTHER RELATED MODELS,
Ministry of the Environment, Rexdale (Ontario). Limnology and Toxicity Branch.
P. J. Dillon.
Water Resources Bulletin, Vol 10, No 5, p 969-989, 1974. 2 tab, 13 ref.

Descriptors: *Nutrients, *Mathematical models, *Reviews, Stratification, Sedimentation, Eutrophication.
Identifiers: *Nutrient budget, *Vollenweider's model, Flushing, *(Arch. Hydrobiol. 66:1-36, 1969).

Early attempts at nutrient budget modeling considered only the case where there was no loss of the material by sedimentation, i.e., the substance was assumed to be conservative. Nonstratified and stratified conditions have both been investigated under these terms. An elegant model, taking into account loss of a substance by sedimentation as well as flushing was presented by Vollenweider. Four important assumptions are inherent in the simple version of that model: the supply J (or loading L) is assumed to be constant through time, as are the flushing and sedimentation rates; the sedimentation process is treated as a first-order chemical process dependent only on the amount of material in the lake (and as a further consideration, dependent on the loading as well); stratification (and other non-uniform mixing features) is ignored, resulting in an unrealistic flushing rate; the concentration of a substance in the outflow is equated to the mean concentration in the lake. Although this model has several shortcomings, it is particularly valuable because it can have immediate practical value in terms of water management policy development. The basic shorcomings in the model are analyzed and suppestions are made to alter the model to take these factors into account. (Jones-Wisconsin)
W75-03761

OIL ON THE SEA.
Massachusetts Inst. of Tech., Cambridge.; and Woods Hole Oceanographic Institution, Mass.
Symposium proceedings 'Scientific and Engineering Aspects of Oil Pollution of the Sea' May 16, 1969, Cambridge, Mass. Plenum Press, New York, 1969. 114 p.

Descriptors: *Technology, *Oil pollution, *Oceans, *Water pollution control, Oil spills, Detergents, Toxicity, Marine plants, Marine animals, Environmental effects, Dispersion, Analysis, Separation techniques, Transportation, Oil industry, Oil wells, Burning, Emulsions, Surfactants, Federal government, Judicial decisions, International waters, Legal aspects, Jurisdiction.
Identifiers: *Oil slicks, Santa Barbara(Calif), Torrey Canyon, Tankers.

The current understanding of oil pollution of the seas relative to oil composition and its biological effects, oil analysis, law enforcement, long-term effects of oil pollution, countermeasures against large oil spills, and the long-term outlook are discussed. The effects and control efforts following the 'Torrey Canyon' and the Santa Barbara oil spills are detailed. The role of chemical dispersants in connection with the behavior of oil spills, its detrimental effects and the basis for dispersing, tests of dispersants' relative effectiveness, toxicity, and some practical field applications are included. Regarding oil slick spread on a calm sea, physical considerations, rate of spread, spread from a steady source in a moving stream, are all compared with field observations. The main engineering features of physical and pneumatic booms operating as oil containment devices in the open sea are discussed. The effectiveness of removal of oil slicks by controlled combustion using CAB-0-SIL ST-2-0 is compared. The role of the federal government in oil pollution has taken the form of congressional and administrative action, judicial interpretations, and participation in international treaties and conventions. (Jones-Wisconsin)
W75-03762

THE MICROFLORA IN THE SETTLING AND SUBSOIL WATER ENRICHING BASINS OF THE BUDAPEST WATERWORKS,
University of Agriculture, Godollo (Hungary).
T. Hortobagyi.
Akademiai Kiado, Budapest, 1973. 341 p.

Descriptors: *Water works, *Microorganisms, *Systematics, Trophic level, Settling basins, Oligotrophy, Eutrophication, Chlorophyta, Cyanophyta, Water purification, Filtration, Infiltration, Subsurface water, Ecosystems, Phytoplankton, Algae, Bacteria, Diatoms.
Identifiers: *Budapest(Hungary), *River Danube, Bacillariophyceae, Conjugatophyceae.

The settling and subsoil infiltration basins of the Budapest Waterworks limnologically belong to the River Danube. On several occasions differences were observed between the actual trophity and trophic type of the basins. Rich and variegated photocoenoses may alternate with poorly populated oligotrophic conditions. The discolorations of the water as well as the formation of water blooms indicate a greater degree of pollution in the river. There is a significant rise both in the number of taxa and individuals proceeding from the River Danube through the settling basins reaching the highest peak in the southwestern corner of the infiltration basin. In the formation of the phytocoenoses certain algal phyla participate in various degrees both in time and space. The water of the basins is betamesosaprobiont in character; it is more pronounced in the infiltration basin. Species with the greatest number of individuals were Planctomyces Bekefii. Merismopedia tenuissima, Microcystis spp., Stephanodiscus Hantzchii, Cryptomonas erosa, Hyaloraphidium contortum var. tenuissimum, Lambertia Judai, Micractinium pussillum, and Scenedesmus spp. Of the organisms identified, the highest number of taxa (266) belong to the order Chlorococcales of the phylum Chlorophyta. The other significant group is Bacillariophyceae with 39 taxa, Cyanophyta 33, and Conjugatophyceae 22. (Jones-Wisconsin)
W75-03763

PRIMARY PRODUCTION IN RELATION TO TEMPERATURE STRUCTURE, BIOMASS CONCENTRATION, AND LIGHT CONDITIONS AT AN INSHORE AND OFFSHORE STATION IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
P. Stadelmann, J. E. Moore, and E. Pickett.
Journal Fisheries Research Board of Canada, Vol 31, No 7, p 1215-1232, 1974. 12 fig, 5 tab, 20 ref.

Descriptors: *Primary productivity, *Temperature, *Biomass, *Light, *Lake Ontario, Photosynthesis, Seasonal, Mixing, Carbon, Nitrogen, Chlorophyll, Light intensity, Stratification, Deep water, Shallow water, Spatial distribution, Temporal distribution.

The vertical and diel variation in primary production at an inshore (60 m) and an offshore station (180 m) were studied using in situ C-14 experiments and this data related to light, biomass, and temperature. During the first week the two stations were investigated to obtain a single profile of physical and biochemical data. The following week, each station was occupied for 48 h and during this period primary production measurements were conducted. A lag in increase of both biomass and photosynthesis rate at the offshore station in early summer was attributed to deep vertical mixing. Production/biomass quotients were computed using different biomass parameters such as particulate organic carbon, nitrogen, and chlorophyll-a. Carbon turnover rates of the seston on an areal basis (sq m) were found to vary between 0.04-0.18 per day and 0.01-0.21 per day at the inshore and offshore station, respectively. Daily photosynthesis efficiency (energy fixed by photosynthesis/available energy) ranged from 0.1 to 1.8% at both stations. Atypical photosynthesis-light intensity curves showed that algal populations behaved differently at different depths during the stratified period. (Jones-Wisconsin)
W75-03764

NUTRIENT UPTAKE KINETICS IN PHYTOPLANKTON: A BASIS FOR NICHE SEPARATION,
State Univ. of New York, Albany. Dept. of Biological Sciences.
R. G. Stross, and S. M. Pemrick.
Journal of phycology, Vol 10, No 2, p 164-169, 1974. 4 fig, 1 tab, 28 ref. NSF GV 29347.

Descriptors: *Nutrients, *Absorption, *Kinetics, *Phytoplankton, *Niches, Photosynthesis, Phosphates, *New York, Diurnal, Diatoms, Biorhythms, Temporal distribution.
Identifiers: *Lake George(NY), Asterionella, Tabellaria, Fragilaria.

Phytoplankton photosynthetic rhythms have long been observed and the total response may result from the expression of an intrinsic rhythmicity in the photosynthetic capacity of a least one major component. Daily patters of incorporation of carbon dioxide and inorganic phosphates were measured in phytoplankton from Lake George. Photosynthesis rates oscillated in phase for the entire assemblage and for individual cells of Asterionella, Tabellaria, and Fragilaria. The photosynthetic capacity was maximal in early afternoon. Daily patterns of phosphate uptake were also rhythmic. At ambient concentrations the assemblage takes up phosphate maximally in the morning while individual cells of the large diatom take it up maximally in the evening. A kinetic analysis of phosphate uptake indicated two uptake velocities for Tabellaria and Frafilaria cells: a hyperbolic function at small and an apparently linear relationship at relatively large concentrations. The large diatoms, in contrast to the total assemblage, functioned maximally at two separate times of the day: in the evening at ambient levels and in the morning at 0.4 micromoles and larger concentrations. Temporal stratification of the nutrient niche may be achieved by several uptake mechanisms in the algal cell functioning at different times of day or with a variable uptake velocity. (Jones-Wisconsin)
W75-03766

NITROGEN AND PHOSPHORUS AVAILABILITY IN LAKE ONTARIO TRIBUTARY WATERS DURING IFYGL,
Texas Univ., Dallas. Inst. for Environmental Sciences.
W. F. Cowen, K. Sirisinha, and G. F. Lee.
Preprint (1974). 33 p, 1 fig, 10 tab, 18 ref. EPA R-800537.

Descriptors: *Measurement, *Nitrogen compounds, *Phosphorus compounds, *Lake Ontario, Tributaries, Algae, Nutrients, Limiting factors, Water pollution sources, Analytical techniques, Bioassay, *New York.
Identifiers: Niagara River(NY), Genesee River(NY), Oswego River(NY), Black River(NY).

What forms of N and P should be measured and how much of the non-readily available N and P

should be considered as potentially available to algae are discussed. It is recommended that the available phosphorus be computed by adding the soluble orthophosphorus to 20% of total phosphorus minus the soluble orthophosphate. The 20% figure is highly variable, and properly the value should be 20 plus or minus 20. Total P should not be used for tributary sources since a substantial part of the P associated with particulate matter will not become available in the lake. One of several procedures for nitrogen analysis as a nutrient source is to measure soluble ammonia and nitrate. The total Kjeldahl N should be made on the samples and the available nitrogen computed by summing ammonia-nitrogen, nitrate-nitrogen and 0.5 total Kjeldahl N minus ammonia nitrogen. It is also important to assess weather N and P are limiting or can be made limiting as there is little need of measuring P transport if it can be domonstrated that N is the limiting element, unless the P input can be reduced to cause it to become limiting. The recommended procedures for computing estimated nutrient load is subject to considerable variation. (Auen-Wisconsin)
W75-03768

WATER POLLUTION RESEARCH IN CANADA 1973,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W75-03770

COMPARATIVE STUDIES OF THE TOXICITY OF HEAVY METALS TO PHYTOPLANKTON AND THEIR SYNERGISTIC INTERACTIONS,
Toronto Univ. (Ontario). Dept. of Botany.
T. C. Hutchinson.
In: Water Pollution Research in Canada 1973, Vol 8, p 68-90, 15 fig, 1 tab, 9 ref.

Descriptors: *Toxicity, *Heavy metals, *Phytoplankton, Cadmium, Copper, Cobalt, Lead, Mercury, Nickel, Algae, Pollutants, Plant growth, Chlorella, Scenedesmus, Chlamydomonas, Zinc, Bioassay, Indicators, Resistance.
Identifiers: *Synergistic effects, Silver, Selenium, Barium, Haematococcus, Antagonistic effects.

Which metals are toxic to phytoplankton and at what levels was investigated. Four unicellular green algae species were used for bioassay under laboratory conditions. Cadmium, copper, cobalt, lead, mercury, silver, selenium, barium, and nickel were tested for toxicity to these algae in nutrient solutions designed to support algal growth. Growth and cell division were used as a simple assay of metal toxicity under a range of concentrations for each metal. To determine effects of specific metal interactions, studies using metals in test pairs are described. They provide examples of synergism and antagonism between metals with respect to toxicity. Toxicity of these metals in solution to the algae had wide diversity. Marked differences between algae, with an almost a unique response to each metal, was revealed. Several metals were inhibitory to some species at 0.1 ppm or less. Silver inhibited Chlorella growth at 0.005 ppm. Most algae showed progressive decrease in growth with increasing metal concentration. Chlorella was the most sensitive to cadmium, copper, mercury, selenium and silver. Copper and nickel were found to act synergistically, each enhancing the other's toxicity. Selenium reduced the toxicity of cadmium thus showing metal antagonism. (See also W75-03770) (Jones-Wisconsin)
W75-03775

HEAVY METAL TOLERANCE IN ALGAE ISOLATED FROM POLLUTED LAKES NEAR THE SUDBURY, ONTARIO SMELTERS,
Toronto Univ. (Ontario). Dept. of Botany.
P. M. Stokes, T. C. Hutchinson, and K. Krauter.
In: Water Pollution Research in Canada 1973, Vol 8, p 178-201. 14 fig, 4 tab, 5 ref.

Descriptors: *Algae, *Heavy metals, *Resistance, Nickel, Copper, Lethal limit, Absorption, Cytological studies, Water pollution effects.
Identifiers: *Multiple metal tolerance, Sudbury(Ontario), Silver.

Algal isolates obtained from lakes in the Sudbury, Ontario district containing high levels of heavy metals, including nickel up to 3 ppm and 0.7 ppm of copper in solution were found to be tolerant to higher levels of toxic metals than were laboratory strains. Their growth response to metals in the medium is distinctive and different from that of the laboratory strains of Scenedesmus and Chlorella, which stop growing at 0.1 ppm Cu and 0.5 ppm Ni. Lake strains continued to grow up to 1.0 ppm Cu and 3.0 ppm Ni, and stop growing at 0.4 ppm Cu. Both lake isolates showed a gradually decreasing growth rate with increasing concentrations of metals whereas the laboratory strains were totally inhibited at low metal concentrations, suggesting a mechanism of metal tolerance. The ecological implications of these adaptations to high levels of toxic metals are discussed, especially the finding that the tolerant algae are adapted to high silver levels, even though silver is not a pollutant in the lakes. The ability of these algae to survive in normally toxic solutions of copper is due to their ability to accumulate it in large amounts and to continue cell division and growth. (See also W75-03770) (Auen-Wisconsin)
W75-03781

LIMNOLOGICAL STUDIES ON THE RIVER YAMUNA AT DELHI, INDIA. PART II. THE DYNAMICS OF POTAMOPLANKTON POPULATIONS IN THE RIVER YAMUNA,
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany). Dept. of Tropical Ecology.
H. Rai.
Archiv fur Hydrobiologie, Vol 73, No 4, p 402-517, 1974. 1 fig, 7 tab, 22 ref.

Descriptors: *Biological communities, *Plankton, *Rivers, Phytoplankton, Zooplankton, Diatoms, Cyanophyta, Protozoa, Rotifers, Turbidity, Light penetration, Water temperature, Nitrates, Phosphates, Oxygen, Chlorophyta, Crustaceans, Euglenophyta, Copepods, Bioindicators, Water pollution sources, Insects, Oligochaetes, Annelids.
Identifiers: *River Yamuna(India), *Potamoplankton, Xanthophyceae, Ostracods, Delhi(India), Bacillariophyceae.

From February 1958 through January 1960 the Yamuna River at Delhi, India supported an abundant and diverse potamoplankton consisting of 124 genera or species of phytoplankton and 97 genera or species of zooplankton. Rotifera represented the most abundant major zooplankton group, although the Protozoa was the dominant generic group at polluted stations. The Bacillariophyceae composed by far the dominant portion of the total annual phytoplankton. The Chlorophyceae and Cyanophyceae were second and third, respectively, in relative abundance, while the pigmented flagellates formed only a small fraction of the total phytoplankton. There is a definite increase in the Cyanophyceae among the phytoplankton and in the Protozoa and Rotifera among zooplankton, in the most polluted stations. An increase in number of some entire organism groups can be used as an indicator of sanitary conditions. The nitrate and albuminoid-N concentration and seemingly the phosphate concentration were increasingly related to phytoplankton yield; soluble silica apparently maintained almost equal concentration. This study suggests that River Yamuna did not develop especially distinctive potamoplankton, but that most organisms were introduced by sewage outfalls. The greater concentrations below the sources of pollution were qualitatively characteristic of the nearest upstream sewage outfall. (Jones-Wisconsin)
W75-03784

CHEMICAL ANALYSES FOR WATER QUALITY - TRAINING MANUAL.
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
For primary bibliographic entry see Field 5A.
W75-03785

A CHECK LIST OF THE BIOTA OF LOWER CHESAPEAKE BAY,
Virginia Inst. of Marine Sciences, Gloucester Point.
M. L. Wass.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-223 655, $8.75 in paper copy, $2.25 in microfiche. Special Scientific Report No 65, October 1972. 290 p, 804 ref.

Descriptors: *Ecological distribution, *Biota, *Chesapeake Bay, *Estuaries, *Varieties, Algae, Fungi, Wetlands, Dunes, Protozoa, Plants, Vectors(Biological), Bacteria, Invertebrates, Fish, Maryland, *Virginia, Reptiles, Birds, Mammals, Barrier islands, Waterfowl, Salinity, Sediments, Hosts, Mollusks.

This ecologically-annotated checklist will help evaluate the current status of the biota of lower Chesapeake Bay and provides a baseline against which future developmental projects and research activities can be judged. Included are lower plants, wetland and dune plants, protozoa, disease organisms and parasites, free-living invertebrates, fishes of Chesapeake Bay and the adjacent coastal plain, herptiles of Maryland and Virginia coastal plain, birds dependent on open water or wetlands, and mammals of water, wetlands, and barrier islands. The list is divided into chapters which can be issued separately for specific interests. Each chapter has an index and one or more reference lists. Common names are provided for some higher plants and all vertebrates. Salinity categories are those of the 'Venice system.' Sediment preferences for invertebrates are generalizations. Chesapeake Bay is the largest estuary in North America, subjected to broad ranges of temperature, wind, turbulence, and dissolved oxygen. Salinities range from rather constant at the mouth to an ecotone. Organisms range from specialists, largely biologically controlled by predation and competition, near the mouth, to generalists, or fugitive species, accommodating to physical factors in upper reaches. Diversity is high in the lower bay. (Jones-Wisconsin)
W75-03786

MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. PROTOZOA: CILIOPHORA,
New Hampshire Univ., Durham. Dept. of Zoology.
A. C. Borror.
For sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402, Price $0.65. NOAA Technical Report NMFS CIRC-378, September 1973. 62 p, 97 fig, 102 ref.

Descriptors: *Marine animals, *New England, *Protozoa, Coasts, Estuaries, Systematics, *Bibliographies.
Identifiers: *Ciliophora.

There is an urgent need for more precise and complete identification of coastal organisms than has been available. It is mandatory, wherever possible, that organisms be identified accurately to species. Accurate scientific names unlock the great quantities of biological information stored in libraries, obviate duplication of research already done, and make possible prediction of attributes of organisms that have been inadequately studied. This manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the marine ciliated Protozoa of coastal

and estuarine waters of New England. The key facilitates identification to family of nonencysted, nondividing marine ciliates at any stage in the life cycle. It is intended for use by a broad audience, hence is artificial (order not necessarily parallel to phylogenetic sequence), and is stripped of unnecessary technical terms. Within the Ciliophora there is wide variation in the arrangement of the cilia, and this forms the basis for classification. A glossary with figures gives the terms used in the key to describe the anatomy of marine ciliates. Collection, examination, and identification techniques are described. (Jones-Wisconsin)
W75-03787

BEHAVIORAL ALTERATIONS IN A SIMPLE PREDATOR-PREY SYSTEM DUE TO SUBLETHAL EXPOSURE TO MERCURY,
Savannah River Ecology Lab., Aiken, S.C.
H. J. Kania, and J. O'Hara.
Transactions of the American Fisheries Society, Vol 103, No 1, p 134-136, January 1974. 1 fig, 1 tab, 7 ref.

Descriptors: *Mercury, *Fish, *Fish behavior, *Laboratory tests, Toxicity, Ecology, Testing procedures, Analytical methods, Lethal limit, Water pollution effects.
Identifiers: *Sublethal effects.

The effects of sublethal concentrations of mercury on a simple predator-prey relationship were investigated. The present work examined the direct ecological ramifications of behavioral alterations caused by stress. After a 24 hour exposure to sublethal mercury concentrations of 0.1, 0.05 and 0.01 ppm Hg(++), the ability of mosquitofish to avoid predation by bass was impaired. Fish exposed to 0.005 ppm Hg(++) were not affected. The degree of effect showed positive correlation with mercury concentrations. (Jernigan-Vanderbilt)
W75-03788

EFFECT OF POTASSIUM AND ZINC IONS OF GROWTH AND TRYPTOPHAN SYNTHETASE IN ALKALOID PRODUCING CULTURE OF ASPERGILLUS FUMIGATUS,
Maharaja Sayajirao Univ. of Baroda (India). Dept. of Microbiology.
K. K. Rao, and A. R. Gupta.
Current Science, Vol 43, No 13, p 415-416, July 5, 1974. 1 tab, 9 ref.

Descriptors: *Zinc, *Microbiology, *Nutrient requirements, Metals, Growth rates, Mineral needs, Potassium.
Identifiers: *Aspergillus fumigatus.

Potassium and zinc stimulate alkaloid formation by supplying more tryptophan through increased activity of tryptophan synthetase. The results of the analysis showed that the omission of K and Zn from the culture medium caused a decrease in both growth and alkaloid production. Alkaloid production was maximum (112 mg/l) when the K content of the medium was 200 mg/l, where there was four times more free endogenous tryptophan available to the culture due to the four fold increased activity of tryptophan synthetase. Similarly 0.75 mg Zn per l gave 110 mg of alkaloids, where again the increase in alkaloid yield may have been due to the availability of more tryptophan in comparison to control. The results clearly indicate that either absence or limited concentration of K and Zn decrease the synthesis of tryptophan ultimately reducing the yield of alkaloids. (Pulliam-Vanderbilt)
W75-03791

EPIDEMIOLOGICAL SURVEY OF WORKERS EXPOSED TO CADMIUM, EFFECT ON LUNG, KIDNEY, AND SEVERAL BIOLOGICAL INDICES,
Louvain Univ. (Belgium).
R. R. Lauwerys, J. P. Buchet, H. A. Roels, J. Brouwers, and D. Stanescu.
Archives of Environmental Health, Vol 28, No 3, p 145-148, March 1974. 1 fig, 4 tab, 22 ref.

Descriptors: *Cadmium, *Public health, *Human pathology, *Human physiology, Testing procedures, Toxicity, Proteins, Analytical techniques, Spectroscopy.

Pulmonary ventilatory function and various biological indices have been investigated in three groups of workers exposed to cadmium dust (women with less than 20 years exposure (E1), men with less than 20 years' exposure (E2), and men with more than 20 years' exposure (E3) and in three matched control groups. The current airborne Cd dust concentration in the workrooms was below the actual American threshold limit value (200 micrograms/cu m). A slight but significant reduction in forced vital capacity, in forced expiratory volume in one second, and in peak expiratory flow rate was found in E3 workers. Kidney damage was more prevalent than pulmonary ventilatory changes, since excessive proteinuria was observed in 15% of E2 workers and in 68% of E3 workers. The electrophoretic pattern of the urinary proteins suggests that the lesion is first glomerular and later becomes predominantly tubular (mixed proteinuria). (Jernigan-Vanderbilt)
W75-03795

DETERMINATION OF MERCURY IN COMMERCIALLY IMPORTANT AQUATIC ORGANISMS,
Puerto Rico Dept. of Agriculture, Santurce.
For primary bibliographic entry see Field 5B.
W75-03796

EVALUATION OF TOLERANCE LIMITS OF SOME TOXIC SUBSTANCES IN INDUSTRIAL WASTE WATERS BY THE ICHTHYO TOXICITY TEST, (IN ITALIAN),
Camerino Univ. (Italy). Istituto di Igiene.
For primary bibliographic entry see Field 5A.
W75-03821

EFFECT OF WATER ON BACTERIAL MULTIPLICATION IN PLANT TISSUE,
Department of Scientific and Industrial Research, Auckland (New Zealand). Plant Disease Div.
J. M. Young.
N Z J Agric Res 17(1): 115-119, Illus. 1974.

Descriptors: Beans, *Bacteria, *Growth rates, Effects, Pathogenic bacteria, *Plant tissues, Nutrients, Water pollution effects, Water pollution control.
Identifiers: Erwinia-herbicola, Psuedomonas-fluorescens, Pseudomonas-lachrymans, Pseudomonas-phaseolicola, Pseudomonas-putida, Pseudomonas-syringae, Nonpathogenic bacteria, *Peptone.

When pathogenic and non-pathogenic bacteria were inoculated into bean leaves which were then kept saturated with water, those bacteria which are normally limited in growth increased in numbers. Pathogens (Pseudomonas lachrymans and P. syringae) in heterologous relationships with beans multipled at a rate equal to the homologue P. phaseolicola, and to higher stationary-phase populations than developed under normal conditions of plant growth. Non-pathogenic bacteria (P. fluorescens, P. putida and Erwinia herbicola) increased in numbers, but their stationary-phase populations were lower than those of the pathogens. Peptone added as a bacterial nutrient to the inoculum of P. fluorescens did not affect the growth of the non-pathogen in bean leaves. The availability of nutrients and water to bacteria in the intercellular spaces of leaf tissue may be important parameters regulating their development. The function of water as a determinant of specificity in host-pathogen relationships in the field is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-03831

POPULATION DYNAMICS OF HOPLOLAIMUS SP. AT VARIOUS LEVELS OF SOIL MOISTURE,
Pakistan Council of Scientific and Industrial Research, Karachi.
M. Saeed, S. Masood, and A. M. Khan.
Sci Ind (Karachi). 9(1/2): 88-90, 1972.

Descriptors: *Nematodes, *Growth rates, *Aquatic populations, Soil moisture.
Identifiers: Hoplolaimus-sp, Population dynamics.

Population dynamics of Hoplolaimus sp., the lance nematode commonly found associated with the roots of many economically important plants, was studied under controlled conditions at different moisture levels. After 5 mo., population was highest at 20% moisture level. With further increase in the moisture nematode population decreased.--Copyright 1974, Biological Abstracts, Inc.
W75-03832

CONTROL OF SALT-MARSH MOSQUITOES WITH ABATE INSECTICIDE AT COOMBABAH LAKES, QUEENSLAND, AUSTRALIA,
Queensland Inst. of Medical Research, Herston (Australia).
For primary bibliographic entry see Field 5G.
W75-03836

EFFECT OF BIOTIC AND ABIOTIC FACTORS ON THE TOXICITY OF ENTOBACTERIN FOR LARVAE OF BLOOD-SUCKING MOSQUITOES AND BITING MIDGES, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Zoologii.
O. G. Saubenova.
Izv Akad Nauk Kaz SSR Ser Biol, Vol 5, p 26-30, 1973.
Identifiers: Aedes-aegypti, Aedes-caspius, Aedes-flavescens, Anopheles-hyrcanus, Culex-modestus, Culex-pipiens, Culicoides-sp, Culiseta-alaskaensis, *Entobacterin, Larvae, *Midges, Mineralization, *Mosquitoes, Tabanus-sp, Temperature, *Toxicity, Water pollution effects, Biota.

The toxic effect of the microbial preparation entobacterin was investigated on the larvae of blood-sucking mosquitoes and biting midges (Aedes caspius, A. aegypti, A. flavescens, Culex pipiens, C. modestus, Culiseta alaskaensis, Anopheles hyrcanus, Tabanus sp., Culicoides sp.). The effectiveness of the preparation was studied in relation to the effect of biotic and abiotic factors: species and age composition of the mosquitoes and midges, temperature regime, pH of the water, degree of its mineralization, and the detoxifying effect of the substrate. The use of entobacterin is most effective during the hot summer when the bodies of water are heated to 25-30C and the water in them have feeble mineralization with pH 7.0.--Copyright 1974, Biological Abstracts, Inc.
W75-03845

5D. Waste Treatment Processes

PRACTICAL TREATMENT OF FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Water Resources Research Inst.
T. J. McGhee.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 629, $3.25 in paper copy, $2.25 in microfiche. Completion Report, June 15, 1974. 18 p, 11 fig, 1 tab, 8 ref. OWRT A-027-NEB(6).

Descriptors: Water quality, Runoff, *Feed lots, *Waste water treatment, *Farm wastes, *Biological treatment, *Aerobic treatment, Color, Adsorption, Design, Chemical oxygen demand, Soils, Agricultural runoff.

A field treatment system was designed, based upon the results of laboratory studies, to treat settled feedlot runoff. The system was operated at liquid retention times of one to four days. Routine data measurements included COD of the raw and treated wastes, influent, effluent, and mixed liquor suspended solids, organic and ammonia nitrogen, mixed liquor dissolved oxygen and effluent BOD. Laboratory studies of residual color removal by adsorption on soil columns were conducted. The soil columns ranged in depth from 3 to 6 feet and were loaded at rates ranging from one to four inches per day. Routine determinations of influent and effluent COD and color were made. Conclusions were: (1) settled feedlot runoff may be effectively stabilized in an aerobic biological treatment system operated at a liquid retention time of two days; (2) the design parameters for such a system are similar to those of high-rate activated sludge; and (3) the humic color characteristic of feedlot runoff is effectively removed by adsorption on soil particles.
W75-03313

EXPERIMENTAL OPTIMIZATION OF A STEP AERATION WASTE TREATMENT PROCESS,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
G. C. Y. Chu, L. E. Erickson, and L. T. Fan.
Biotechnology and Bioengineering, Vol XVI, p 231-250, 1974. 6 fig, 7 tab, 13 ref, (KWRRI Contribution No 117). OWRT A-045-KAN(8). 14-31-0001-3516.

Descriptors: *Activated sludge, *Waste water treatment, *Biological treatment, *Optimization, *Aeration, Chemical oxygen demand.
Identifiers: Experimental optimization, Step aeration.

Evolutionary operation (EVOP) was used to experimentally investigate the optimum steady state operating conditions for a step aeration activated sludge waste treatment process. A laboratory scale two tank step aeration activated sludge unit with fixed total volume, total influent flow rate, recycle flow rate, and sludge wasting rate was employed. The volume ratio and flow rate ratio which minimized effluent chemical oxygen demand were determined. The results indicate that EVOP is a useful technique for improving the performance of biological processes.
W75-03322

PURIFIED WASTEWATER-THE UNTAPPED WATER RESOURCE,
Envirotech Corp., Menlo Park, Calif.
F. P. Sebastian.
Journal Water Pollution Control Federation, Vol 46, No 2, p 239-246, 1974. 3 fig, 3 tab, 21 ref.

Descriptors: *Waste water treatment, *Water supply development, Recycling, Water sources, Tertiary treatment, Annual costs, Capital, *Water reuse.

Purified wastewater has become an increasingly important source of water. A recent U.S. government study of 155 communities with populations over 25,000 indicates, for example, that 145 presently have some raw waste in their water supplies. Several communities, including Windhock, South West Africa; Lake Tahoe, California; Colorado Springs, Colorado; and Rye Meads, U.K., have recently applied advanced waste treatment technology to boost existing tap, trout lake, swimming, irrigation, and industrial cooling water supplies. Treatment plants for the respective communities utilize biological-algae-physical-chemical, biological-physical-chemical, biological-physical-chemical, and extended-biological techniques to meet required quality standards. Some earlier problems of wastewater reuse have been resolved. First, problems of dissolved solids buildup have not resulted because not all water is recycled. Second, a number of toxic materials present in wastewater are effectively eliminated in the advanced treatment stage. Third, potential hazards from viruses have been virtually nonexistent to this point. Cost estimates for the summarized advanced treatment methods indicate conventional primary-secondary-tertiary treatment is more expensive than independent physical-chemical treatment for similar effluent, although the latter is generally more expensive in producing water up to primary-secondary treatment quality. Potential benefits arising from the development of an advanced treatment potential, in addition to increased water supplies, are listed. (Schroeder-Wisconsin)
W75-03337

HOUSTON SUBURBS PROFITS FROM BUILDING THE STATE'S WASTEWATER TREATMENT PLANT.
Water and Sewage Works, Vol 121, Reference Number, p R38-R40, April 1974.

Descriptors: *Waste water treatment, *Tertiary treatment, *Pollution abatement, *Texas, Investment, Facilities, Regional development, *Treatment facilities, *Costs.
Identifiers: Montgomery County(Tex), Harris County(Tex), Houston(Tex).

While many communities point to the high costs in justifying their failure to utilize today's best water pollution abatement techniques, a Houston, Texas suburb has shown how a high quality, three stage sewage treatment plant can be profitable. The approach shows a way to insure adequate sewage treatment for future community needs while still not overburdening the present 1600 residents: install a large advanced treatment plant, then sell excess capacity to neighboring districts. Within two months of the plant's operation, the district has found buyers willing to pay $308,000 to utilize 700,000 of the plant's 1 mgd capacity. This annual income significantly defrays the costs of equipment, land, engineering, and legal fees ($400,000) and the 9.2 miles of sewage tank lines ($800,000). Future expansion is seen on the community's 20 acre treatment site to provide a 20 mgd treatment capacity serving the 200,000 people in Montgomery County and Harris County which includes Houston. The ingenuous approach has worked, providing citizens of the area with high quality effluent which has equaled or bettered a 5 mg/l BOD and suspended solid levels, four times better than Texas' requirement and at a reasonable cost. (Schroeder-Wisconsin)
W75-03340

BACTERIOLOGY OF CHLORINATED AND UNCHLORINATED WASTEWATER EFFLUENTS,
North Texas State Univ., Denton. Dept. of Biological Sciences.
J. K. G. Silvey, R. L. Abshire, and W. J. Nunez.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2153-2162, September 1974. 1 fig, 7 tab, 20 ref.

Descriptors: *Chlorination, *Pathogenic bacteria, *Waste water treatment, Pollution abatement, Streptococcus, Coliforms, Salmonellae, Biochemical oxygen demand, Dissolved oxygen, Microorganisms, *Texas, Chlorine.
Identifiers: Trinity River(Tex), Fecal coliforms, Nonfecal coliforms, Fecal streptococci.

Chlorination has not been widely practiced in the treatment of waste water although chlorination of finished water is standard procedure for the purpose of eliminating pathogenic bacteria. The current emphasis on curtailment of further massive pollution of water by waste products has made necessary a re-evaluation of waste water treatment methods. A bacteriological and chemical study was made on part of the Trinity River in Texas. High numbers of fecal coliforms and fecal streptococci were attributed to the presence of waste effluents. Chlorination was effective in reducing the quantities of microorganisms only where the chlorine was directly applied. Bacterial populations recovered immediately after chlorination was ended. Decreasing susceptibility of microbial organisms to chlorine was, in this order: beneficial heterotrophic organisms, fecal coliforms, nonfecal coliforms and fecal streptococci. Chlorination did not effectively destroy Salmonellae. The BOD and DO of the effluent improved as a result of chlorination. The data obtained indicate that chlorination did not effectively improve the conditions of the river. (Orr-FIRL)
W75-03366

LIQUID WASTE TREATMENT METHOD USING MICROORGANISM AS ADSORBENT (BISEIBUTSU O KYUCHAKUZAI TO SHITA HAISUI SHORIHO),
H. Kobayashi.
Gijutsu to Kagai, Vol 4, No 4, p 39-43, July 1974. 3 fig.

Descriptors: *Bacteria, *Mercury, *Adsorption, *Heavy metals, *Yeasts, Water pollution sources, Water treatment, Pollutants, Chlorella, Liquid wastes, Foreign research, Foreign countries, *Waste water treatment, Degradation(Decomposition), Microorganisms.
Identifiers: Japan, Saccharomyces cerevisiae, Torulopsis utilis.

The use of a type of pseudomous bacteria for decomposition of organic mercury compounds was developed by the Fermentation Research Institute (the present Microbiol Industrial Technology Research Institute). Generally, continuous treatment of toxic heavy metals by this method is extremely difficult. Heavy metal ions are considered water pollutants because of their easy accumulation in living organisms. Research was performed on the ability of yeast, chlorella, and bacteria to remove heavy metal ions, detergent, and dyes both by adsorption on the cell surfaces and by internal absorption. Saccharomyces cerevisiae (store bought bread yeast) and Torulopsis utilis (feed yeast) were used because of their easy accessibility. The results showed that depending on the bacterial cell, sodium, potassium, potassium bichromate and arsenic oxide were not adsorbed, but mercury, lead, cadmium, and other plus metal ions and aluminum ion were relatively well adsorbed. Basic dye, which turns into plus ion in a neutral solution, was adsorbed well, but acidic dye and catalytic dye were not. These physiochemical reactions are explained and their application for liquid waste treatment is discussed. However, at the present stage of research, the unsolved problems are too many, the cost of such a system is unfeasible, and the development of much less expensive microbial agents is not yet foreseeable. (Siegle-FIRL)
W75-03367

DISINFECTION,
Texas Univ., Houston.
E. M. Davis, L. W. Whitehead, and J. D. Moore.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1181-1191, June 1974. 102 ref.

Descriptors: *Disinfection, *Reviews, Publications, Water supply, *Waste water treatment, Research and development, Patents, *Chlorination, Tertiary treatment, *Bibliographies, Methodology, Kinetics, Filtration, Biological treatment.

The methodology and techniques developed and used in disinfection which have been reported in

recent literature are reviewed. The need for increased attention in providing safe water supplies, adequately disinfecting waste water, and overall research is emphasized. Disinfection kinetics and chlorine research are highlighted. The possibility of using biological filtration and chlorination as tertiary treatment methods and the biological effects of chlorine are mentioned. Finally, three patent applications on disinfection are discussed. (Sandoski-FIRL)
W75-03369

WATERLESS SANITATION FOR REST AREAS,
Chrysler Corp., New Orleans, La. Space Div.
R. W. Fullerton.
Water and Sewage Works, Vol 121, No 6, p 86-88, June 1974. 1 fig, 2 tab.

Descriptors: *Sewage disposal, *Sewerage, *Separation techniques, Treatment facilities, Domestic wastes, *Waste water treatment, Incineration.
Identifiers: Mineral oil.

Since 1970, the Chrysler Corporation's Space Division has been developing marine and land based sewage disposal systems. One such system is a closed loop no-discharge nonbiological sewage disposal system which uses mineral oil as the flush fluid to transport human waste instead of water. The flushing fluid carries waste from conventional commodes to a separation tank where the sewage is separated by gravity. The fluid is filtered, purified, and reused indefinitely. Disposal is by burning in a pollution-free incinerator. (Sandoski-FIRL)
W75-03370

ANAEROBIC DIGESTION OF ORGANIC MATTER,
Rowett Research Inst., Bucksburn (Scotland).
P. N. Hobson, S. Bousfield, and R. Summers.
Critical Reviews in Environmental Control, Vol 4, No 2, p 131-191, July 31, 1974. 6 fig, 197 ref.

Descriptors: *Reviews, *Anaerobic digestion, *Waste water treatment, Equipment, Model studies, Theoretical analysis, Bacteria, Biochemistry, *Organic matter, *Filters, Digestion, *Digestion tanks, *Bibliographies.
Identifiers: *Digester systems.

Treatment of waste products is of current concern. The biochemistry of anaerobic digestion is discussed with regard to anaerobic metabolism in the rumen and in digesters, to the composition of digester feedstocks, cellulose digestion, to digestion of nitrogenous and lipid materials, minor bacterial metabolites in digesters, effects of growth rate, substrate concentration, and pH, and fermentation. Theoretical digester systems and modeling of digester systems are presented with emphasis on the high rate digester, tow-stage digester, and the anaerobic filter system. The bacterial populations of anaerobic digesters and practical aspects of anaerobic digestion systems are mentioned. (Sandoski-FIRL)
W75-03371

UNIQUE NEW SECONDARY OXYGEN TREATMENT SYSTEM FOR EFFLUENT.
Paper Trade Journal, Vol 158, No 31, p 22-23, August 5, 1974. 2 fig.

Descriptors: *Sewage treatment, *Waste water treatment, Water pollution, Chemical wastes, Pulp and paper wastes, Aeration, Activated sludge, Municipal wastes, Effluents, Industrial wastes, Oxidation, *Oxygenation, Activated sludge.
Identifiers: Secondary oxygen treatment systems, Pipeline waterfall reactors, *Black liquor oxidation.

A forced free-fall oxygenation (F3o) waste water treatment system has been developed by a unit of Airco Industrial Gases. This system is designed for municipal, chemical, pulp and paper waste usage. Conventional aeration tank capacity may be doubled or tripled by this system. It can also be used in conjunction with new activated sludge plants of existing operations. The waterfall principle is used in individual modular mixing and dissolving units. Also developed was a simple pipeline waterfall reactor useful in black liquor oxidation. (Leibowitz-FIRL)
W75-03372

NEW CONCEPTS FOR CLARIFICATION OF WATER USING SOME ALTERNATIVES TO ALUM,
Regional Engineering Coll., Durgapur (India).
M. N. Rao, and A. K. Datta.
Journal of the Institution of Engineers (India), Vol 54, No PH2, p 57-60, February 1974. 5 fig, 12 ref.

Descriptors: *Water purification, *Alum, *Polyelectrolytes, *Magnesium carbonate, *Foaming, Coagulation, *Waste water treatment, Colloids, Bacteria, Dyes, Municipal water, Potable water.
Identifiers: *Cationic polymers.

Alum has been fundamental in the clarification of municipal waste water for drinking purposes for centuries. The employment of alum as a coagulant in sophisticated water treatment plants is nearly universal. New concepts in the field of clarification of water recommend the use of polyelectrolytes, foam, and magnesium carbonate as alternatives to alum. Polyelectrolytes are polymers with only the cationic being used as prime coagulants. They exhibit a high charge density, and when added as a coagulant, the positively charged polymers are absorbed on the surface of the negatively charged colloidal impurities of water. The particle surface charged is reduced or used sufficiently to allow cohesion and aggregation on collision. Foam has only a limited field of application in treatment of turbid water. A cationic surfactant is added to and mixed with the raw water, and passes to a flotation cylinder. The surfactants are both collector for the colloidal turbidity particles and frothing agent for carrying particles from the solution. When using magnesium carbonate as a coagulant, the sludge problem is often totally eliminated. (Leibowitz-FIRL)
W75-03374

CONCENTRATION OF POLARISATION IN REVERSE OSMOSIS FLOW SYSTEMS UNDER LAMINAR CONDITIONS. EFFECT OF SURFACE ROUGHNESS AND FOULING,
Birmingham Univ. (England). Dept. of Chemical Engineering.
J. W. Carter, G. Hoyland, and A. P. M. Hasting.
Chemical Engineering Science, Vol 29, No 7, p 1651-1658, 1974. 1 fig, 3 tab, 18 ref.

Descriptors: *Reverse osmosis, *Transition flow, *Membranes, Membrane processes, Fouling.
Identifiers: Cellulose acetate membranes, Distilled water fluxes, *Polarization, Rough membrane surfaces.

Experimentation in reverse osmosis was conducted under laminar flow conditions in a channel of cross-section 3.38 mm. Solution concentrations giving pi f/delta p up to 0.66 and cellulose acetate membranes having high rejections and distilled water fluxes of 12-15 x 0.0001 cm/sec were employed. A close prediction was made by a numerical solution of the theoretical equations of the product fluxes and concentration polarization. The effects of rough membrane surfaces in increasing polarization and decreasing product flux were also predicted utilizing a roughness depth determined from a profile of the surface irregularities. A rust layer on the membrane surface had like effects on flux and polarization which were calculable. (Leibowitz-FIRL)
W75-03375

TREATMENT OF WASTE-WATER CONTAINING SURFACE ACTIVE SUBSTANCES, (IN JAPANESE),
K. Hagiwara, and Y. Murakami.
Bulletin of the Government Industrial Research Institute, Osaka, Vol 24, No 4, p 325-330, December 1973. 8 fig, 3 tab, 5 ref. English summary.

Descriptors: *Water pollution, *Waste water treatment, *Sludge disposal, Hydrogen ion concentration, *Phenols, Iron, Aluminum.
Identifiers: Polyhydric phenol, *Polysaccharose, Ethylene glycol molecules, *Surface active substances, Ferric ion, Aluminum ion.

A condensed product of polyhydric phenol and polysaccharose was discovered to be effective for removal of nonionic surface active substances, in a new method of waste water treatment. This can also be used in the treatment of emulsified oil. The condensed product is added to waste water and ferric or aluminum ion is added as a coagulant, with the pH value of the solution adjusted to between 5 and 6. The solution is filtered and the sludge treated by a method such as burning. The treatment's efficiency is dependent upon the number of ethylene glycol molecules in the surface active substance. Efficiency decreases as the number of ethylene glycol molecules increases. The solubilities of the reaction product of the surface active substance and the condensed product of polyhydric phenol and polysaccharose increases as the ethylene glycol molecule increases. With the surface active substance at a concentration of 1,000 ppm, more than 90 percent of the surface active substance was removed. (Leibowitz-FIRL)
W75-03376

UPFLOW FILTRATION IMPROVES OXIDATION POND EFFLUENT,
Nebraska Univ., Lincoln. Engineering Research Center.
T. J. McGhee, and R. K. Patterson.
Water and Sewage Works, Vol 121, No 7, p 82-83, July 1974. 3 fig, 11 ref.

Descriptors: *Waste water treatment, *Oxidation lagoons, Effluents, Sewage treatment, Water quality control, *Filtration, *Biochemical oxygen demand, Coagulation, Alum, Flocculation, Aggregation, Polyelectrolytes, Algae, Industrial wastes.
Identifiers: *Upflow filtration.

Oxidation ponds are an effective, uncomplicated and economical way of treating domestic sewage and certain industrial wastes. The system requires no skilled operator or maintenance. Through evaporation and seepage the total reduction in BOD through an oxidation pond can approach 95 percent, although the actual concentration of BOD and suspended solids may not meet the new standards of 30 mg/liter monthly average and 45 mg/liter weekly average determined for secondary treatment. The material which contributes to the BOD effluent and suspended solids of oxidation ponds is largely algal cells utilizing inorganic byproducts of the bacterial oxidation of the waste. Techniques listed for removal of algae include coagulation with alum, coagulation with alum and polyelectrolytes, flocculation and aggregation on cationic exchange resins, chlorine disinfection, anaerobic rock filters, fly ash slurry filtration, pressure filtration through a diatomaceous earth filter, and sand filtration. (Leibowitz-FIRL)
W75-03377

LIME SLUDGE: SOME PROBLEMS–SOME SOLUTIONS,
Grand Rapids Municipal Water Plant, Mich.
D. E. Hazelswatts.
Water and Sewage Works, Vol 121, No 7, p 72-73, July 1974. 3 fig.

Descriptors: *Waste water treatment, *Sludge, *Centrifuges, *Flocculant, Costs, Lime, *Michigan, Polymers, Water treatment.
Identifiers: *Lime sludge, Grand Rapids(Mich), Grand River(Mich), Bird centrifuge, Nalco 'Instant' polymer.

The Grand Rapids municipally owned water system operates from two sources of supply, Lake Michigan and Grand River. Lime-softened river water produces 2260 pounds of solids per million gallons, producing at maximum rate 90,400 pounds of sludge per day. When the sludge was put in sewers to be dewatered, lime precipitates formed a pasty sludge heavier than sewage, causing the machinery to break down. After investigation, a Bird 36x72 inch solid bowl centrifuge with a spiral scraper was installed. Flocculant was injected through a 3/4 inch diameter pipe inside the feed pipe; however, results with the flocculant were no better than without; the flocculant pipe had broken. The baffle hole surrounding the flocculant pipe was enlarged; the machine is still operant. Because of problems of dissolving the sludge and also poor working conditions caused by the accumulation of the powdered flocculant on walkway surfaces, a new liquid flocculant was tried. The liquid flocculant proved as effective as the dry flocculant, but twice the amount was required. However, the cost of the required quantity of liquid is about half. Therefore the overall cost is the same, and the convenience and safety are much improved. The cake produced by the centrifuge is hauled to a driving yard. (Carpenter-FIRL)
W75-03378

TREATMENT FACILITY INCORPORATES UNIQUE DESIGN FEATURES,
Carollo (John) Engineers, Santa Ana, Calif.
G. P. Lynch.
Public Works, Vol 105, No 9, p 106-107, September 1974. 3 fig.

Descriptors: *Waste water treatment, Facilities, *Design, Digestion, Flow rates, Sedimentation, Operation and maintenance, *California, Municipal wastes, *Treatment facilities, *Anaerobic digestion.
Identifiers: *Degasification, Peaking ponds, Redlands(Calif).

The city of Redlands, California, is currently upgrading and increasing the capacity of their existing waste water treatment facilities. Two unique design features of the new system include a digester supernatant degasification facility to allow further concentration of supernatant following high rate primary-secondary anaerobic digestion and a peaking pond to limit peak flow rates to existing secondary treatment facilities and to third-stage ammonia conversion facilities. The new facilities are two rectangular tanks with a bottom width of 21 feet and length of 11 feet, side slopes at 3 to 1 covered with 4 inches of concrete, a normal working depth of 6 feet, and 2 feet of freeboard. A decant box pump at one end, with a scumbaffle and adjustable overflow weir, return the decanted liquid to the plant influent flow. A sump at the opposite end from the decant box collects the concentrated sludge. Effects of the facilities which have not yet been evaluated include: optimum process control of third stage biological facilities due to more uniform flow rates; greater effluent solids control caused by reduction of peak flow rates on second and third-stage sedimentation facilities; equalization of organic loadings; and, operational flexibility. (Orr-FIRL)
W75-03379

BACTERIAL PRODUCTION OF ENZYMES IN ACTIVATED SLUDGE SYSTEMS,
Connecticut Agricultural Experiment Station, New Haven. Dept. of Biochemistry.
L. Handin, and D. C. Sands.
Journal Water Pollution Control Federation, Vol 46, No 8, p 2015-2025, August 1974. 14 tab, 14 ref.

Descriptors: *Sludge treatment, *Waste water treatment, *Bacteria, *Activated sludge, *Enzymes, *Biological treatment, Microbial degradation, Sludge, Effluents, Biodegradation, Microorganisms, Treatment facilities.

The five important stages (raw influent, primary effluent, mixed liquor, activated sludge, final effluent) in four activated sludge treatment facilities were examined to determine the numbers and percentages of bacteria capable of producing specific enzymes. The activated sludge contained the greatest total number of bacteria, followed by the number in the mixed liquor. A 17- to 93-fold increase was evident between raw influent and mixed liquor and activated sludge. There is not a selective removal of any one specific bacterial type in the primary effluent stage. From the primary effluent to the mixed liquor stage, a selective process seems to occur which favors bacteria with certain enzymatic capabilities. Bacteria in enzyme categories not readily precipitated in the sludge appear in higher numbers in the final effluent. The fact that the increase of bacteria from the mixed liquor and the activated sludge was not greater than was found may indicate that activated sludge contains more undegraded material than bacterial cells or, if the sludge is predominately bacteria, that they are dead cells. The lack of significant difference between these two stages may mean that the percentage of active bacteria tends to equalize in the aeration step. The information obtained could be useful when considering the possible use of stabilized enzymes in lieu of, or in addition to, microorganisms. (Orr-FIRL)
W75-03380

COMPARISON OF COMPLETELY MIXED AND PLUG FLOW BIOLOGICAL SYSTEMS,
Fehr and Graham Consulting Engineers, Freeport, Ill.
E. D. Toerber, W. L. Paulson, and H. S. Smith.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1995-2014, August 1974. 26 fig, 9 tab, 3 ref.

Descriptors: *Activated sludge, *Waste water treatment, Evaluation, Flow rates, Organic loading, Construction, Design, Illinois, Biochemical oxygen demand, Chemical oxygen demand, *Biological treatment.
Identifiers: Completely mixed system, Plug flow.

The performance of a completely mixed activated sludge system and the performance of a plug flow system under parallel operating conditions were compared. The two systems were tested with waste from Freeport, Illinois. Under normal operating conditions both the completely mixed and the plug flow systems had similar removal efficiencies. If there were separate operating conditions and constant influent flow rates, both systems showed a rapid leveling off of removal efficiency after a nominal aeration detention time of 2 to 3 hours. The completely mixed system exhibited an overall removal efficiency ten percent greater than the plug flow system when both were subjected to a severe shock load. (Orr-FIRL)
W75-03381

HIGH RATE BIOLOGICAL DENITRIFICATION USING A GRANULAR FLUIDIZED BED,
Manhattan Coll., Bronx, N.Y. Dept. of Civil Engineering.
J. S. Jeris, C. Beer, and J. A. Mueller.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2118-2128, September, 1974. 11 fig, 4 tab, 11 ref.

Descriptors: *Biological treatment, *Activated sludge, *Carbon, *Nitrogen, Research and development, Microorganisms, Microbial degradation, Equipment, Trickling filters, *Waste water treatment, Nutrient removal, *Denitrification.
Identifiers: Granular fluidized bed.

Using fluidized, small media for biological removal of contaminants in a reactor has the advantages of greater surface area available for growth per unit of reactor volume, very small head loss, no danger of clogging, and easier carrier removal procedure. A fluidized bed is a solid, granular carrier medium in a columnar reactor suspended in an upflowing fluid. An experimental apparatus was designed and tested for denitrification capabilities. A major problem with the process was the continual growth of the organisms on the carbon particles. This caused bed expansion and necessitated the removal of part of the biologically coated carbon to prevent bed overflow. The idea of achieving a balance between growth and washoff similar to that found in a trickling filter was dropped because increasing the flow failed to affect the growth on the media. It was estimated that the chemical costs would be slightly over $0.02/1000 gal for removal of 25 mg/liter nitrate nitrogen. The nitrogen removals obtained ranged from 257 to 424 lb inorganic nitrogen/ day/1000 cu ft of reactor capacity. When the hydraulic loading was 12 gpm/sq ft, the superficial detention time required was about seven minutes for removal of 20 to 35 mg/liter nitrogen. The fluidized biological bed concept has demonstrated the ability to remove more nitrogen than the activated sludge process and requires less detention time than other biological waste treatment systems. (Orr-FIRL)
W75-03382

COMBINED CHEMICAL-BIOLOGICAL TREATMENT STUDIES,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
H. O. Bouveng.
Pure and Applied Chemistry, Vol 37, No 3, p 329-341, 1974. 10 fig.

Descriptors: *Sewage treatment, *Biological treatment, Chemical precipitation, Phosphorus, Biochemical oxygen demand, *Waste water treatment, Costs, Municipal wastes, Industrial wastes.
Identifiers: *Chemical-biological treatment.

The OECD study of chemical treatment of urban sewage is discussed with special reference to the relation between cost and performance of alternative processes. The application of combined chemical and biological treatment processes is discussed with emphasis on the factors which influence the stability of performance. Considering chemical treatment of urban sewage only as a method for phosphorus removal is an unjustified limitation of its application. Chemical precipitation of urban sewage is a profitable alternative when an effluent having a low and stable level of residual BOD is desired. Chemical treatment is a useful supplement to biological treatment of industrial waste water when the latter is not able to achieve the required effluent quality. (Orr-FIRL)
W75-03383

MEMBRANES AND MODULES FOR THE WATER DESALINATION WITH REVERSE OSMOSIS (MEMBRANEN UND MODULE FUR DIE WASSERENTSLZUNG MIT UMGEKEHRTER OSMOSE),
For primary bibliographic entry see Field 3A.
W75-03384

DESALINATION - NEW WATER FOR OLD (ENTSALZUNG-FRISCHWASSERVERSORGUNG UND ABWASSERAUFBEREITUNG),
United Kingdom Atomic Energy Authority, London (England).
O. Pugh.
Meerestechnik, Vol 5, No 4, p 119-123, August, 1974. 7 fig.

Descriptors: *Desalination, *Potable water, *Reverse osmosis, *Waste water treatment, Distillation, Water quality control, Water resources, Water reuse.

Previously desalination has been used to provide an essential commodity for man--potable water. The newer desalting processes are becoming more important in waste treatment. Desalination technology, which has been mainly distillation processes, contributes to only one aspect of the complete water cycle. The advent of the reverse-osmosis system introduces the technology to the area of protection of clean water resources from the discharge of polluting waste. Reverse-osmosis can also be used for the renovation of waste water. (Orr-FIRL)
W75-03385

ADSORPTION PROCESSES,
Michigan Univ., Ann Arbor. Coll. of Engineering.
W. J. Weber.
Pure and Applied Chemistry, Vol 37, No 3, p 375-392, 1974. 6 fig, 1 tab, 15 ref.

Descriptors: *Waste water treatment, *Adsorption, *Activated carbon, Water reuse, Costs, Municipal wastes, Effluents, Organic loading, Toxicity, Heavy metals, Phosphorus, Design, Operation and maintenance.
Identifiers: *Physicochemical treatment.

Adsorption is a basic process in the physiochemical treatment of municipal waste water. This treatment can economically meet the higher effluent standards and water reuse requirements of today. Activated carbon is the most effective adsorbent for this method. Expanded-bed contact systems are the most efficient means for utilizing granular carbon for waste treatment. Augmentation of the adsorption process occurs as an in-situ partial regeneration resulting from biological growth on the surfaces of the carbon. The system produces high levels of treatment and has a high degree of stability and reliability. It is very resistant to shock loads and toxic waste constituents. The advantages of a physicochemical system over a biological system include: less land is required; a lower sensitivity to diurnal variation exists; it is unaffected by toxic substances; and the former has a potential for significant removal of heavy metals. In addition, a physicochemical system gives excellent removal of phosphates and organic waste constituents and greater flexibility in design and operation. (Orr-FIRL)
W75-03386

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART I,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
P. K. Misra.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 146, $7.00 in paper copy, $2.25 in microfiche. Kansas Water Resources Research Institute, Manhattan, 1971. 162 p, 34 fig, 20 tab, 118 equ. OWRT A-048-KAN(2).

Descriptors: *Water quality, Streams, *Waste water treatment, *Estimating, *Filters, Dynamic programming, Measurement, Systems analysis, Equations, Mathematical models, Simulation analysis, Algorithms, *Filtration.
Identifiers: Linear estimation theory, Nonlinear estimation theory, Process dynamics, Physical processes, Accuracy, Kalman filters, Invariant imbedding filters.

This is Part I of a Doctoral Thesis which demonstrates that linear and nonlinear estimation theory can be used successfully in the identification of states and parameters in a conceptual model of a dynamic physical process. In this first part, stream quality and waste water treatment processes are examined. A two-dimensional stream quality model is used to investigate linear estimation theory; for nonlinear theory, nonlinearity is entered either through the process dynamics model or through an arc-tan measurement model. Out of eight filters studied, two result for linear systems: the Kalman and the invariant imbedding. It is concluded that although the invariant imbedding filter is simpler in its derivation, the Kalman filter's performance is significantly better. Nonlinear process dynamics with linear measurement models results in three different filters -- linearized Kalman, invariant imbedding or dynamic programming, and a first-order minimal variance filter; the latter proves best regarding estimation accuracy. Finally, the nonlinear dynamics coupled with the nonlinear measurement scheme yields all eight filters. Again, the first-order minimal variance is proved to be the best. (See also W75-03388) (Bell-Cornell)
W75-03387

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART II,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
P. K. Misra.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-238 599, $7.00 in paper copy, $2.25 in microfiche. Kansas Water Resources Research Institute, Manhattan, 1971. 186 p, 37 fig, 5 tab, 145 equ, 286 ref. OWRT A-048-KAN(2).

Descriptors: *Model studies, Hydrologic systems, *Chemical reactions, *Waste water treatment, Activated sludge, Streams, Optimization, Water quality, *Estimating, Measurement, Simulation analysis, *Filters, Equations, Systems analysis, *Filtration.
Identifiers: Linear estimation theory, Nonlinear estimation theory, Process dynamics, Physical processes, Optimal weighting function, Sensitivity analysis, Search techniques, Parametric analysis, *Convergence, Accuracy, Invariant imbedding filters.

This is Part II of a Doctoral Thesis which demonstrates that linear and nonlinear estimation theory can be used successfully in the identification of states and parameters in a conceptual model of a dynamic physical process. In this second part, waste water treatment, hydrologic system, and chemical reaction processes are examined. Considered is convergence, an important criteria for any sequential scheme; convergence depends highly on the initialization of certain parameters, the estimation of which is not simple (for practical problems). Two algorithms are developed to improve the convergence of filters. One employs a 'search' technique to determine the optimal initial conditions, and the other uses a local sensitivity concept to achieve the same end result. It is demonstrated that states and parameters of a waste water treatment process and a hydrologic model can be estimated effectively using a first-order minimal variance filter; this strengthens the applicability of the estimation theory to dynamic systems. Because of the wide range of applicability of the invariant imbedding concept, computational improvements have been suggested for the invariant imbedding filter; these can be applied equally well to all filters. (See also W75-03387) (Bell-Cornell)
W75-03388

ARGONNE NATIONAL LABORATORY, WASTE MANAGEMENT PROGRAMS QUARTERLY REPORT, OCTOBER-DECEMBER 1973,
Argonne National Lab., Ill.
M. J. Steindler, N. M. Levitz, L. E. Trevorrow, T. J. Gerding, and B. J. Kullen.
Available from the National Technical Information Service, Springfield, Va. 22161, as Rept. No ANL-8087, $4.00 in paper copy, $2.25 in microfiche. Report No ANL-8087, February 1974. 45 p, 3 fig, 7 tab, 144 ref, append.

Descriptors: *Radioactive wastes, Water pollution sources, *Nuclear wastes, Nuclear powerplants, *Plutonium, Fuels, *Radioactivity effects, Radiochemical analysis, Research and development, Water pollution treatment, Tritium, Hydrogen, Water, Separation techniques, Waste storage, Reverse osmosis, Membrane processes, Transport, Economics.
Identifiers: *Waste management, *Fuel reprocessing, *Zircaloy.

Metal-compaction methods have been reviewed and information on the irradiation-induced property changes of Zircaloy surveyed as part of a study on the handling of fuel cladding hulls. Information originating from AEC-site visits and from a review of the open literature concerning decontamination of plutonium-contaminated materials is presented. The technical and economic feasibility of adapting reverse osmosis to the concentration of tritium from tritiated fuel reprocessing wastes was briefly evaluated. Technical feasibility was assumed from literature reports of a difference of about 3% in the self-diffusion coefficients of THO and H2O, and possibly greater differences in transport rates in solution-diffusion membranes. The costs of such a process werw calculated. The result ranged from 10(-4) to 1 mill/kWh of nuclear power, depending on the assumed single-stage separation factor and whether tritium-depleted water was recycled to the reprocessing plant. (See W75-03416 thru W75-03418) (Houser-ORNL)
W75-03415

CONSOLIDATION TECHNIQUES FOR FUEL CLADDING HULLS,
Argonne National Lab., Ill.
N. M. Levitz, and B. J. Kullen.
In: Argonne National Laboratory Waste Management Programs Quarterly Report, October-December, 1973. Report No ANL-8087, p 3-12, February 1974. 2 fig, 4 tab.

Descriptors: Management, *Nuclear wastes, *Water pollution sources, *Fuels, *Radioactivity, *Zirconium, Compaction, Contaminants, *Waste treatment, Waste storage, Waste disposal, Alloys, Consolidation, Compressibility, Comparative costs, Economics, Transportation.
Identifiers: Fuel reprocessing wastes, *Zircaloy.

The studies in this program involve (1) characterization of waste Zircaloy hulls from the chop-leach processing of spent water cooled reactor (LWR) fuel; (2) review of experience with pyrophoricity of Zircaloy and related hull-handling practice; and (3) review of mechanical-compaction experience and related problems. Work in this quarter has been on the review of compaction methods and the properties of zirconium that could adversely affect the safety of compaction processes. The review will be the basis of an evaluation of compaction methods and the development of an experimental program to obtain data that are not available in the literature or are of uncertain quality. The primary incentive for compacting Zircaloy hulls is the economic savings gained by volume reduction. Information in the literature indicates that this reduction in volume would result in cost savings for containers, interim storage, shipment, and ultimate storage/disposal. (See also W75-03415) (Houser-ORNL)
W75-03416

SALVAGE OF ALPHA-CONTAMINATED METALS,
Argonne National Lab., Ill.
M. J. Steindler, and T. J. Gerding.
In: Argonne National Laboratory Waste Management Programs Quarterly Report, October-December 1973. Report No NAL-8087, p 13-19, February 1974.

Descriptors: Management, *Nuclear wastes, *Plutonium, *Waste treatment, *Waste storage, Separation techniques, Research and development, Water pollution sources, Nuclear power plants, Equipment, Apparatus, Tools, Materials, *Metals, Acids, Radioactive wastes.

Identifiers: Retrievable storage, Decontamination, Waste burial.

The extensive operations in AEC facilities that handle plutonium have resulted in the accumulation of large quantities of waste contaminated by alpha-active elements, particularly plutonium. Although much of this waste is combustible and can also be reduced in volume by compaction, a significant volume of waste is in the form of metallic equipment such as machinery, tools, enclosures, etc. The program concerns methods by which these metals can be salvaged. The effort during the present period has been directed toward a review of existing information on the decontamination of metals. The results of this review are summarized. (See also W75-03415) (Houser-ORNL)
W75-03417

STORAGE OF TRITIUM AND NOBLE GASES,
Argonne National Lab., Ill.
L. E. Trevorrow.
In: Argonne National Laboratory Waste Management Programs Quarterly Report, October-December, 1973. Report No ANL-8087, p 20-29, February 1974. 1 fig, 3 tab.

Descriptors: *Waste treatment, *Nuclear wastes, *Tritium, Separation techniques, Research and development, Water pollution sources, *Reverse osmosis, *Membrane processes, Radioactivity, Hazards, Safety factor, Storage, Fuels, Public health, Costs, Economics, Regulation, Legal aspects, Governments, Administrative agencies.
Identifiers: *Fuel reprocessing wastes, *Noble gases.

The objective is to evaluate various techniques for the storage of tritium and noble gas fission products. The scope of the program includes evaluations of proposed storage techniques and techniques for the concentration of the desired nuclides. Recent efforts have included evaluations of proposed techniques for concentrating tritiated wastes. An Evaluation is presented of the possibility of concentrating tritiated water by reverse osmosis (RO). (See also W75-03415) (Houser-ORNL)
W75-03418

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.
W75-03420

RECOMMENDED METHODS OF REDUCTION, NEUTRALIZATION, RECOVERY, OR DISPOSAL OF HAZARDOUS WASTE. VOLUME IX, NATIONAL DISPOSAL SITE CANDIDATE WASTE STREAM CONSTITUENT PROFILE REPORTS - RADIOACTIVE MATERIALS,
TRW Systems Group, Redondo Beach, Calif.
R. S. Ottinger, J. L. Blumenthal, D. F. Dal Porto, G. I. Gruber, and M. J. Santy.
Available from NTIS, Springfield, Va, 22161 as PB-224 588, $6.25 in paper copy, $2.25 in microfiche. Rept No EPA-670/2-73-053-i, August 1973. 166 p, 1 fig, 35 tab, 124 ref.

Descriptors: Radioactivity, Materials, *Radioactive waste disposal, *Profiles, Physical properties, Chemical properties, *Waste treatment, *Waste storage, Radioisotopes, Carbon, Cobalt, Ruthenium, Promethium, Strontium, Zirconium, Niobium, Iridium, Radium, Cesium, Hydrogen, Iodine, Krypton, Xenon, Plutonium, Americium, Curium, Cerium.
Identifiers: Alternative methods.

Summary information and evaluation of waste management methods in the form of Profile Reports for radioactive materials are presented. These Profile Reports were prepared for either a particular hazardous waste stream constituent or a group of related constituents. Each Profile Report contains a discussion of the general characteristics of the waste stream constituents, their toxicology and other associated hazards, the definition of adequate management for the waste material, an evaluation of the current waste management practices with regard to their adequacy, and recommendation as to the most appropriate processing methods available and whether the waste material should be considered as a candidate for National Disposal, Industrial Disposal, or Municipal Disposal. (Houser-ORNL)
W75-03426

GUIDELINES FOR THE INTERIM STORAGE OF AEC-GENERATED SOLID TRANSURANIC WASTES.
Los Alamos Scientific Lab., N. Mex.
Available from NTIS, Springfield, Va 22161 as Rept No LA-5645, $5.45 in paper copy, $2.25 in microfiche. Report No LA-5645, June 1974. 70 p, 1 tab, 12 ref.

Descriptors: *Radioactive waste disposal, Wastes, Management, *Waste storage, Technology, *Safety, Safety factors, Evaluation, Assessment, Toxicity, Public health, Methodology, Solids, *Waste disposal, Solid wastes, *Waste treatment.
Identifiers: Guidelines, *Transuranic wastes, Retrievable storage.

Guidelines have been developed to provide a basis against which to judge the adequacy of techniques and methods for the retrievable storage of AEC-generated transuranic-contaminated solid wastes. These guidelines apply to operations for packaging, handling, and storage of such wastes. Each guideline has been fully discussed with emphasis on the reasoning behind the guideline statement, problems that should be considered in developing a storage facility, and methods currently in use at AEC installations. (Houser-ORNL)
W75-03430

WATER TREATMENT PLANT WASTES DISPOSAL-PART 2,
G. P. Westerhoff, and M. P. Daly.
Journal American Water Works Association, Vol 66, No 6, p 379-384, June 1974. 3 fig, 6 tab, 5 ref.

Descriptors: *Waste water treatment, *Waste disposal, *Sludge treatment, *Sludge disposal, Filtration, Coagulation, Centrifugation, Chemical precipitation, Evaluation.
Identifiers: *Alum.

The available alum-sludge treatment and disposal methods were evaluated by pilot plant studies so that the Sturgeon Point Water Treatment Plant could be improved in accordance with the Federal Water Pollution Control Act Amendments of 1972. Processes evaluated included alum recovery, recycling of recovered alum, pressure filtration, scroll centrifugation, basket centrifugation, vacuum filtration, chemical coagulation, a belt-filter-press system, and artificial freeze-thaw. The processes or combinations of processes most feasible at the Sturgeon Point Plant are pressure filtration, precoat rotary-vacuum filtration, scrool centrifugation, freeze-thaw plus vacuum filtration, and alum recovery plus horizontal vacuum filtration. (See also W74-13284) (Orr-FIRL)
W75-03444

TEMPERATURE-SUBSTRATE INTERACTIONS IN BIOLOGICAL TREATMENT,
Missouri Univ., Columbia. Dept. of Civil Engineering.
J. T. Novak.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1984-1994, August 1974. 12 fig, 3 tab, 23 ref.

Descriptors: *Biological treatment, *Waste water treatment, Kinetics, *Aerobic treatment, *Anaerobic treatment, Temperature.
Identifiers: Arrhenius equation.

Temperature correction factors are used in biological waste treatment processes to modify microorganism growth rates or substrate utilization rates to correspond to variations in the temperature. The modified Arrhenius equation is usually used to characterize the temperature correction for these modifications. The temperature response of biological processes was found to depend on the substrate concentration present in the system. Therefore, the applicability of the Arrhenius equation is limited because one of its factors (the temperature coefficient) is substrate dependent. Aerobic processes were nearly independent of temperature variations at low substrate levels and anaerobic processes were dependent on temperature at all substrate levels. Although temperature models provided reasonable descriptions of process response, they must be used with care, keeping in mind the fact that temperature can affect the organism yield coefficient and decay rate, the dominant organism groups and the availability of nutrients, which in turn can alter the kinetic response. The following basic temperature model clarifies the temperature-substrate relationship present in biological waste treatment systems: for aerobic degradation both k and Ks increase logarithmically with increased temperature; for anaerobic decay k increases logarithmically with increased temperature and Ks decreases logarithmically with increased temperature. (Orr-FIRL)
W75-03445

WASTEWATER DEGASSING BY ADIABATIC FLASHING,
New Mexico State Univ., University Park. Dept. of Chemical Engineering.
D. B. Wilson, and H. Y. Tsao.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2209-2214, September, 1974. 3 fig, 1 tab, 11 ref.

Descriptors: *Separation techniques, *Flash distillation, *Waste water treatment, Gases, Aqueous solutions, Industrial wastes, Domestic waste, Equipment, Costs, Economics, Mathematical studies, Algorithms.
Identifiers: *Adiabatic flashing.

Aqueous solutions of dissolved gases can result from a variety of industrial and water treatment operations such as the production of oil from petroleum, domestic waste water treatment, petroleum refining, hydroelectric production, fish farming operations, and the scrubbing of power plant stack gases. The dissolved gases must be removed before the water is released to the environment if the gaseous components are corrosive or toxic to the biological life in the water system. These gases can be physically separated either by stripping or flashing. Adiabatic flashing is recommended because the equipment is relatively simple, a short residence time for phase separation is provided and eliminates mist entrainment, the gaseous solute produced is in a high concentration, and the discharge temperature of the water steam is lowered. A mathematical analysis of adiabatic flashing was performed. The analysis indicated that if the quantity and condition of the feed, adiabatic operation, and the flash temperature are specified, all the other design variables may be calculated by using the system material and energy balances. The design variables include the pressure of the flash, and the ratio of the quantity of gas phase produced to the quantity of feed. The recommendation of adiabatic flashing is based on the results of the analysis, an estimation of economic costs based on equipment prices, and estimated operating costs. (Orr-FIRL)
W75-03446

METHOD AND APPARATUS FOR RECOVERING A SUBSTANCE FLOATING AS A SHEET ON THE SURFACE OF A LIQUID MASS,
Societe Bertin et Cie, Paris (France).
For primary bibliographic entry see Field 5G.
W75-03449

A PROGRAM FOR THE FUTURE--WATER AND SEWER IN RURAL AMERICA.
Commission on Rural Water, Washington, D.C.
April 1974. 20 p, 22 photo.

Descriptors: *Sewage, *Sewage treatment, *Water quality control, Water pollution sources, Groundwater resources, Virginia, West Virginia, South Carolina, Arkansas, New Mexico, Florida, Water pollution control, *Waste water treatment, Water supply, Water wells, Water table, Water resources, Potable water, Water quality, Federal government, State governments, Water pollution.

Providing an adequate water supply is a major problem for rural communities in America. Studies conducted by various federal agencies show extensive contamination of rural public water sources as well as private water sources. Contamination usually results from improper septic fields. The National Demonstration Water Project (NDWP) was an outgrowth of the Demonstration Water Project (DWP). DWP was set up to supply water to five rural counties near Roanoke, Virginia. The Roanoke project was very successful, so the Office of Economic Opportunity established a similar national program in 1971. NDWP has six affiliate projects in Virginia, West Virginia, South Carolina, Arkansas, New Mexico and Florida. The purpose of NDWP is to design and test models of rural water-sewer projects, to gather and disseminate information and technical expertise, and to expand water-sewer facilities in rural areas. The NDWP includes coordination and project assistance, research and publications, an information clearing house and a management and technical assistance program. (Barnes-Florida)
W75-03488

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE,
Florida Univ., Gainesville. Coll. of Law.
For primary bibliographic entry see Field 4B.
W75-03489

THE USE OF POLLUTANTS FOR AQUACULTURE - CONDITIONING OF WASTES FOR AQUACULTURE,
Papua and New Guinea Univ., Port Moresby (New Guinea).
G. L. Chan.
In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 84-91. 2 fig.

Descriptors: *Farm wastes, *Sewage treatment, Algae, Self purification, *Aquiculture, Organic wastes, *Domestic wastes, *Biodegradation, Sewage bacteria, Sewage disposal, Aquatic microorganisms, Bacteria, Environmental sanitation, *Biological treatment, Water reuse, Biochemical oxygen demand, Fertilization, Waste water treatment.

The conditioning of human and animal wastes for use in aquaculture is described. The processes are sanitary and scientific and produce as by-products, fuel such as methane gas, feed in the form of algae, and plant fertilizer. The organic matter is digested by bacteria, producing methane, allowing the settling of cellulose and destroying parasites. The effluent is then further purified by algae. At this stage the effluent is then further purified by algae. At this stage the effluent may be used in aquaculture. The water finally leaving the system will contain only minerals. A design for the unit is presented. (Katz)
W75-03514

SEWAGE AND AQUACULTURAL PRODUCTION,
Victoria Univ., Wellington (New Zealand).
E. B. Slack.
In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 70-75, 17 ref.

Descriptors: *Aquiculture, *Salmonids, *Fertilization, *Sewage treatment, *Biodegradation, *Waste water treatment, Rainbow trout, Water reuse, Sewage lagoons, Farm wastes, Smelts, Sewage effluents, Sewage disposal, Food chains, *Tertiary treatment.
Identifiers: Goldfish.

Experiments on a sewage stabilization pond are described in which rainbow trout have been successfully cultivated together with wild goldfish, eels, and common smelt. Weight gains of up to twenty-fold for rainbow trout in a six-month period and thirty fold for the goldfish have been obtained in a ten-month period. The author suggests the need for changing the attitude toward sewage wastes and in particular their effect on the environment of rainbow trout and other salmonids. (Katz)
W75-03524

MUNICIPAL WASTES - A DESIGN FOR AN INTEGRATED PLANT TO MAKE A PROFIT,
New South Wales Univ., Kensington (Australia). School of Chemical Engineering.
C. H. Hunt, and R. F. Terpstra.
Australian Chemical Engineering, Vol 15, No 9, p 9-16, September 1974. 4 tab, 15 ref.

Descriptors: *Municipal wastes, *Waste disposal, *Water reuse, Economics, *Australia, Sludge disposal, Sewage disposal, Alcohols, Recycling, *Costs, Profit, Cities, Cellulose, Capital costs.

The currently accepted methods of garbage disposal in Australia - dumping and burial - are rapidly becoming unacceptable both in terms of cost and environmental quality. A plan suitable for garbage disposal for a city of about 400,000 people is proposed whereby cellulose pulp extracted from refuse is used as a raw material for acid hydrolysis, fermentation and distillation to yield ethyl alcohol. The water requirements for the plant are provided by sewage water purification, and the sludge derived from water treatment at the input and output stages may be dried and used as fuel for the plant. On the basis of market prices in 1972-3, and allowing for capital and fixed costs, it is estimated that a profit of about $15 per ton of refuse treated could result from the sale of ethyl alcohol and other reclaimed materials such as crushed glass, metals and plastics, and fertilizers. (Levick-CSIRO)
W75-03531

ALUM RECOVERY FROM WATER AND WASTEWATER TREATMENT PLANT SLUDGES,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
B. H. H. Chen.
Available from Xerox University Microfilms, Ann Arbor, Mich. 48106, Order No 74-14,485. PhD Thesis, 1974, 146 p.

Descriptors: Investigations, Alum, *Sludge treatment, Economics, *Waste water treatment, Treatment facilities, Hydrogen ion concentration, *Water treatment.
Identifiers: *Alum recovery.

The extent of alum recovery achievable is defined, the effectiveness of recovered alum is demonstrated, and the properties of the remaining sludge are characterized. The economy of the alum recovery process in water and waste water treatment systems was also analyzed. Results showed that the amount of alum recovered can be controlled by noting the associated stoichiometric relationship and by pH measurement. An extensive cost analysis of the alum recovery technique developed in the laboratory was conducted with two illustrative problems demonstrating the economic advantage of this recovery process. Alum recovery and reuse may be a viable alternative to the conventional method of water and waste water treatment. (Sandoski-FIRL)
W75-03542

SOME EFFECTS OF NITROGEN AND PHOSPHORUS LIMITATION ON A BIOLOGICAL-CHEMICAL WASTEWATER TREATMENT PROCESS,
Michigan Univ., Ann Arbor.
Y. C. Wu.
Available from Xerox University Microfilms, Ann Arbor, Mich 48106, Order No 74-15,908. PhD Thesis, 1973, 219 p.

Descriptors: *Nitrogen, *Phosphorus, *Waste water treatment, *Waste treatment, *Biological treatment, Treatment facilities, Sludge treatment, Activated sludge, Laboratory tests, Efficiencies.
Identifiers: *Chemical treatment, Charge production.

The effect of nitrogen and phosphorus limitation on substrate removal, sludge productivity, biochemical behavior of sludge, and capsule and electric charge production on the surface of treatment organisms has been studied using two laboratory activated sludge units with heterogeneous populations. Experimental results indicate that the treatment efficiency of the biological-chemical process is highly dependent on the chemical nature of the waste to be treated. Also, an increase in sludge protein and sludge phosphorus content was observed as the sludge yield and carbohydrate content decrease. Finally, results of chemical flocculation studies showed that lower chemical doses per unit of effluent biological solids were required at high initial solids and low initial phosphorus conditions. The relationship between quantity of chemical precipitant and percentage of phosphorus removal was not a stoichiometric function. Indications are that following phosphorus removal there is a chemical separation of dispersed microorganisms. (Sandoski-FIRL)
W75-03543

THE SEWAGE SYSTEM OF THE CITY OF RANGOON,
G. P. Singh.
The Public Health Engineer, No 9, p 96, May 1974.

Descriptors: *Water supply, *Sewerage, *Sewers, Municipal wastes, Waste water treatment, Water utilization, History.
Identifiers: *Burma(Rangoon).

The existing sewerage system in Rangoon was installed in the year 1874 during the British regime; it covered an area of 3.4 square miles of central Rangoon, Burma. From 1915 to 1924 the system was extended, bringing the total area covered to 6.3 square miles. The remaining 44 suburbs have no sewerage at present, but are served with bucket and pit latrines. The contents of both collecting chambers flow into the main sewers which discharge into the eastern end of the Irrawaddy River. Municipal sewage is discharged into the main sewers by ejector stations at the roadside. Water consumption in the city is about 35 gallons per head per day or 70 million gallons per day. The supply is insufficient and authorities have begun the construction of a water reservoir project at Pugyi, 32 miles from Rangoon. (Sandoski-FIRL)
W75-03544

STATE OF THE ART-ACTIVATED CARBON TREATMENT OF WASTEWATER,
CH2M-Hill, Reston, Va.
L. G. Suhr, and G. L. Culp.

Water and Sewage Works, Vol 121, No 4, p 104-108, 110-112, April 30, 1974. 3 fig, 6 tab, 17 ref.

Descriptors: *Waste water treatment, *Activated carbon, *Tertiary treatment, Adsorption, Suspended solids, Waste treatment, *Reviews.
Identifiers: Physical-chemical treatment.

Currently there are two approaches for the use of granular activated carbon in waste water treatment. One approach is to use activated carbon in a tertiary treatment sequence following conventional primary and biological secondary treatment. Another approach utilizes activated carbon in a physical-chemical treatment (PCT) process in which raw waste water is treated in a primary clarifier with chemicals prior to carbon adsorption. Filtration and disinfection also may be included in PCT, but biological processes are not used. The PCT approach seeks to make maximum use of granular activated carbon by extending its function of removing refractory dissolved organics to adsorption of biodegradable organics as well. In some cases, the granular bed of carbon is used as a filter to remove suspended and colloidal materials. The capabilities of PCT must be evaluated in light of specific effluent quality requirements to determine its applicability. (Sandoski-FIRL)
W75-03545

A SLUDGE CAKE INCINERATION PROCESS AND AIR POLLUTION CONTROL SYSTEM,
Environmental Protection Agency, Chicago, Ill. Surveillance and Analysis Div.
P. Cho.
Water and Sewage Works, Vol 121, No 4, p 76-80, April 30, 1974. 2 fig, 4 tab, 4 ref.

Descriptors: *Design criteria, *Sewage treatment, *Treatment facilities, Equipment, Biochemical oxygen demand, Suspended solids, Sludge treatment, Simulation analysis, Computers, *Incineration, *Waste water treatment, *Kentucky.
Identifiers: Sludge cakes, *Air pollution control.

A study was completed in 1970 on basic design data for the proposed Secondary Treatment Facilities for Fort Southworth Sewage Treatment Plant in Kentucky. The proposed facility was designed to provide for a minimum BOD5 removal of 90 percent and to effect comparable suspended solids removal and peak flow disinfection. The following design alternative was accepted by the City of Louisville and Jefferson County: five trains of oxygenation tanks designed to operate with pure oxygen generated by on-site units; twenty final settling tanks; a return sludge pumping station; chlorination facilities and chlorine contact tanks; a final effluent pumping station; and a building containing sludge thickener tanks, sludge vacuum filters, chemical handling facilities, and three multiple hearth incinerators; and, miscellaneous structures and facilities. The sludge treatment phase using the Zimpro wet air oxidation units as well as computer simulation techniques employed are described. (Sandoski-FIRL)
W75-03546

PVC SEWER PIPE MEETS TIGHT SPECIFICATIONS.
For primary bibliographic entry see Field 8A.
W75-03547

SEWER PIPE: INFILTRATION IS THE ISSUE,
V. Fairweather.
Civil Engineering-ASCE, Vol 44, No 7, p 79-83, July, 1974. 4 fig.

Descriptors: *Pipes, *Sewers, *Infiltration, *Inflow, *Legislation, Repairing, Federal Water Pollution Control Act, Sewage treatment, Treatment facilities.

Due to the 1972 amendment of the Water Pollution Control Act, the infiltration/inflow rates to sewers are becoming an important consideration for applicants proposing new sewage treatment facilities. A three-phase procedure for complying with regulations requires a preliminary infiltration/inflow analysis, a sewer system evaluation survey, and sewer rehabilitation and/or construction or expansion of treatment plants. The problems, economics, and technology associated with this legislative requirement are reviewed. (Sandoski-FIRL)
W75-03548

A BASIC STUDY OF BIOLOGICAL NITRIFICATION AND DENITRIFICATION, (IN JAPANESE),
T. Yamanouchi, and K. Sugata.
Mitsubishi Heavy Industries Technical Review, Vol 11, No 3, p 87-95, May, 1974. 13 fig, 11 ref.

Descriptors: *Nitrification, *Denitrification, *Waste water treatment, Nitrogen, Nutrients, Eutrophication, *Biological treatment.
Identifiers: Biological nitrification, Biological denitrification.

Advanced ways of treating waste water and sewage are increasingly in demand, because of the phenomenon of eutrophication. The total removal of nitrogen is the most significant problem facing these treatments for nutrient removal. Biological nitrification and denitrification systems are investigated as nitrogen removal methods. Results are: biological nitrification and denitrification are subject to such environmental conditions as pH value and temperature; nitrifying bacteria and denitrifying bacteria are domesticated easily, and when these systems are considered as a total biological treatment system, the utilization of existing sewage and waste water treatment systems would be the most effective method. (Leibowitz-FIRL)
W75-03550

TREATMENT FOR OILY WASTE WATER USING MAGNETIC POWDER, (IN JAPANESE).
Water Purification and Liquid Waste Treatment, Vol 15, No 7, p 37-44, July, 1974. 9 fig, 7 tab, 3 ref.

Descriptors: *Waste water treatment, *Oily water, *Coagulation, Water pollution control, Flocculation, Sediments.
Identifiers: *Magnetic powder.

Chemical coagulation processes are often used to treat waste water that contains fine oil droplets. When these processes are performed by adding fine magnetic powder and suspending them in oily waste water layers, the produced flocks containing oil droplets include these magnetic powders. Coagulated flocks containing oil droplets, metal hydroxide and magnetic powder are tightened and sedimented in a magnetic field. These sediments are easily removed with the moving of the magnetic belt or rotation of the magnetic drum. (Leibowitz-FIRL)
W75-03551

STUDY OF THE REMOVAL OF COPPER ION AND CADMIUM ION FROM WASTE WATER BY FLOTATION METHOD UTILIZING XANTHATE, (IN JAPANESE),
Iwate Univ., Morioka (Japan). Dept. of Mining and Civil Engineering.
S. Hasebe, H. Sato, and Y. Sugata.
Report on Technology of Iwate University, No 26, p 41-46, November, 1973. 9 fig, 1 tab, 13 ref.

Descriptors: *Copper, *Cadmium, *Waste water treatment, *Flotation, Zinc, Water pollution, Ions.
Identifiers: *Xanthate, *Calcium carbonate, Ferric ions.

A small number of cadmium and copper ions are occasionally contained together with ferric and zinc ions in waste water. The removal of copper and cadmium ions from waste water by flotation using xanthate was investigated. Copper ion was easily removed as copper xanthate by adding about 2 or 3 equivalents of methyl or ethyl xanthate; cadmium ion was removed by adding 2 or 3 equivalents of butyl or amyl xanthate. The removal of the cadmium or copper ions was influenced by the peripheral speed of the impeller; the scum was stabilized by adding frother such as methyl iso-butyl carbinol. Copper or cadmium ions in artificial waste water were reduced by the secondary treatment method, from 10 mg/liter of copper and 1 mg/liter of cadmium ions to less than 0.1 mg/liter each. The co-existence of zinc and ferrous ions prevented the removal of copper and cadmium of xanthate salt from the waste water. Ferric ions must be turned into ferric hydroxide by adding calcium carbonate, because xanthate ion is oxidized by ferric ion when ferric ion is contained in waste water. (Leibowitz-FIRL)
W75-03552

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW),
National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div.
R. Field, and P. J. Szeeley.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1209-1226, June, 1974. 228 ref.

Descriptors: *Reviews, *Overflows, *Storm runoff, *Storm water, *Urban runoff, Combined sewers, Water pollution sources, Management(Applied), Control systems, Flow characteristics, Infiltration, Storage, *Waste water treatment, *Bibliographies.

As significant contributors to water pollution, stormwater runoff and combined sewer overflows have become increasingly important to the Environmental Protection Agency as an area for concern and control. Reviewed are the characteristics of stormwater runoff and various management practices such as control systems, flow models, soil infiltration and runoff predictions. The control of combined sewer overflows, infiltration, storage, and the beneficial use of stormwater are outlined. Finally, the various treatment methods for stormwater and combined waste water are presented. (Sandoski-FIRL)
W75-03553

THE USE OF AEROBIC PROCESSES FOR THE STABILIZATION OF ANIMAL WASTES,
North of Scotland Coll. of Agriculture, Aberdeen.
K. Robinson.
Critical Reviews in Environmental Control, Vol 4, No 2, p 193-220, July 31, 1974. 4 fig, 1 tab, 130 ref.

Descriptors: *Waste water treatment, *Reviews, *Bibliographies, Agriculture, *Aerobic treatment, Agricultural runoff, *Farm wastes, Oxidation lagoons, Farm lagoons, Aerated lagoons, Oxygen, Oxygen demand, Biological oxygen demand, Microorganisms, Temperature, Hydrogen ion concentration, Hogs, Poultry.
Identifiers: *Composting, Beef, Oxygen transfer.

During the last two or three decades there has been a shift in agricultural practice from relatively small quantities and wide distribution of agricultural wastes to specialist intensive enterprises in which animal and crop production are separate and the resulting wastes are therefore more concentrated. The various aerobic methods for treating agricultural wastes such as the oxidation pond, the barrier ditch, the aerated lagoon, the aerated basin, and composting are reviewed. The advantages and disadvantages of these systems are discussed and ten areas for further research are offered. (Orr-FIRL)
W75-03555

THE THREE SLUDGE SYSTEM FOR NITROGEN AND PHOSPHORUS REMOVAL,
Federal Water Quality Administration, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
M. C. Mulbarger.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-213 778, $4.25 in paper copy, $2.25 in microfiche. April, 1972. 57 p, 16 fig, 29 ref.

Descriptors: *Waste water treatment, *Phosphorus, *Nitrogen, Activated sludge, Water pollution treatment, Waste treatment, Sewage treatment, Tertiary treatment, Pilot plants, Carbon, Nitrification, Denitrification, *Sludge treatment.
Identifiers: Phosphorus removal, Nitrogen removal, *Three sludge system.

The three sludge (carbon removal, nitrification and denitrification) system with alum added was evaluated for the effectiveness of phosphorus and nitrogen removal. Eight months of performance data from a pilot plant were obtained. The data included measurements of pH, temperature, substrate concentration, COD removal, phosphorus removal, nitrification and nitrogen removal, solids production, solids characteristics, effluent suspended solids, nitrification inhibition, alkalinity losses, dissolved solids introduction, aeration and mixing requirements, chemical addition, clarifiers, solids wasting, spray water, disinfection, instrumentation, and costs. The following conclusions were made: the three sludge system is preferred over other biological nitrogen removal systems; nitrification and denitrification are temperature dependent and are pH dependent in nonacclimated cultures; phosphorus removal to a high level can be easily obtained with split alum addition and pH optimization; good removals of soluble COD and carbonaceous BOD5 are achieved with two-stage nitrification system; negative or small solids production values occur in the nitrification system and the values are temperature dependent; and alkalinity dependent addition for the pH optimization should be automated to insure maximum system dependability. (Leibowitz-FIRL)
W75-03556

PHOSPHORUS REMOVAL PRACTICE.
Environmental Protection Agency, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-214 059, $3.75 in paper copy, $2.25 in microfiche. Presented at the Sanitary Engineering Inst., Madison, Wis., 9-10 Mar 71. (1971). 28 p, 8 fig, 13 tab, 21 ref.

Descriptors: *Phosphorus, *Sewage treatment, Activated sludge, Trickling filters, *Tertiary treatment, *Waste water treatment, Sanitary engineering, Treatment facilities.
Identifiers: Phosphorus removal, Chemical treatment.

A limited number of phosphorus removal processes are discussed. Only those processes which utilize chemical additions because of their economics and reliability, such as chemical treatment of raw degritted sewage, mineral addition, and tertiary treatment for phosphorus removal, are considered. The primary, secondary, and tertiary chemical addition techniques are illustrated by the use of results from specific treatment plants. Advantages and disadvantages are presented; each waste water has its own particular set of conditions and its own particular solution. (Orr-FIRL)
W75-03558

COMBINATION LIMESTONE-LIME TREATMENT OF ACID MINE DRAINAGE,
Environmental Protection Agency, Norton, W. Va. Norton Mine Drainage Field Site.
R. C. Wilmoth, R. B. Scott, and R. D. Hill.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-213 777, $3.25 in paper copy, $2.25 in microfiche. April, 1972. 22 p, 6 fig, 13 tab, 4 ref.

Descriptors: *Waste water treatment, *Mine drainage, *Acid mine water, *Neutralization, *Lime, *Limestones, Water clarification, Costs, Mine drainage, Mine wastes, Water pollution sources, Liquid wastes, Mine water.
Identifiers: *Combination limestone-lime treatment.

One of the most promising treatment methods for acid mine drainage is a combination limestone-lime neutralization. Testing at the Norton Mine drainage field in Norton, West Virginia showed that combination treatment obtained greater than 25 percent reduction in material cost for treatment of pH 6.5 as compared to lime of limestone treatment alone. Combination treatment also produced a sludge with solids content up to five times higher than sludge produced by lime neutralization. Combination treatment was almost as effective in clarification as lime and was more effective than limestone. The volume of sludge produced by the combination method was less than by that produced by using lime or limestone. The effluent waters produced by all three methods are of comparable quality. (Orr-FIRL)
W75-03559

SEWAGE TREATMENT IN THE CITY OF PLYMOUTH,
Plymouth Sewage Works (England).
G. E. Tucker.
Water Pollution Control, Vol 73, No 3, p 325-329, 1974. 2 fig, 5 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Sludge treatment, Sludge disposal, Equipment, Sedimentation.
Identifiers: United Kingdom(Plymouth-Eng).

A discussion of the Camel's Head sewage works and the Plympton sewage works is presented. The Camel's Head process gives full treatment with heated sludge digestion with disposal by barge to the sea. When completed, the Plympton sewage works will be the largest of the city's treatment facilities, serving a population of 90,000. The sedimentation tanks of the old works were incorporated on the new works as storm tanks and space is available on the site to allow for doubling the size of the works if necessary. (Sandoski-FIRL)
W75-03561

METHOD OF BLEACHING WOOD PULP,
Atlantic Richfield Co., New York.
R. M. Lincoln, and J. A. Meyers.
Canadian Patent 949,263. Issued June 18, 1974. Canadian Patent Office Record, Vol 102, No 25, p 3, June 18, 1974.

Descriptors: *Waste water treatment, *Industrial wastes, *Pulp and paper industry, *Patents, Water pollution control, *Pulp wastes, Bleaching, Methodology.
Identifiers: Butyl hydroperoxide.

A method to prevent both atmospheric and water pollution in the pulp and paper industry is described. Under this process, pulping and bleaching of wood chips is accomplished in a single stage using tertiary butyl hydroperoxide in an aqueous alkaline medium. (Sandoski-FIRL)
W75-03562

SEWAGE TREATMENT SYSTEM,
H. G. Long, and V. E. Long.
United States 3,819,054. Issued June 25, 1974. Official Gazette of the United States Patent Office, Vol 923, No 4, p 1378, June 25, 1974. 1 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Equipment, *Patents, Septic tanks, Weirs.
Identifiers: Float skimmer, Air diffuser.

A sewage treatment system especially adapted to be a conversion unit for existing septic tanks is comprised of the following equipment. An inner tank to receive raw sewage is within the septic tank and spaced from the walls with its upper surface open above the liquid line. An air diffuser system delivers compressed air within the inner tank and draws activated solid portions settline from the clarifier zone in the outer tank toward the sludge zone at the bottom and through the slot in the inner tank into the aeration zone for further aeration treatment, with a final venotched weir discharge means attached to the outer wall of the inner tank. Lastly, a float skimmer means is provided to insure the return of floating solids from the clarifier zone to the interior of the inner tank for retreatment. (Sandoski-FIRL)
W75-03563

AEROBIC BIOLOGICAL STABILIZATION OF SANITARY LANDFILL LEACHATE,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
E. Foree, and E. Cook.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-214 194, $3.25 in paper copy, $2.25 in microfiche. September 1972. 43 p, 3 fig, 7 tab, 13 ref.

Descriptors: *Aerobic treatment, *Biological treatment, Sewage treatment, *Activated sludge, *Leachate, Leaching, Chemical oxygen demand, Water quality, *Waste water treatment, *Landfills, Kentucky.

Treatments of raw sanitary landfill leachate by aerobic biological processes and by combinations of chemical and physical processes were evaluated. Also effluent polishing was evaluated and chemical and physical characteristics of the leachate and treated effluent were determined. Activated sludge units with a 10-day retention time were most effective in removing COD. Ninety-seven percent COD removal efficiency could be obtained by activated sludge treatment alone. In combination with effluent polishing, activated sludge treatment could obtain more than 99 percent COD removal efficiency. The physical-chemical treatment methods were not effective in treating raw leachate. (Orr-FIRL)
W75-03564

OPERATING EXPERIENCE AND DESIGN CRITERIA FOR 'UNOX' WASTEWATER TREATMENT SYSTEMS, DESIGN SEMINAR FOR WASTEWATER TREATMENT FACILITIES.
Union Carbide Corp., Tonawanda, N.Y. Linde Div.
Report prepared for Environmental Protection Agency, Washington, DC, Technology Transfer Program, for seminar at New York, NY, February 29-March 2, 1972. 68 p.

Descriptors: *Waste water treatment, *Activated sludge, *Oxygenation, Oxygen, Safety factors, Design, Costs, Sewage treatment, *Design criteria, Operations.

The 'UNOX' system for waste water treatment is described. This system utilizes a covered and staged oxygenation basin for contact of oxygen gas and mixed liquor. High purity oxygen is introduced in the first stage and flows concurrently with the waste being treated. Mass transfer and mixing within each stage is performed either by surface aerators or by a submerged turbine rotating sparge system. The number of stages and parallel biological reactors and the type of mass transfer device used depend on waste characteristics, plant size, land availability, treatment

requirements and more. Operating data and experience, process design, process safety, the 'UNOX' system scope of supply, and economic considerations are also discussed. (Orr-FIRL)
W75-03565

INTERNAL POLLUTION CONTROLS IN THE PULPING INDUSTRY,
EKONO, Seattle, Washington.
H. Edde, and E. Sebbas-Bergstrom.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2593-2603, November 1974. 7 fig, 7 tab, 16 ref.

Descriptors: *Pulp wastes, *Bleaching wastes, Pulp and paper industry, *Pollution abatement, *Costs, Waste water(Pollution), Water consumption, Industrial water, *Waste water treatment, Water conservation, Water reuse, *Industrial wastes, Wastes, Biochemical oxygen demand, Chemical oxygen demand, Systems analysis, Organic loading, Water pollution sources, Economic justification.
Identifiers: *Kraft mills, Scandinavia, Pulp washing.

Internal process control measures for controlling pulp mill pollution and reducing materials wastage include increased pulp washing, closing the brown stock screening system, new bleaching process, improved condensate handling, and spill collection. These measures are exemplified in recent Scandinavian installations. The overall treatment costs to meet various final discharge limits in a bleached kraft mill are examined for different combinations of internal and external control measures. Compared with a conventional bleached kraft mill discharging raw BOD loads of 70-100 lb/air-dried ton of pulp, (35-50 kg/metric ton), a raw BOD load of about 30 lb/air-dried ton (15 kg/metric ton) may be reached in an 'advanced mill' using the described internal controls. The total cost to reach the same value by external treatment is about twice the cost of internal controls. (Witt-IPC)
W75-03566

THE ROLE OF THE CHEMICAL INDUSTRY IN THE FIGHT AGAINST WATER POLLUTION IN THE PAPER INDUSTRY (ROLE DE L'INDUSTRIE CHIMIQUE DANS LA LUTTE CONTRE LA POLLUTION DES EAUX EN PAPETERIE),
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (Germany).
For primary bibliographic entry see Field 5G.
W75-03567

REMOVAL OF ARSENIC FROM EFFLUENT SLUDGES OF SULFATE AND OF PULP AND PAPER PRODUCTION (UDALENIE MYSH'YAKA IZ SHLAMOV SERNOKISLOTNOGO I TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA),
V. M. Kosover.
Khimiya i Khimicheskaya Tekhnologiya, Vol 16, No 12, p 1865-1867, 1973. 3 fig, 7 ref.

Descriptors: *Arsenic compounds, *Sludge treatment, Heavy metals, *Pulp wastes, *Sulfates, *Leaching, Hydrogen ion concentration, *Industrial wastes, Water pollution sources, Toxicity, Suspended solids, Dissolved solids, Alkalis(Bases), *Waste water treatment.

Effluent sludges or slurries from the manufacture of sulfates and of pulps and papers usually contain relatively high concentrations of arsenic compounds, such as arsenic trioxide, trisulfide, and heavy metal arsenates. Leaching such sludges with hydrochloric acid gives incomplete As removals and, moreover, gives rise to toxic volatile arsenic trichloride. Leaching with an alkali, such as NaOH, on the other hand, converts all As compounds into soluble forms. Optimum operating conditions were established to include 2 hr of reaction at 80-90C at a liquor/solids ratio of 15-20:1, using 2-3% alkali. Leaching with NaOH solution has the advantage of a lower apparent energy of activation, compared to sodium carbonate solution. (Chern-IPC)
W75-03568

TREATMENT OF INDUSTRIAL EFFLUENTS BY FLOTATION (TRAITEMENT D'EFFLUENTS INDUSTRIELS PAR FLOTTATION),
Societe Generale d'Epuration et d'Assainissement Degremont, Suresnes (France).
R. Treille.
Revue ATIP (Association Technique de l'Industrie Papetiere), Vol 28, No 4, p 197-200, 1974. 3 fig.

Descriptors: *Pulp wastes, *Water pollution treatment, *Treatment facilities, *Waste water treatment, *Waste treatment, *Flotation, *Flocculation, *Aeration, Suspended solids, Recirculated water, Filters, Filtration, Chlorination, Sedimentation, Chemicals, Pilot plants.

Recent advances in flotation equipment for removal of suspended solids from industrial effluents are discussed. Particular attention is focused on a process in which paper industry waste waters are aerated with compressed air and fed through a two-stage apparatus designed to form fine bubbles within floating flocks or particle aggregates while avoiding the formation of larger bubbles. Excellent flotation yield is reported at a speed five times that of a sedimentation unit while requiring less chemical consumption. Pilot-plant studies with this process in a paper mill using recirculated water resulted in the development of an effluent-treatment facility having a capacity of 250 cu m/hr which includes a coagulation-flocculation unit, a flotation unit, a battery of filters, and a prechlorination station. (Speckhard-IPC)
W75-03569

A REVIEW OF TURBIDITY REMOVAL ASSOCIATED WITH BIOLOGICAL TREATMENT OF PAPER MILL WASTEWATERS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
H. Costa.
NCASI Stream Improvement Technical Bulletin, No 274, April 1974. 55 p, 26 fig, 24 tab, 40 ref.

Descriptors: *Turbidity, *Colloids, Waste treatment, *Biological treatment, *Pulp wastes, *Activated sludge, *Aerated lagoons, Oxidation lagoons, Adsorption, Flocculation, Nutrients, Temperature, Water temperature, Waste water(Pollution), *Waste water treatment, Biochemical oxygen demand, Reviews.

A survey is presented of published literature, unpublished studies, and field tests regarding the removal of turbidity-causing colloid particles in paper mill effluents by means of aerobic biological treatments. Both the activated sludge and the aerated stabilization basin process remove turbidity through a mechanism involving bio-adsorption and flocculation. The efficiency of colloid removal is improved by (a) temperatures above 15-18 C, (b) nutrient additions sufficient to support maximum BOD removal, and (c) high-rate systems, such as activated sludge treatment. (Buchanan-IPC)
W75-03574

SLIME CONTROL COMPOSITIONS AND THEIR USE,
Betz Labs., Inc., Trevose, Pa. (assignee)
B. F. Shema, R. H. Brink, Jr., and P. Swered.
US Patent No 3,829,424. Issued Aug 13, 1974. 4 p, 3 tab.

Descriptors: *Slime, *Pesticides, *Waste water treatment, *Industrial water, *Water conservation, *Recirculated water, *Pulp and paper industry, Organic compounds, Bromine, Freshwater, Closed circuits, Additives, Chemicals.
Identifiers: Slimicides, White water(Paper machine).

A slimicidal mixture of bromonitrostyrene and cetyl pyridinium bromide can be added to the white water system of paper machines, notably those conserving freshwater by full or partial closure of the water circuit, to prevent or control the formation of bio-organic deposits. (Lynch-IPC)
W75-03575

PEAT: NEW MEDIUM FOR TREATING DYE HOUSE EFFLUENT,
Hussong-Walker-Davis Co. Cornwells Heights, Pa.
M. E. Leslie.
American Dyestuff Reporter, Vol 63, No 8, p 15-16, 18, August 1974. 6 fig, 2 tab.

Descriptors: *Dyes, *Heavy metals, *Waste water treatment, Waste treatment, *Chemical wastes, *Textiles, *Peat, Pollution abatement, Effluents, Industrial wastes, Color, Turbidity, Chemical oxygen demand, Biochemical oxygen demand, Phosphates, Suspended solids, Cadmium, Chromium, Copper, Iron, Lead, Nickel, Zinc, Mercury, Metals, Operating costs, Filtration, Filters, Solids contact processes.
Identifiers: *Antimony.

A recently developed process for removing pollutants from textile dye house effluents is based on the scrubbing action of a moving mat of peat as the effluent is passed through it. In tests performed on actual dye house effluents with an operational water treatment system (not in a laboratory but under carefully controlled conditions), color was reduced by as much as 99.6%, turbidity by 100%, COD by 98.7%, BOD by 95%, total oxygen demand by 87.8%, phosphates by 97.7%, and suspended solids by 98.1%. The removal of heavy metal pollutants (Cd, Cr, Cu, Fe, Pb, Ni, Zn, Sb, and Hg) was virtually complete. The spent peat, which is the only by-product of the process, can be disposed of in a sanitary landfill or may be dried and burned. Operating costs, when treating textile dye effluent, range from 7 to 14 cents/1000 gal. (Witt-IPC)
W75-03577

LIGHT-ENERGIZED OXIDATION OF ORGANIC WASTES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
J. W. Sargent, and R. L. Sanks.
Journal Water Pollution Control Federation, Vol 46, No 11, p 2547-2554, November 1974. 9 fig, 15 ref.

Descriptors: Waste treatment, *Chemical degradation, Waste water(Pollution), Pollutants, *Organic wastes, *Waste water treatment, *Radiation, Light, Dyes, Organic compounds, *Industrial wastes, Energy, Anaerobic conditions, Aerobic conditions, Kinetics, Laboratory tests, Phenols, Chemical reactions, Oxidation, Aqueous solutions, Chemical wastes.
Identifiers: *Photooxidation, Methylene blue, Photodegradation, Photochemistry, Reaction mechanisms, Reaction kinetics, *Cresol.

Laboratory studies indicate that a refractory organic substance (cresol) in aqueous solution can be destroyed by photooxidation, a process that uses visible light as a direct energy source. Methylene blue is an effective photosensitizer for cresol. Optimum initial concentrations for the dye and the cresol were determined. The reaction rate at which the photooxidation process proceeds can be roughly described by first-order kinetics, although the reaction mechanism is probably not simple first-order. The reaction proceeds 2.8 times faster in an aerobic than in an anaerobic environment. The significant amount of cresol photooxidation

achieved indicates that photooxidation has potential as a waste treatment process and merits further study and development. (Witt-IPC)
W75-03578

MODIFIED CELLULOSE ADSORBENT FOR REMOVAL OF MERCURY FROM AQUEOUS SOLUTIONS,
Bureau of Mines, Salt Lake City, Utah. Salt Lake City Metallurgy Research Center.
V. N. Marchant.
Environmental Science and Technology, Vol 8, No 12, p 993-996, November 1974. 3 fig, 2 tab, 4 ref.

Descriptors: Waste treatment, *Mercury, *Water purification, *Cellulose, *Separation techniques, Waste water treatment, Adsorption, Water pollution, Metals, Pollutants, Water pollution control, Heavy metals, Sulfur compounds, Inorganic compounds, Organic compounds.
Identifiers: Cellulose derivatives, Adsorbents.

Inorganic mercury was selectively removed from aqueous solution over a pH range of 1-9 by a modified cellulose adsorbent containing vicinal thiol groups. The amounts of mercury removed from solution were dependent on the flow rate. When a solution containing 1 ppm mercuric ion was passed through a column (10 mm inside diameter by 23 mm) prepared from 0.5 g of the cellulose derivative at an initial flow rate of 50 ml/hr, the mercury concentration in the effluent remained below 5 ppb for 60 bed volumes. (Witt-IPC)
W75-03579

SOME ASPECTS OF TREATMENT AND DISPOSAL OF BIOLOGICAL AND NON-BIOLOGICAL SLUDGES OF THE PAPER AND BOARD INDUSTRY (EINIGE ASPEKTE DER BEHANDLUNG UND BESEITIGUNG VON BIOLOGISCHEN UND NICHTBIOLOGISCHEN SCHLAEMMEN DER PAPIER- UND KARTONINDUSTRIE),
Cellulose Attisholz A.G., Solothurn (Switzerland).
H. Scherler.
Wochenblatt fuer Papierfabrikation, Vol 102, No 9, p 315-324, May 15, 1974. 7 fig.

Descriptors: Water types, *Sludge treatment, Sludge disposal, *Dewatering, Treatment facilities, Equipment, *Pulp wastes, *Waste water treatment, Filters, *Filtration, Centrifugation, Europe, Pulp and paper industry, Economics, Waste disposal, Cost-benefit analysis, Costs, Operating cost, Industrial wastes.
Identifiers: *Switzerland.

Described are the amounts of sludge produced in various kinds of paper industry effluent treatment plants; different types of water in sludges (interstitial, capillary, adsorptive, etc.); sludge thickening and dewatering methods and equipment; sludge pretreatment (preconditioning by chemical and/or thermal methods); and engineering calculations and cost-benefits analyses for sludge treatment and disposal. The relative efficiencies of various dewatering machines are illustrated, notably vacuum and pressure filters, such as the vertical tower filter press, the horizontal Sandritz dewatering press, and the conical-cylindrical screw decanter (centrifuge). How economically these machines are being used at two Swiss paper mills (Biberist and Utzenstorf) is illustrated by detailed cost figures. (Speckhard-IPC)
W75-03580

METAL SALTS OF DITHIOCARBAMIC ACID DERIVATIVES, THEIR MANUFACTURE AND USE (METALLSALZE VON DITHIOCARBAMIDSAEURE-DERIVATEN, DEREN HERSTELLUNG UND VERSENDUNG),
Buckman Labs., Inc., Memphis, Tenn.
H. D. Buckman, and J. D. Pera.
German Patent (Offenlegungsschrift) No 2,308,807. Nov 8, 1973. 30 p, 8 tab.

Descriptors: *Pulp wastes, *Slime, *Waste water treatment, *Water conservation, *Pesticides, Chemicals, Closed conduits, Pulp and paper industry, Industrial water, *Recirculated water, Sulfur compounds, Nitrogen compounds, Potassium compounds, Organic compounds, *Thiocarbamate pesticides, Carbamate pesticides.
Identifiers: Slimicides, White water(Paper machine).

Slime deposits in pulp and paper mill water systems, notably in closed circuits for conservation of freshwater, are controlled by introducing doses of microbicidal organic salts, such as potassium N-hydroxymethyl-N-methyl-dithiocarbamate. (Speckhard-IPC)
W75-03581

PROCESS FOR WASTE WATER PURIFICATION (VERFAHREN ZUM REINIGEN VON ABWASSER),
Casco A.B., Stockholm (Sweden).
E. S. Hecktor, H. Storstrom, and G. W. L. Eselbock.
German Patent (Offenlegungsschrift) No 2,308,815. Sept 6, 1973. 9 p, 2 tab.

Descriptors: *Chemical precipitation, Waste treatment, *Pulp wastes, *Suspended solids, *Flocculation, Sedimentation, *Flotation, Polymers, Additives, *Coagulation, *Waste water treatment, Hydrogen ion concentration, Mixing, Chemicals, Phenols, Polymers, Polyelectrolytes, Lignins, Carbohydrates, Fibers(Plant), Water purification.
Identifiers: Phenol-formaldehyde resins, Polyethylene oxide, Polyethers, Aluminum sulfate.

A process is provided for removing suspended solids from industrial waste waters, notably effluents of the paper, paperboard, and fiberboard industries which contain cellulosic fibers, fines, fillers, and dissolved lignin degradation products and hemicelluloses. The process involves the addition and dissolution of a phenol-formaldehyde resin in the waste water at an alkaline pH, followed by pH reduction through addition of aluminum sulfate or the like, until the resin precipitates while coprecipitating suspended solids. The precipitate is then separated by sedimentation or flotation. The agglomeration of phenolic resin flocs can be improved by mixing an aqueous solution of polyethylene oxide or other high-molecular-weight polyether with the resin. (Speckhard-IPC)
W75-03582

EFFECT OF BOD(5) LOADS AND CARBOHYDRATE CONCENTRATION ON WASTE WATERS ON THE DEVELOPMENT OF FILAMENTOUS BACTERIA (VLIYANIE NAGRUZOK PO BPK(5) I KONTSENTRATSII UGLEVODOV V STOCHNYKH VODAKH NA RAZVITIE NITCHATOI BAKTERII),
T. V. Zharova, and L. M. Abramova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 5, p 17-18, 1974. 2 tab, 5 ref.

Descriptors: *Organic loading, *Carbohydrates, Hydrolysis, *Fermentation, Industrial wastes, Waste water(Pollution), *Wood wastes, Waste treatment, *Waste water treatment, Activated sludge, *Biological treatment, *Bacteria, Aerated lagoons, Settling basins, Sedimentation rates, Sludge, *Biochemical oxygen demand, Treatment facilities, Foreign countries, Aquatic bacteria, Aeration, Nutrients.
Identifiers: Bacillus subcuticularis, Hydrolysis industry, Glucose.

Aqueous effluents of wood hydrolysis factories contain large amounts of organic materials, mostly unfermented carbohydrates, humins, furfural, and organic acids. During purification of these effluents, surges of filamentary bacterial growth are frequently observed which interfere with biological treatment, since they contribute to the swelling and poor sedimentation of activated sludge in secondary settling tanks. Filamentary growths are more common in media of lower organic loading. A systematic study of this phenomenon was conducted with a pure culture of Bacillus subcuticularis isolated from an aeration tank and grown in media containing 455 to 3300 mg/liter of 5-day BOD, viz., residual yeast-fermentation liquors supplemented with N and P compounds, with or without added glucose. In high-BOD media (2800-3300 mg/liter), only small cocci but no filamentary bacteria were observed, whereas filamentous growths occurred within 4 days in lower-BOD media (1400-1650 mg/liter) treated with glucose. At still lower BOD (650-850 mg/liter), filamentary bacteria developed even in the absence of glucose, although their growth was accelerated by glucose. To avoid such growths in aeration tanks, it is recommended to operate effluent treatment facilities at high BOD loadings and to reduce sugar concentrations in waste waters by more thorough prior fermentation. (Stapinski-IPC)
W75-03583

THE 'SHOCK ABSORBER' SYSTEM OF WASTEWATER TREATMENT,
J. W. Day.
Paper Processing, Vol 10, No 9, p 27-31, Sept 1974. 6 fig, 6 tab.

Descriptors: *Oxygenation, *Oxygen, *Activated sludge, Waste treatment, *Pulp wastes, *Aeration, *Waste water treatment, Economics, Biochemical oxygen demand, Biological treatment, Odor, Energy, Surges.
Identifiers: Unox(Oxygen-aided activated sludge) process.

Union Carbide Corp. pilot-plant studies led to the commercial development of the 'Unox' process, in which high-purity oxygen is used to aid activated sludge treatment of waste waters. Trial runs with effluents from bleached and unbleached kraft, sulfite, and groundwood/kraft combined pulp mills evidences BOD removals of 87% to 95%. Advantages claimed for the Unox process over plain air systems include reduced land area requirement, less off-gas odors, improved process control, better response to surges, and less power demand. (Hansen-IPC)
W75-03584

MILL EFFLUENT AND ITS UTILISATION FOR CROP CULTIVATION PURPOSES,
S. J. Khambatta, and C. M. Ketkar.
Paper (London), Vol 182, No 2, p 88, 90-91, July 17, 1974. 3 tab, 3 ref.

Descriptors: Treatment facilities, *Activated sludge, *Biological treatment, *Pulp wastes, Waste treatment, *Waste water treatment, *Irrigation, *Soil disposal fields, Landfills, Incineration, Agriculture, Crops, Crop response, *Effluents, Discharge(Water), Filtration, Soil bacteria, Percolation, Path of pollutants, Lignins, Carbohydrates, Nutrients, Plant growth, Dissolved solids, Suspended solids, Color, Sludge disposal.
Identifiers: India, Straw, Straw(Paper) mills.

An Indian mill producing mechanochemical pulp and fine papers, such as greaseproof and glassine, from rice straw, has installed a modern activated sludge effluent treatment facility. The treated effluent is suitable, according to regulations of the Indian Standards Institution, for irrigation of crop lands, while the dried sludge is used as landfill and/or domestic fuel. Effluent characteristics and the treatment installation are described. Large-scale irrigation experiments indicated that the lignins, polysaccharides, and residual nutrients

present in the treated effluent are not detrimental to the growth of paddy rice, sugar cane, groundnuts, vegetables, and other crops. On the contrary, increased plant yields indicate a beneficial effect. Color, dissolved solids, and suspended solids are appreciably reduced by soil percolation, filtration, and action of anaerobic soil bacteria. (Buchanan-IPC)
W75-03585

MEASUREMENTS OF SLUDGE LEVEL AND SLUDGE DENSITY IN CLARIFIER INSTALLATIONS (MESSUNGEN VON SCHLAMMNIVEAU UND SCHLAMMDICHTE IN KLAERANLAGEN),
Der Papiermacher, Vol 23, No 5, p 76-77, May 11, 1974. 2 fig.

Descriptors: *Instrumentation, *Sludge, *Treatment facilities, *Waste treatment, *Waste water treatment, Sedimentation, Flocculation, Storage tanks, Density, Measurement.

Two photoelectric instruments developed by the Siemens Co. in Germany are described and illustrated. One is designed to measure the sludge level, the other the sludge content (bulk or density) in waste water treatment basins. (Speckhard-IPC)
W75-03586

UNIQUE NEW SECONDARY OXYGEN TREATMENT SYSTEM FOR EFFLUENT,
Paper Trade Journal, Vol 158, No 31, p 22-23, Aug 5, 1974. 2 fig.

Descriptors: *Oxygenation, *Oxygen, *Treatment facilities, Waste treatment, *Waste water treatment, *Activated sludge, Equipment, Industrial wastes, Municipal wastes, Energy, Explosions, Safety, Oxidation, Mixing, *Pulp wastes, Pipelines.
Identifiers: Black liquors, Kraft mills, F30(Free-Fall Oxygenation) process.

The 'F30' (free-fall oxygenation) process developed by Airco Cryoplants Division of Airco Industrial Gases is based on an enclosed waterfall reactor for treating domestic and industrial waste waters with pure oxygen in activated sludge systems. The self-contained modular units require no tank covers, are easily installed in existing treatment facilities, and minimize explosion or combustion hazards. Their power consumption is low, and oxygen-utilization efficiencies of 90% or higher are reported. A special pipeline reactor suitable for oxidation of kraft mill black liquors has also been devised. (Hansen-IPC)
W75-03587

PULPING PROCESS PREVENTS POLLUTION,
R. A. Young.
Pollution Engineering, Vol 5, No 4, p 33-34, April 1973. 2 fig.

Descriptors: *Pollution abatement, *Washington, Columbia River, *Pulp wastes, Pulp and paper industry, Treatment facilities, *Sulfite liquors, Water quality, Waste treatment, *Waste water treatment, Calcium, Magnesium, Costs, Cost-benefit analysis, Employment, Economics, Biochemical oxygen demand.
Identifiers: Magnefite pulping process, *Chemical recovery.

When Washington State modified its water quality standards to require a 70% reduction in discharged effluent BOD, several sulfite pulp and paper mills along the Columbia River were faced with the decision of closing down, curtailing production, or altering their manufacturing technology to meet the stricter regulations. Two mills did shut down. At Camas, Washington, a 420 ton-per-day pulp mill of Crown Zellerbach Corp. was converted from the traditional calcium-base to a new magnesium-base sulfite cooking process. This 'Magnefite' process is described, including the method of recovering chemicals (sulfur and magnesium hydroxide) from the spent liquor. The Magnefite process meets both water and air quality codes, but has increased the mill's production costs, mainly by requiring 13 more employees. (Witt-IPC)
W75-03588

METHOD OF REDUCING THE DISCHARGE OF WASTE PRODUCTS FROM PULP MILLS,
Skogsagarnas Industri A.B., Vaxjo (Sweden). (assignee)
N. V. Mannbro.
U. S. Patent No 3,830,688. Issued Aug 20, 1974. 8 p, 1 fig.

Descriptors: *Pulp wastes, *Water conservation, *Bleaching wastes, *Industrial water, *Industrial wastes, *Waste water treatment, Lignins, Oxidation, Evaporation, Pulp and paper industry.
Identifiers: Kraft mills, Black liquors, Chemical recovery.

A method for reducing the freshwater consumption as well as the waste water discharge volume of pulp mills is described. It makes use of a nonoxidative pulping (chemical cooking) and an oxidative bleaching process. The cooked chips containing spent pulping liquor are passed from the digester to a brown stock washer where the liquor is washed out of the pulp with an aqueous solution containing volatile digestion residues from the spent liquor evaporation condensate. The undiluted pulp then passes directly to a high-density oxidative bleaching tower for further delignification and simultaneous oxidation of residual spent liquor chemicals, followed by an alkaline extraction stage. Liquor discharged from the brown stock washer can be combined with the alkaline extraction effluent and conveyed to a chemical recovery system. (Lynch-IPC)
W75-03590

REMOVAL OF TRACE METALS FROM WASTE WATER BY TREATMENT WITH LIME AND DISCARDED AUTOMOTIVE TIRES,
Canada Centre for Inland Waters, Burlington (Ontario).
A. Netzer, P. Wilkinson, and S. Beszedits.
Water Research, Vol 8, No 10, p 813-817, Oct 1974. 3 fig, 1 tab, 5 ref.

Descriptors: *Heavy metals, Water purification, *Lime, Waste treatment, *Waste water treatment, *Rubber, *Trace elements, *Adsorption, Liquid wastes, Aluminum, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc, Laboratory tests, Hydrogen ion concentration, Cations, Industrial wastes, Chemical wastes.
Identifiers: *Silver.

Laboratory experiments evaluated the feasibility of using discarded automotive tires in conjunction with lime to remove Al, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Ag, and Zn from aqueous solutions. The results showed that the groundup rubber is particularly useful as a polisher for removing final traces of metal after conventional lime treatment. It is as effective as activated carbon, cheaper, and easier to dispose of. Furthermore, the rubber reduces the amount of lime required which, in turn, leaves less sludge for dewatering and disposal. Better than 99% metal removal or less than 0.1 ppm residual metal concentration was achieved for Cd, Co, Mn, and Ni (pH 10-11), Al (pH 5-8), Cr (pH 5-11), Cu (pH 5.5-11), Fe (pH 3-11), Pb (pH 8-11), Hg (pH 4.5-11), Ag (pH 6-11), and Zn (pH 9-11). (Witt-IPC)
W75-03591

SYSTEM FOR RECOVERY OF FIBER FROM PAPER MILL EFFLUENT, INCLUDING A SIEVE BEND SCREEN,
Dorr-Oliver, Inc., Stamford, Conn. (assignee)
A. Boniface.
U.S. Patent No 3,833,468. Issued Sept 3, 1974. 14 p, 11 fig.

Descriptors: *Pulp wastes, *Industrial wastes, Waste treatment, *Waste water treatment, *Recycling, *Recirculated water, Suspended solids, *Fibers(Plant), Screens, Filters, Filtration, Waste water(Pollution), Equipment, Effluents, Pollution abatement.
Identifiers: White water(Paper machine effluent).

The various waste waters of a paper mill are collected in the form of a suspension which is passed under pressure through a sieve-bend screen. The function of the screen is to separate an overflow fraction containing long reuseable fibers from the underflow fraction which carries off other entrained solids. (Lynch-IPC)
W75-03592

BENEFICIATION OF LIGNIN SOLUTIONS AND PULP MILL WASTES,
Betz Labs., Inc., Trevose, Pa. (assignee)
K. R. Lange, A. M. Stern, L. L. Gasner, and Y. T. Hsu.
U. S. Patent No 3,829,388. Issued Aug 13, 1974. 5 p, 5 tab.

Descriptors: *Pulp wastes, *Industrial water, *Cooling water, *Boiler feed water, *Water treatment, *Lignins, *Corrosion control, *Scaling, Water softening.
Identifiers: Alkali lignins, Black liquors, Kraft lignin, Scale inhibitors.

A method for reducing scale and deposit formation in boiler feedwater, cooling water, and other aqueous industrial systems involves the addition of a sequestering agent derived from a soluble lignin derivative, such as alkali lignin obtained from kraft pulp black liquor. (Lynch-IPC)
W75-03593

SLIME CONTROL IN INDUSTRIAL WATERS,
Economics Lab., Inc., St. Paul, Minn. (assignee)
H. J. Hatcher, R. J. Truda, T. G. Lechner, and C. R. McDuff.
U. S. Patent No 3,824, 184. IssuedJuly 16, 1974. 5 p, 5 tab.

Descriptors: *Waste water treatment, *Industrial water, Closed circuits, *Slime, *Pesticides, *Enzymes, Pulp and paper industry, Chemicals, Additives, Recirculated water, *Pulp wastes.
Identifiers: Levan hydrolase, White water(Paper machine).

Pulp and paper mill water systems, notably closed circuits, can be protected against formation of slime deposits by adding suitable amounts of an enzyme preparation based on levan hydrolase. (Lynch-IPC)
W75-03594

METHOD OF DECOLORIZING WASTE PROCESS LIQUID DISCHARGED BY A PAPER MILL,
Owens-Illinois, Inc., Toledo, Ohio. (assignee)
H. C. Croom.
U. S. Patent No 3,833,463. Issued Sept 3, 1974. 8 p, 2 fig.

Descriptors: *Pulp wastes, *Lime, Waste treatment, *Waste water treatment, *Color, *Chemical precipitation, Calcium carbonate, Carbon dioxide, Hydrogen ion concentration, *Pulp wastes.

Aqueous effluents of pulp and paper mills are decolored by a chemical process comprising the following steps: (1) carbonation to neutralize the pH, (2) addition of lime mud to form soluble calcium bicarbonate in the presence of carbon dioxide, (3) repeated carbonation, (4) addition of lime to raise the pH and precipitate calcium carbonate, (5

treatment with carbon dioxide to reduce the pH and to form a carbonate with any remaining soluble calcium, and (6) removal of the precipitated calcium carbonate together with coprecipitated color bodies. (Lynch-IPC)
W75-03595

METHOD OF DECOLORIZING PAPER MILL EFFLUENT LIQUID,
Owens-Illinois, Inc., Toledo, Ohio. (assignee)
O. E. Rolfe.
U. S. Patent No 3,833,464. Issued Sept 3, 1974. 8 p, 3 fig.

Descriptors: *Pulp wastes, *Chemical precipitation, *Color, Waste treatment, *Waste water treatment, *Lime, Calcium carbonate, Carbon dioxide, Pressure, Effluents, Adsorption.

A method for reducing the color of aqueous pulp and paper mill effluents, such as kraft mill wastes, involves the following chemical treatment steps: (1) Addition of excess calcium carbonate, (2) pressure application in the presence of carbon dioxide to convert the carbonate to soluble calcium bicarbonate, and (3) discharging the pressurized liquid to atmospheric pressure, thereby precipitating insoluble calcium carbonate which carries adsorbed color bodies with it. (Lynch-IPC)
W75-03596

AIR AND WATER POLLUTION CONTROL IN CRUDE TALL OIL MANUFACTURE IN THE PULP AND PAPER INDUSTRY,
Rust Engineering Co., Birmingham, Ala.
A. B. Adams, Jr.
Journal of the American Oil Chemists' Society, Vol 50, No 12, p 498-500, Dec 1973. 3 fig, 4 ref.

Descriptors: Waste treatment, Water pollution treatment, *Pulp wastes, *Air pollution, *Waste water treatment, *Pollution abatement, *Odor, Engineering, Structural engineering, Equipment, Treatment facilities, Incineration, Biochemical oxygen demand, Color, Storage tanks, Valves, Skimming, Byproducts, Sumps.
Identifiers: *Tall oil, Sulfate soap, Kraft mills, Black liquors, Flue gases(Stack gases), Lime kilns, Recovery furnaces, Hoods.

In the production of tall oil from the sulfate soap skimmed from black liquor, the control of air pollution requires preventive measures in the design of new mills, or corrective measures to be taken by older existing kraft pulp mills. For controlling air pollution, these measures involve essentially the enclosure of all black liquor vessels from which tall oil is to be recovered, e.g., by installation of hoods on storage tanks, sumps, heat exchangers, etc., along with ventilation ducts and flue gas scrubbers or incinerators. Odorous gases are typically burned in kraft recovery furnaces and/or lime kilns. Water pollution is prevented best by careful design of soap skimmers, level controls, and valve systems. Some tall oil will still enter the waste water stream and requires an effluent treatment installation designed to remove this additional BOD load, along with the color of the treated effluent. (Witt-IPC)
W75-03598

REMOVAL OF RESIN ACIDS FROM CULTURE MEDIA AND KRAFT-MILL EFFLUENTS BY YEASTS AND SOME OTHER FUNGI,
National Research Council of Canada, Saskatoon (Saskatchewan). Prairie Regional Lab.
F. T. Spencer, G. D. Sinclair, and N. R. Gardner.
Canadian Journal of Microbiology, Vol 20, No 9, p 1288-1290, Sept 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Microorganisms, *Yeasts, *Fungi, Aquatic microorganisms, *Waste water treatment, Organic acids, *Resins, *Pulp wastes, *Biological treatment, Waste treatment, Toxicity, Nutrients.

Epicoccum nigrum, Rhinocladiella mansonii, Rhodotorula minuta, and Trichosporon cutaneum were evaluated for their ability to remove resin acids from nutrient-supplemented kraft mill effluents and from a nutrient medium containing yeast extract as the sole source of nitrogen. Up to 39% of the resin acid content was removed by all four organisms. As measured by the induction of gene conversion in a strain of Saccharomyces cerevisiae, the mutagenic activity of the resin acid preparation was low, if at all existent. (Witt-IPC)
W75-03599

ULTRAFILTRATION OFFERS 'GOOD' REMOVAL OF COLOR, COD, BOD.
Canadian Pulp and Paper Industry, Vol 27, No 9, p 50-52, Sept 1974. 4 fig, 1 tab.

Descriptors: Treatment facilities, *Pulp wastes, Waste treatment, *Waste water treatment, *Filtration, Reverse osmosis, Membrane processes, Effluents, Separation techniques, *Biochemical oxygen demand, *Color, *Chemical oxygen demand, Pressure, Temperature, Mixing, Costs, Operating cost, Capital cost.
Identifiers: *Ultrafiltration, Agitation, Cellulose acetate, Molecular weight, Kraft mills.

A filtered sample of bleached kraft mill effluent was treated with defoamer and subjected to ultrafiltration at a specific pressure and with constant agitation. The ultrafiltration provided good removals of color, COD, and 5-day BOD. The process was not dependent on pressure, thus operating at lower pressures than reverse osmosis. However, rate of agitation was an important variable. BOD removal was best for a cellulose acetate membrane of 10,000 molecular weight or less. Process economics for a 500 t/day ultrafiltration installation are estimated at $20 to $50 million for capital investment and $1 per 1000 gal in operating costs. (Sykes-IPC)
W75-03600

NOVEL METHODS OF FRESHWATER PREPARATION AND WASTE WATER PURIFICATION IN PULP AND PAPER MILLS (NEUERE METHODEN ZUR FRISCHWASSERAUFBEREITUNG UND ABWASSERREINIGUNG IN ZELLSTOFF- UND PAPIERFAKRIKEN),
C. Auer-Welsbach.
Wochenblatt fuer Papierfabrikation, Vol 102, No 8, p 293-294, 296, April 30, 1974.

Descriptors: *Water purification, Freshwater, Water treatment, *Waste water treatment, Waste treatment, *Pulp and paper industry, *Reverse osmosis, *Flotation, Membrane processes, *Flocculation, *Oxidation, Adsorption, *Activated carbon, Electrochemistry, Chemicals, Industrial water, Industrial wastes, Pollution abatement.
Identifiers: Thermal oxidation, Electrochemical flocculation.

Water and waste water treatment processes based on electroflotation, electrochemical flocculation, thermal oxidation, activated carbon adsorption, and reverse osmosis are reviewed. Process parameters and efficiencies are indicated, and advantages versus limitations of each method are compared. (Speckhard-IPC)
W75-03602

HYBRID DONNACONA TMR PLANT FEATURES ZERO POLLUTION,
L. Skory.
Canadian Pulp and Paper Industry, Vol 27, No 8, p 20-22, Aug. 1974. 5 illus.

Descriptors: *Industrial water, *Recirculated water, *Filtration, *Pulp wastes, *Filters, *Water conservation, Pulp and paper industry, *Canada, Effluents, Discharge(Water), *Waste water treatment.
Identifiers: *Thermomechanical pulp refining, Newsprint, White water(Paper machine effluent).

At Donnacona, Quebec, Domtar Pulp and Paper Ltd. has built a $4.6 million thermomechanical pulp refining (TMR) pilot plant utilizing six disk refiners for defibration of steam-pretreated wood chips to be made into newsprint. The refiner installation is connected with the paper machine's white water system in such a way that water is being recycled and only 100 gal/million with a 20 ppm solids content needs to be sewered. A Vargo filter (made by Polcon Engineering Co.) makes it possible to reclaim all the water needed for dilution of the paper stock in the pulper and for paper-machine shower sprays. (Sykes-IPC)
W75-03603

BIOCHEMICAL PURIFICATION OF WASTE WATERS AT THE SYAVSK (WOOD-PYROLYSIS) COMBINE (BIOKHIMICHESKAYA OCHISTKA STOCHNYKH VOD NA SYAVSKOM KOMBINATE),
Syavskii Lesokhimicheskii Kombinat (USSR).
N. K. Molodtsov, M. F. Morozov, P. S. Fokin, E. V. Mikhalitsyna, and L. N. Smirnova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 5, p 22-24, 1974. 1 fig, 1 tab.

Descriptors: *Industrial wastes, Waste treatment, *Waste water treatment, Treatment facilities, *Wood wastes, *Chemical wastes, *Activated sludge, *Biological treatment, Biochemical oxygen demand, Chemical oxygen demand, Water pollution sources, Foreign countries, Sewage treatment.
Identifiers: USSR, Wood pyrolysis, Joint (Municipal/industrial waste) treatment, Acetic acid, Ethyl acetate, Methyl alcohol(Methanol), Wood tar.

At the wood-processing and silvichemical factory of Syavsk (USSR), mechanical and chemical effluent purification facilities have been operating since 1969. An activated sludge system for biochemical treatment has been added in 1973. Highly polluted effluents originating mainly from wood pyrolysis, manufacture of acetic acid and ethyl acetate, and processing of wood tar and wood alcohol (methanol) are purified jointly with municipal sewage. The treatment installation, which is described in some detail, reduces the effluent COD from 720-1400 to 128-192 mg/liter, i.e., by 82%, and the 5-day BOD from 540-1080 to 6-36 mg/liter, i.e., by 97%. (Stapinski-IPC)
W75-03606

DECOLORIZING DYE WASTES,
Rohm and Haas Co., Philadelphia, Pa. Pollution Control Research Dept.
D. C. Kennedy, B. Stevens, and J. W. Kerner.
American Dyestuff Reporter, Vol 63, No 8, p 11-14, August, 1974. 7 fig, 3 tab.

Descriptors: *Dyes, *Waste water treatment, *Waste treatment, *Chemical wastes, Industrial wastes, Effluents, Anion exchange, Adsorption, Solids contact processes, Pollution abatement, Polymers, Water pollution control, Color, Chemical oxygen demand, Copper, Chromium, Heavy metals, Ion exchange, Solvents, Incineration, Chelation.
Identifiers: *Amberlite resins.

A system employing polymeric adsorption to decolorize streams containing waste dyestuffs has been in operation for about a year at the plant of a major dye producer in the Northeast United States. The system reduces the color of the waste stream (300,000 gal/day) from an average of 75,000 to 500 APHA units on the Pt-Co scale, and the COD from an average of 5,280 to 2,600 ppm. The system also removes copper and chromium both as salts and as organic chelates. The operating system consists of two columns of polymeric adsorbent (Amberlite XAD-7) each followed by an

anion exchange polisher. When exhausted the adsorbent and anion exchange resin are regenerated with a solvent. The solvent is condensed for reuse, and the concentrated aqueous solution of waste dyestuffs is further concentrated and disposed of by incineration. (Witt-IPC)
W75-03608

PROBLEM-FREE CLARIFIER SLUDGE TREATMENT BY A NEW THERMAL TWO-STAGE PROCESS (PROBLEMLOSE KLAERSCHLAMMBEHANDLUNG DURCH EIN NEUES THERMISCHES ZWEISTUFEN-VERFAHREN),
W. Vogeno.
Das Papier, Vol 28, No 5, p 209-210, May 1974. 2 fig.

Descriptors: *Sludge treatment, *Sludge disposal, Ultimate disposal, *Dewatering, *Incineration, Equipment, Treatment facilities, Europe, *Waste water treatment, Pulp wastes, Pumping, Drying, Solid wastes.
Identifiers: *Thermal treatment, Heat recovery, Flue gases, Germany.

Thermal dewatering followed by incineration is the basis of a newly developed two-stage process for drying and disposal of effluent-treatment sludges, which is said to be applicable to sludges of any consistency. The schematically illustrated equipment is produced by KHD Industrieanlagen AG Humboldt Wedag in Cologne, West Germany. It comes in two varieties, one designed for pumpable sludges, the other for thicker slurries, and includes provisions for heat recovery and exhaust gas purification. (Speckhard-IPC)
W75-03609

REMOVING THREE AIR POLLUTANTS AT ONCE.
Environmental Science and Technology, Vol 8, No 9, p 788-789, September, 1974. 1 fig, 1 tab.

Descriptors: *Aluminum, *Air pollution, *Industrial wastes, *Waste treatment, Particle size, Effluents, Recycling, Wastewater.

The removal of aluminum hydroxide, aluminum chloride, hydrogen chloride and particulate matter from the exhaust of an aluminum processing plant by the use of venturi scrubbers was discussed. These scrubbers are unique in that the venturi diverging section is located within the main scrubber chamber and passes vertically through the packed entrainment separator. In operation, gas effluent from the aluminum bonding oven enters the top of the scrubber at the rate of approximately 35,000 acfm while water is injected at 200 gpm. Both water and gas speed through the highly constricted venturi throat and are thoroughly mixed as the water passes over a small turbulence-producing 'knee' projection around the periphery of the venturi throat. Cleansed air is pulled through two 32-in. diameter exhaust pipes (at 16,000 acfm each) at the top of the scrubber, then to the base of a 40-ft. high exhaust stack. Exhausted air is approximately 99% free of pollutants and produces a barely visible steam plume that dissipates itself within about 20 ft. of the stack. The same water used in the manufacturing process is also used in the pollution control system. (Jernigan-Vanderbilt)
W75-03631

DAIRY MANURE MANAGEMENT METHODS,
Washington State Univ., Pullman. Environmental Engineering Section.
D. E. Proctor.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-233 441, $4.75 in paper copy, $2.25 in microfiche. Report No EPA/530/SW-67d, 1974. 128 p, 34 fig, 1 tab, 5 append. G06-EC-00102.

Descriptors: *Farm wastes, *Management, *Dairy industry, *Waste disposal, On-site investigations, Research facilities, Agriculture, Anaerobic conditions, Lagoons, Data collections, Storage, Seasonal, Environmental effects, Land use, Crop response, Sprinkler irrigation, Slurries, Hydraulic transportation, Cattle, *Waste treatment.

New pens for the confinement and feeding of dairy cattle were constructed under a continuous roofed area to prevent the addition of precipitation to the cattle excrement. The manure was collected in underground sumps, pumped to large anaerobic lagoons for wet-season storage, and subsequently applied to crop land during the comparatively drier summer months. Observations were made to evaluate, at least partially, the effect of the roofed environment upon the cattle. Some unseccessful attempts were made to collect the excrement by hydraulic flushing techniques alone. The pump and pipeline transport of manure slurry either to storage or to large bore field irrigation nozzles was quite successful. Observations of surface ponding and runoff, soil penetration, and crop response indicated that the concept of seasonal storage and seasonally scheduled crop land disposal of dairy manure slurry can be an environmentally acceptable and agriculturally compatible method of dairy manure management. Attempts to aerobically treat manure slurry supernatant liquor were technically successful but still impractical. Weather data and soil and water quality data were tabulated in appendixes. Also included were reports on the post-experimental operations, planning and implementation of required facilities and equipment, and construction progress and problems. (Humphreys-ISWS)
W75-03636

APPARATUS FOR BIOLOGICALLY PURIFYING EFFLUENT,
A. F. J. C. Stengelin, V. Stengelin, and J. Stengelin.
US Patent No 3,847,811, 3 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 743, November 12, 1974.

Descriptors: *Patents, *Biological treatment, *Aerobic treatment, *Waste water treatment, Water pollution control, Pollution abatement, Water quality control, Equipment, Microorganisms, *Trickling filters, Effluent, Aerobic treatment.
Identifiers: Aerobic microorganisms.

The apparatus for biological treatment of effluent by the use of aerobic microorganisms has at lease one trickling filter. The filter is mounted on a shaft. The individual sections of the filter are immersed successively in the effluent during rotation of the shaft. The filter comprises several annular, segment-shaped or cube-shaped filter sections arranged side by side around the shaft. Passages present a large area into which the effluent penetrates on immersion and from which the effluent drains away again when reemerging. (Sinha-OEIS)
W75-03734

METHOD AND APPARATUS FOR PROCESSING WASTE WATER SLIMES OF STEEL MILL WATER TREATMENT SYSTEMS,
L. A. Duval.
US Patent No 3,844,943, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2094, October 29, 1974.

Descriptors: *Patents, *Waste water treatment, *Filters, Pollution abatement, Water pollution control, Water quality control, *Slime, *Oil wastes, Iron oxides, *Separation techniques, *Industrial wastes, Filtration.
Identifiers: Magnetic separators, Steel mills.

A method and apparatus are presented for processing a stream of water from a steel mill water treatment system where the water contains iron oxides, liquid oils, heavy oil particles, a slime of finely divided particles of waste materials, and water. The stream is first passed through an operation where a rough separation is made between the lighter components such as slime and oil and the heavier components such as the iron oxides, the heavy oil particles and much of the fine waste particles. The heavier particles are then passed through a classifier where again the heavier components are separated and the lighter oil, slime and water are discarded, after which the heavier material is again passed through a combined scrubber and classifier where extra water and oil solvent are added and the heavier material discharged from this operation, mostly iron oxide, is discharged to oxide storage. Again, the lighter oil slime and water are discharged. All of the oil, slime and water from these previous operations are passed to a thickener where the remaining solids in the stream are settled to the bottom by continuous non-turbulent agitation and liquid oil and water are removed at the top and separated from each other. The solids discharged from the thickener are forced by means of a pump serially through a magnetic separator and a cake filter, the oxides removed in the magnetic separator are discharged to the oxide storage and the cake from the filter is discharged to a filter cake storage. The filtrate from this filter is again discharged back to the thickener. (Sinha-OEIS)
W75-03740

AEROBIC WASTEWATER TREATMENT SYSTEM WITH PARTIAL REUSE AND INFREQUENT DOSING TO SOIL,
Environment/One Corp., Lathan, N.Y. (assignee).
R. P. Farrell, Jr.
U. S. Patent No. 3,844,946, 8 p, 2 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2095, October 29, 1974.

Descriptors: *Patents, *Waste disposal, *Waste water treatment, *Aerobic treatment, Chemical treatment, Effluents, Equipment, Recycling, Conservation, *Water reuse, *Soil disposal fields, Settling business.
Identifiers: Dwellings, Settling tanks, Drain fields.

A waste disposal system, particularly for dwellings having limited drain fields or drain fields soils having limited capacity, is described. The effluent is removed from an aerobic treatment and settling tank for ultimate return (at least in part) as flushing fluid for toilets, etc. The sludge is removed from the treatment and settling tank for further treatment and settling so that liquid may be removed from the sludge for return ultimately to the treatment and settling tank. The effluent used for flushing purposes is run into a storage tank and thereafter may be chemically treated by a treatment solution educator and stored in the surge tank supplying the toilets until it is used by the toilets in flushing. Waste water from toilets and other sources is deposited in a small holding tank until a predetermined level has been reached, at which time a grinder-pump will remove the waste from the holding tank and discharge it into the aerobic treatment and settling tank. The liquid removed from the sludge is returned to this holding tank. Various pressure and level sensing controls are used in conjunction with a coordinating and timing control unit to control the sequence of operations for efficiency. Excess effluent is discharged to a drain field or the like, in infrequent slug doses in a known manner to thereby enhance performance of any drain field of a given capacity. (Sinha-OEIS)
W75-03741

POWERED MOBILE SPRAY IRRIGATION FOR PRODUCTIVE CROP SEWAGE UTILIZATION,
D. P. Livingston.
U. S. Patent No. 3,844,481, 9 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1953, October 29, 1974.

Descriptors: *Patents, *Irrigation systems, *Sewage disposal, Liquid wastes, *Sprinkler irrigation, Equipment, Conservation, Puddling, *Water reuse, *Waste water disposal, Water conservation.

A mobile, self-propelled rotary irrigation rig uses liquid sewage to irrigate crop lands. The system is designed to avoid puddling. The rig includes a pivot tower, a conduit pivoting about the tower, a series of supports spaced along the length of the conduit, and a series of nozzles spaced along the conduit. The conduit moves so that the nozzles move in arcs to gradually and progressively irrigate adjacent circular sectors. (Sinha-OEIS)
W75-03743

TREATMENT OF SEWAGE,
Sanitas Co. Ltd., London (England). (assignee)
J. H. Stokes, and A. G. Cousins.
U. S. Patent No. 3,846,301, 4 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 264, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Pollution abatement, *Disinfection, Chlorination, Bleaching wastes, Effluents, Water pollution control, Water quality control, *Separation techniques, *Chemical treatment.
Identifiers: Deodorizing, Sterilization, Calcium hypochlorite, Caustic alkali, Decoloration.

Sewage is treated by the following steps: (a) Form a mixture of flushing liquid and sewage (b) Separate the mixture into a part which has a high content of solid matter and a part which has a high content of liquid (c) Separate solid matter from liquid in the part with the high liquid content (d) Maintain a chemical composition in that liquid such that the liquid is disinfectant and deodorant (e) Maintain a bleaching action in the liquid so as to have a decolorizing effect (f) Use the liquid as flushing liquid for a repetition of the mixing step (g) Subject the part with high solid content to mechanical reduction of size of pieces of the solid matter (h) Thereafter hold that part in a place of storage, so that substantially all the solid matter is exposed to the chemical content of the liquid constituent of that part and is thereby broken down, dispersed, sterilized and deodorized. (Sinha-OEIS)
W75-03746

ROTATING FILTER FOR WASTEWATER BIOLOGICAL PURIFICATION,
C. Di Bello.
U. S. Patent No. 3,837,492, 3 p, 10 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 926, No 4, p 1266, September 24, 1974.

Descriptors: *Patents, *Filters, *Filtration, *Waste water treatment, Water purification, Water pollution control, Water quality control, *Aeration, Pollution abatement, *Biological treatment, Equipment.
Identifiers: Rotating filters.

The rotating filter comprises at least one assembly of parallel open-ended elongated channels, and a shaft having an axis of rotation about which at least one assembly can rotate. The axis of rotation is to be perpendicular to the elongated channels. The assembly of channels is rotated so that it is periodically in contact with the wastewater and then with the atmospheric oxygen. A biological film develops on the surfaces of the filter. When the filter rotates submerged in the wastewater, the biological film absorbs the organic pollutants present in the same wastewater. When the filter rotates out of the wastewater, the organic pollutants, absorbed by the biological film, are exposed to the oxygen in the air. The natural oxidation transforms the organic pollutants into metabolic products. As the biological film grows, the excess of the film continuously sloughs off the surfaces of the filter, falling by gravity in the bottom of the tank. (Sinha-OEIS)
W75-03747

RECLAMATION OF HYDROCARBON CONTAMINATED GROUND WATERS,
Sun Research and Development Co., Philadelphia, Pa. (assignee)
R. L. Raymond.
U. S. Patent No. 3,846,290, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 260, November 5, 1974.

Descriptors: *Patents, *Groundwater, *Oil wells, Pollutants, *Biodegradation, *Oil pollution, Water wells, *Injection wells, Pollution abatement, Microorganisms, Nutrients, Oxygen, Reclamation, *Waste water treatment, Water reuse.

Hydrocarbon contaminants of underground water sources can be quickly disposed by providing nutrients and oxygen for hydrocarbon-consuming microorganisms normally present in underground waters. Nutrients and oxygen are introduced through wells within or adjacent to the contaminated area and water is removed from the contaminated area until the contaminating hydrocarbons are no longer present or are reduced to an acceptable level. A contaminated producing well will yield hydrocarbon contaminated water due to the presence of hydrocarbons in the water. A second well may be specifically drilled within the contaminated area and adjacent the producing well to be employed as an injection well. At ground level, the injection well will be equipped with a mixing tank for the nutrients and an injection tube extending from the tank to the water level for introducting the nutrients to the subsurface water. An air pump pumps air through a conduit to below the water level. A pump at the producing well removes water from the well through a submerged conduit. The normal microorganism flora between the injection well and the producing well will thus have sufficient nutrients and oxygen to effectively feed on the hydrocarbon substrate present in the area between the wells and decomposition of the unwanted hydrocarbon will proceed. (Sinha-OEIS)
W75-03750

WASTE TREATMENT PROCESS,
Ecolotrol, Inc., Bethpage, N.Y. (assignee)
J. S. Jeris, C. Beer, and J. A. Mueller.
U. S. Patent No. 3,846,289, 4 p, 1 fig, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 260, November 5, 1974.

Descriptors: *Patents, *Denitrification, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, *Biological treatment, Bacteria, Nitrates, Nitrites, Specific gravity, Temperature, Carbon, Pseudomonas, Hydrogen ion concentration.

A process for denitrifying waste water includes generating a fluidized bed containing denitrifying biota on a particulate carrier, metering a carbon source into the waste water and mechanically removing excess bacterial growth from the carrier at predetermined intervals. The fluidized bed through which the influent waste water is passed is contained in an upright cylindrical column. Waste water enters the column through a distribution manifold in its base. A cylindrical manifold plate having a series of spaced apart holes may be employed to regulate and even the flow of waste water through the column. To perform the process of fluidized bed formed from denitrifying biota attached to a solid particulate carrier or substrate is generated. For optimum denitrification each bed particulate preferably has a thin layer of bacteria seeded thereon. Generally, the bed particles are first cultured to seed bacteria, such as pseudomonas. The specific gravity of such seeded particles must be no less than about 1.1 and preferably greater than about 1.20 in order to insure that such particles are not carried out of the system during operation. In general, the pH of the system is adjusted, if need be, to fall in the range of from about 5.5 to 9.5. Enhanced results are obtained and, accordingly, it is preferred to operate at a pH from about 6.5 to 8.5. The temperature of the fluidized bed environment should be sufficient to permit bacterial activity. Usually, it is kept at from about 5 to 45C. There must be sufficient levels of carbon in the feed influent in order to provide stoichiometric amounts of carbon to permit oxidized nitrogen to be reduced to nitrogen. (Sinha-OEIS)
W75-03751

PROCESS OF AND INSTALLATION FOR PURIFYING SEWAGE,
C. Brucker.
U. S. Patent No. 3,846,291, 5 p, 7 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 261, November 5, 1974.

Descriptors: *Patents, *Aeration, *Biological treatment, *Waste water treatment, Water purification, Water pollution control, Water quality control, Pollution abatement, Microorganisms, Sewage treatment, Equipment, *Sludge treatment, *Recycling, Water reuse.

Sewage is introduced into a basin through an intake located at its upstream end. It is allowed to flow toward the downstream end. A travelling bridge is mounted for reciprocating movement along the basin between both ends. Sludge aerating and recycling devices are mounted on the bridge forming a sludge circuit including a suction intake located adjacent to the bottom of the basin. A suction pump is used for drawing the sludge from the bottom of the basin through the suction intake. The sludge is sprayed into the air toward the upstream end of the basin. The sludge is thus continually recycled in an upstream direction counter to the downstream flow of the progressively treated sewage. (Sinha-OEIS)
W75-03752

EJECTOR AERATED OXIDATION DITCH FOR WASTE TREATMENT,
Kimberly-Clark Corp., Neenah, Wis. (assignee)
A. R. Lecompte, Jr.
U.S. Patent No. 3,846,292, 5 p, 4 fig, 3 tab, 9 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 261, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, *Oxidation lagoons, Water quality control, Water pollution control, Pollution abatement, Sludge, Settling basins, Suspended solids, Liquid wastes, Biochemical oxygen demand.
Identifiers: *Oxidation ditch.

A system for treating waste liquid containing settleable solids and BOD comprises: an oxidation ditch for confining and retaining the waste liquid and defining a continuous, substantially closed flow path through which the confined liquid is moved and providing for a liquid depth of at least about 10 feet; and ejectors for aerating the waste liquid in the ditch to reduce the BOD and for simultaneously moving the waste liquid through the flow path. The ejectors are constructed and arranged so that they are solely capable of circulating the waste liquid throughout the ditch at a velocity of at least 0.3 foot per second to maintain the settleable solids in suspension. The ejectors comprise a housing having a waste liquid inlet for receiving a stream of pressurized waste liquid, a high velocity waste liquid nozzle connected with the waste liquid inlet, an air inlet for receiving air, a mixing chamber connected with the waste liquid nozzle and the air inlet, and a discharge outlet for discharging a high velocity waste liquid-air jet. The ejectors are arranged to discharge the waste liquid-air jets at least about 9 feet below the surface of the waste liquid in the oxidation ditch and in the direction of movement. (Sinha-OEIS)
W75-03753

LIQUID WASTE TREATMENT,
S. J. Campbell.
U.S. Patent No. 3,846,293, 8 p, 3 fig, 4 tab, 11 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 261, November 5, 1974.

Descriptors: *Patents, Liquid wastes, *Waste water treatment, *Coagulation, *Flocculation, Pollution abatement, Water pollution control, Water quality control, Lime, Polyelectrolytes, *Chemical treatment.
Identifiers: Ferric chloride.

Liquid waste is subjected to a multi-phase chemical-physical treatment process. In the first or densifying phase, the waste is treated with a first charge-density reducing agent, preferably an inorganic salt having a trivalent cation and most preferably ferric chloride, to reduce the zeta potential of the particles to a value at which some of the more easily removed, suspended particles coagulate and partially flocculate. These coagulated and partially flocculated particles are maintained in suspension in the liquid and are transferred together with the liquid to a succeeding treatment phase, wherein a sufficient quantity of a second charge-density reducing agent, preferably an inorganic salt having a divalent cation, and most preferably lime, is added to impart to the system a charged-density such that substantially all of the suspended particles flocculate or agglomerate into masses or particles which can be removed readily from the liquid. These flocculated impurities can be removed from the liquid waste in this phase of the treatment process. It is preferable to add a polyelectrolyte, along with the divalent inorganic salt, to the liquid waste containing the floc produced in the densifying phase. (Sinha-OEIS)
W75-03754

WASTE WATER PURIFICATION SYSTEM,
W. C. Hay.
U.S. Patent No. 3,846,296, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 262, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, *Filtration, *Flocculation, Pollutants, Water pollution sources, *Biological treatment, Water pollution control, Water quality control, Equipment, Industrial wastes, Domestic wastes, Suspended solids, Irradiation.
Identifiers: Activated charcoal, Gamma radiation, Dissolved organic matter.

Waste water from industrial and/or domestic sources is passed through a filtering stage then through conventional treatment as at a biological treatment station in which the waste water is exposed to organic flocculent materials to break down organic solids suspended in the waste water and then this treated waste water is filtered through a bed of sand. This treatment removes the major portion of the suspended solid materials from the waste water. Then, the waste water is passed through a bed of activated charcoal contained within an irradiation tank upon which organic contaminates dissolved within the waste water are deposited. The absorbent activated charcoal is regenerated by means of gamma radiation issuing from an energy basket contained within the radiation tank which holds the activated charcoal. The tank is surrounded by a heavy shield of concrete material and the entire shielded structure is submerged within a tank of water to prevent radiation escape. (Sinha-OEIS)
W75-03755

WATER POLLUTION RESEARCH IN CANADA 1973,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
Excerpts from Proceedings of 8th Canadian Symposium on Water Pollution Research, February 1973, held at Waterloo Univ., Ontario, Vol 8, 238 p.

Descriptors: *Water pollution, *Canada, *Waste treatment, *Sewage treatment, Organic matter, Effluents, Systems analysis, Sludge disposal, Sludge, Activated carbon, Sludge treatment, Outfall sewers, Urban runoff, Jets, Diffusion, Flow characteristics, Leaching, Sludge digestion, Organic acids, Activated sludge, Waste water treatment, Toxicity, Heavy metals, Phytoplankton, Anaerobic digestion, Iron compounds, Phosphates, Phenols, Landfills, Oxidation.
Identifiers: Alum sludge, Synergistic interactions, Iron phosphate.

Thirteen papers chosen from those presented at the Eighth Canadian Symposium on Water Pollution Research, held at the University of Waterloo in February 1973 appear in this volume. Five deal with metals--toxicity of heavy metals to phytoplankton, anaerobic digestion of primary sludge containing iron phosphate, use of activated carbon to remove trace metals from wastewater, effects of aluminum sludge from water purification plants on municipal primary sewage, and heavy metal tolerance in algae from polluted lakes. Other papers deal with size distribution of dissolved organics in effluents, study of pollution loadings from urban runoff, and performance of aerobic sludge digestion. Also included are papers on phenol removal in wastewater by wet air oxidation, boundary effects on dilution of buoyant jets, phosphorus leaching from sewage sludge used as landfill, and wet air oxidation of low molecular weight organic acid. (See W75-03771 thru W75-03783) (Jones-Wisconsin)
W75-03770

DETERMINATION OF THE SIZE DISTRIBUTION OF DISSOVED ORGANICS IN EFFLUENTS,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
L. A. Addie, K. L. Murphy, and J. L. Robertson.
In: Water Pollution Research in Canada 1973, Vol 8, p 1-15, 7 fig, 2 tab, 13 ref.

Descriptors: *Waste water treatment, *Organic matter, *Analysis, Tertiary treatment, Effluents, Separation techniques, Filters, Biological treatment, Chromatography.
Identifiers: Fractionation, Gel filtration chromatography, Molecular size, Molecular weight.

Problems concerning molecular size information on organic matter found in wastes and treated effluents are examined and the extent to which this information may be useful in analysis of organic waste constituents is illustrated. Size distributions of the residual organics in secondary effluents were determined using gel filtration with differential ultraviolet and refractive index detection and automated organic carbon and chemical oxygen demand analyses. Samples from activated sludge treatment were filtered, acidified, and purged with purified nitrogen to remove bicarbonate alkalinity. The concentrate was adjusted to pH 5.2-5.5 filtered prior to being applied to the chromatograph for size distribution. Separation into components is possible on the basis of Stokes' radius but not by molecular weight for the unknown organics in wastes and effluents. Identification is possible qualitatively but not quantitatively by UV. Use of COD and refractive index to detect organic components is not a valid procedure for analyzing wastewater and effluents. Inorganics influence the separation either by changing the apparent Stokes' radius (conformation) or through the Donnan salt exclusion effect. Effluents from three plants had similar proportions of carbon in three distinct molecular size ranges. Each size range included acidic, basic, and neutral fractions. (See also W75-03770) (Jones-Wisconsin)
W75-03771

A PERFORMANCE STUDY OF AEROBIC SLUDGE DIGESTION,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
K. S. Hogg, and J. Ganczarczyk.
In: Water Pollution Research in Canada 1973, Vol 8, p 26-35, 3 tab, 10 ref.

Descriptors: *Aerobic treatment, *Sludge digestion, *Economic efficiency, Canada, Waste treatment, Operations, Design, Cost comparisons, Evaluation, Capital costs, Treatment facilities.
Identifiers: Dunnville(Ontario).

An evaluation of a full-scale single-stage aerobic digester in the sewage treatment plant in Dunnville, Ontario was conducted during the summer of 1972. Parameters for evaluating aerobic digestion process performance from actual field study were determined and design and operational characteristics investigated with the results compared to other full-scale plants of similar size, and the capital and operational costs associated with aerobic and anaerobic sludge digestion compared. The aerobic digestion system for the sewage treatment plant in Dunnville is operating efficiently. Performance of the Dunnville digester cannot be judged on the basis of the volatile solids removal. The specific oxygen uptake rate in mg oxygen/g VSS/hr which is temperature dependent is one of the most reliable indicators of the biological activity of aerobically digested sludge. Within the context of this study, economical comparison of anaerobic versus aerobic digestion tends to favor aerobic digestion for small activated sludge plants. The cost of power for supplying high volumes of air to the Dunnville aerobic digester was not economically restrictive. Annual power costs associated with aeration of the aerobic digester contents represents 2.5% of the total annual budget for this treatment plant. (See also W75-03770) (Jones-Wisconsin)
W75-03773

DISPOSAL OF ALUM SLUDGE TO THE EXISTING ACTIVATED SLUDGE WASTEWATER TREATMENT PLANT,
McGill Univ., Montreal (Quebec). Dept. of Civil Engineering.
D. Y. Hsu.
In: Water Pollution Research in Canada 1973, Vol 8, p 36-67, 22 fig, 21 ref.

Descriptors: *Sewage disposal, *Activated sludge, *Waste water treatment, Municipal wastes, Sewers, Phosphates, Anaerobic digestion, Dewatering, Sludge.
Identifiers: *Alum sludge.

One of the most promising methods of handling sludge from the alum coagulation process is to discharge it to the sanitary sewers. The qualitative and quantitative effects on the mechanism of each unit of an activated sludge wastewater treatment plant when alum sludge was added, at various concentrations, were determined. It was found that the crucial effects were the increase in sludge production, either in the primary settling tank or in the secondary settling tank, and the retardation of the digestibility of the wastewater sludge. These effects were significant only when the aluminium hydroxide concentrations added were beyond certain limits. The efficiency of wastewater treatment, in terms of removal of organic matter, suspended solids, and phosphate and the sludge dewatering could be improved. Conclusions are that it is feasible to discharge alum sludge into sanitary sewers and treat it in the existing activated sludge wastewater treatment plant. However, it should be discharged into the sewer at a suitable rate to decrease strength of the adverse effects of aluminium hydroxide and the water treatment plant wastes should be discharged into a thickener in the wastewater treatment plant. (See also W75-03770) (Jones-Wisconsin)
W75-03774

ANAEROBIC DIGESTION OF PRIMARY SLUDGE CONTAINING IRON PHOSPHATE,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.

M. E. Jack, G. J. Farquhar, and G. M. Cornwall.
In: Water Pollution Research in Canada 1973, Vol 8, p 91-109, 10 fig, 4 tab, 25 ref.

Descriptors: *Waste treatment, *Anaerobic digestion, *Sewage sludge, *Iron, *Phosphorus, Nutrient removal, Solubility, Phosphates.
Identifiers: *Primary sludge, *Iron phosphate.

The digestibility of sludges containing metallic phosphate precipitates and about the fate of these precipitates during the anaerobic digestion process particularly as to whether or not phosphorus is returned into solution was investigated. The effect of storage on iron phosphate sludge was first investigated. Storage of the iron phosphate primary sludge at 5C resulted in rapid increases in orthophosphate, total soluble iron and volatile acids concentrations. Since the concentrations of orthophosphate in the fresh iron phosphate primary sludge were several times greater than those of both the raw sewage and the primary effluent, it was concluded that solubilization of phosphorus had begun in the primary clarifier. The stored iron phosphate sludge was usccessfully digested anaerobically after dilution to about 60% of its original strength. Precipitation rather than solubilization of iron phosphate was observed during anaerobic digestion. The digester effluent contained less than 7 mg/l as P or orthophosphate and less than 4 mg/l as Fe of total soluble iron. (See also W75-03770) (Jones-Wisconsin)
W75-03776

REMOVAL OF TRACE METALS FROM WASTEWATER BY ACTIVATED CARBON,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
A. Netzer, and J. D. Norman.
In: Water Pollution Research in Canada 1973, Vol 8, p 110-121, 1 fig, 2 tab, 18 ref.

Descriptors: *Waste water treatment, *Metals, *Activated carbon, *Inorganic compounds, Aluminum, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc, Hydrogen ion concentration.
Identifiers: Silver.

Experiments were carried out on stock solutions with initial metal concentrations of about 100 ppm and about 10 ppm to assess the possibility that activated carbon treatment would remove aluminum, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, and zinc from wastewater. All metals studied were tested over the pH range 3-11. In this experiment the greatest removal was obtained by a combined process using pH adjustment followed by activated carbon treatment. Less than 0.1 ppm residual metal concentration was obtained for all the metals investigated (except aluminum) over the pH range 4.0 to 10.0. Results are tabulated. The removal of heavy metals by adsorption on activated carbon was proven to be feasible, for greater than 99.5% removal was achieved by pH adjustment and activated carbon treatment for most of the metals tested. This has shown that the higher the activated carbon to metal ratio, the better the removal will be, and over a broader pH range. Because of the relatively high cost of activated carbon, this method will only be economically feasible for residual metal concentrations. (See also W75-03770) (Jones-Wisconsin)
W75-03777

THE EFFECTS OF ALUMINUM SLUDGE FROM WATER PURIFICATION ON MUNICIPAL PRIMARY SEWAGE TREATMENT,
Royal Military Coll. of Canada, Kingston (Ontario). Dept. of Civil Engineering.
J. D. O'Blenis, and T. R. Warriner.
In: Water Pollution Research in Canada 1973, Vol 8, p 122-147, 16 fig, 4 tab, 5 ref.

Descriptors: *Sewage treatment, *Water purification, *Sludge disposal, Filtration, Pilot plants, Nutrient removal, Phosphates.
Identifiers: Alum sludge.

Sludges from two different water purification plants were tested along with alum and a combination of alum and water purification sludge, for their effects on the removal of suspended solids, chemical oxygen demand, and phosphates. Results indicated that the two water treatment plant sludges did not impair sewage treatment at dosages up to about 10% of hydraulic flow. Both sludges exhibited a capability for removal of phosphate from domestic sewage. In the range of 75% to 98% relative phosphate removal, sludge dosages are seven to nine times as large as those required using alum (as aluminum). The sludges decreased in their phosphate removal capacity following successive exposure to sewage. The use of alum and sludge together enhances the phosphate removal performance of each, with combined removals greater than the cumulative effects of each if used separately. Recycling the clarifier underflow sludge reduces the dosing requirements of water treatment alum sludge for a specific phosphate removal objective. Suspended solids performance of primary clarifiers may be enhanced by sludge addition providing solids overload is avoided. Chemical oxygen demand reductions across the pilot primary clarifier, compared with undosed operations, were improved approximately 100% by addition of waterplant sludge. (See also W75-03770) (Auen-Wisconsin)
W75-03778

REMOVAL OF PHENOL IN WASTE WATER BY WET AIR OXIDATION,
Ottawa Univ. (Ontario). Dept. of Chemical Engineering.
B. B. Pruden, and D. R. Ferguson.
In: Water Pollution Research in Canada 1973, Vol 8, p 148-167, 11 fig, 20 ref.

Descriptors: *Waste water treatment, *Oxidation, *Phenols, Organic matter, Energy, Mass transfer, Chemical reactions, Mathematical models, Energy conversion.
Identifiers: *Wet air oxidation, Unmixed reactors, Zimmermann process, Steam energy.

Treatment of waste waters containing phenols by conventional methods poses some unique problems: at 80-100 ppm, phenol is a food for bacteria and can be oxidized in an activated sludge plant, whereas at concentrations above 200 ppm it is a bactericide, necessitating waste dilution before treatment. The wet air oxidation process has been applied to the continuous oxidation of phenol in dilute solutions and was shown to be effective in converting up to 99.5% of the phenol to carbon dioxide and water, in a simple unmixed reactor. A mathematical theory has been adapted which allows all of the data to be plotted on one graph for one temperature from which the effect of mass transfer and chemical reaction can be obtained. The effects of imperfect mixing, phenol distillation, and gas humidification on the use of correct terms in the equation are discussed. At high concentrations mass transfer control can be neglected whereas at low concentrations chemical reaction control can be neglected supporting the thesis that 'no mixer may be required' with the qualification that the reactor concentration, determined by the pressure, temperature, and residence time be sufficiently low. This process in a continuous flow system is feasible and workable, with possible application to water pollution control. (See also W75-03770) (Auen-Wisconsin)
W75-03779

BOUNDARY EFFECTS ON DILUTION OF BUOYANT JETS,
Memorial Univ. of Newfoundland, St. John's. Faculty of Engineering and Applied Science.
For primary bibliographic entry see Field 8B.
W75-03780

HEAVY METAL TOLERANCE IN ALGAE ISOLATED FROM POLLUTED LAKES NEAR THE SUDBURY, ONTARIO SMELTERS,
Toronto Univ. (Ontario). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-03781

PHOSPHORUS LEACHING FROM SEWAGE SLUDGE USED AS A LANDFILL,
Windsor Univ. (Ontario). Dept. of Chemical Engineering.
P. K. Wadehra, and M. Adelman.
In: Water Pollution Research in Canada 1973, Vol 8, p 202-223. 11 fig, 9 tab, 9 ref.

Descriptors: *Nutrient removal, *Phosphorus, *Sewage sludge, *Leaching, Landfills, Waste treatment, Waste disposal, Anaerobic digestion.

The effect of anaerobic digestion on total phosphorus present as soluble and insoluble phosphates in raw sludge, the effect of the addition of chemicals on the total soluble and insoluble phosphates when it is digested anaerobically, and the effect of water on the phosphorus release from the dried sludge, as it might be used as landfill, was investigated. It was concluded that during anaerobic digestion of raw sludge, a large portion of the total soluble phosphates present is converted to an insoluble form. The ratio of orthophosphate to condensed phosphate in the effluent digested sludge was roughly equal to that in the raw sludge, indicating that anaerobic digestion was unfavorable for any significant conversion of one phosphate form to another. The amount of phosphorus released from the sludge cake to water is independent of pH at pH 4.0 and 9.0, and was greatly reduced when the sludge was anaerobically digested. Phosphorus release to water was greatly reduced when the raw sludge was treated with either ferric chloride or alum, with the alum producing a somewhat greater insolubilization effect than the ferric chloride. The addition of ferric chloride or alum to the sludge before anaerobic digestion only slightly improved the phosphate insolubilization. (See also W75-03770) (Auen-Wisconsin)
W75-03782

WET AIR OXIDATION OF LOW MOLECULAR WEIGHT ORGANIC ACIDS,
Waterloo Univ. (Ontario). Dept. of Chemical Engineering.
P. E. L. Williams, D. C. Day, R. R. Hudgins, and P. L. Silveston.
In: Water Pollution Research in Canada 1973, Vol 8, p 224-236. 7 fig, 12 ref.

Descriptors: *Sewage treatment, *Sludge treatment, *Oxidation, *Kinetics, Organic matter, Mass transfer, Organic acids, Equations.
Identifiers: *Wet air oxidation, Zimmermann Process.

A kinetic study of wet air oxidation, using propionic acid, identified the kinetic-control regime, developed a rate equation model, and investigated the oxidation mechanism. Results indicated that wet air oxidation of the lower carboxylic acids appears to be kinetically rather than diffusion controlled under normal operating temperatures from 300 to 600C. Oxidation apparently occurs only in the liquid phase and is predominantly homogeneous. Rate studies suggest that reaction is not first order in acid or oxygen. The activation energy for propionic acid oxidation was found to be about 62 kcal/gmole. Acctaldehyde was found to be an intermediate in the oxidation of both butyric and propionic acid. Attack at the alpha carbon of the carboxylic acid is indicated by the results. Acetic acid is found in large quantities when oxidation is incomplete because it is oxidized much more slowly than higher members of its homologous series. The induction period, the scatter of the data, and the presence of small amounts of low molecular weight hydrocarbons in-

dicate a free radical mechanism is involved in wet air oxidation. (See also W75-03770) (Auen-Wisconsin)
W75-03783

RECYCLING MILLING WATER IN MISSOURI'S NEW LEAD BELT,
Cominco American, Inc., St. Louis, Mo.
F. H. Sharp, and K. L. Clifford.
Mining Engineering, Vol 25, No 7, p 68-72, July 1973. 2 fig, 3 tab.

Descriptors: *Water reuse, *Mine water, *Froth flotation, *Lead, *Mineral industry, Metals, Zinc, Copper, Industries, Mining, Mills, Frothing, Reclaimed water, Industrial wastes, *Recycling, Flotation.

Tests were run at two mines in dry areas of Missouri's New Lead Belt which must rely on water reclaimed from their tailings lake to augment the mine water. In the mills in this study, lead concentrate is the principal product with lesser amounts of zinc concentrate and copper concentrate. One mine has a tailings lake with a theoretical retention time of 6 months. The return water will not produce a persistent froth, however, minute amounts of alcohol or glycol frother produce voluminous froth. Oily oxidation products in reclaimed water can seriously handicap the separation of copper from lead in milling. Control of pH is necessary to keep heavy metals concentrations low and prevent sphalerite activation when the water is returned to the mill. Another mine has had success with recycling mill water over a test period of six months. By comparing mill tails COD with recycle water COD, an indication of degradation or buildup is possible. (Pulliam-Vanderbilt)
W75-03799

CATEGORY VERSUS SUCCESSIVE-INTERVALS SCALES,
California Univ., Berkeley. School of Public Health.
For primary bibliographic entry see Field 6B.
W75-03802

THE EFFECT OF INCORPORATING HEN MANURE INTO THE DIET OF YOUNG CHICKS,
Florida Univ., Gainesville. Dept. of Poultry Science.
D. R. Sloan, and R. H. Harms.
Poultry Science, Vol 52, No 2, p 803-805, March, 1973. 3 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, Diets, Feeds, Proteins, Growth rates, Performance, *Waste treatment, Waste disposal.
Identifiers: *Refeeding, Manure recycling, Chicks, Air-dried hen manure, Feed efficiency, Growth depression, Uric acid, Feed consumption.

The effect of adding air-dried hen manure to a chick diet was studied. Two experiments were conducted using 720 day-old broiler-type chicks. In the first experiment, protein levels of 16, 20, and 24% were fed with five levels of hen feces. Manure was substituted on a pound for pound basis in the basal diet. Diets used in the second experiment contained either 20, 24 or 28% protein with three levels of manure, and 2 levels of sand. A decrease in growth was obtained with each increase in manure level. The incorporation of the manure at any level of protein was detrimental to weight gain. A decrease in growth and feed efficiency was obtained by adding either 5 or 10% hen manure to the feed. The addition of 5% sand did not influence growth or feed efficiency. When the level of sand was increased 10% a significant growth depression was obtained when the diet contained only 20% protein. However, growth was not depressed at levels of 24 or 28% protein. It would appear that some factor is present in air-dried hen manure, perhaps uric acid, which masks the bird's ability to eat and meet its energy requirements, thus having a depressing effect upon body weight gain and decreasing feed utilization. (Cartmell-East Central)
W75-03814

MANURE STACK FLY BREEDING DEPENDS ON THE AMOUNT OF MANURE ADDED DAILY,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5B.
W75-03815

REPLACES NEW WORKS 1900 INSTALLATION.
Water and Waste Treatment, Vol 16, No 12, p 13, 15, December, 1973.

Descriptors: *Sewage disposal, *Treatment facilities, Sludge, Pumping plants, Construction, Design, Filters, Filtration, *Sludge treatment, *Waste water treatment.
Identifiers: England.

The complete reconstruction of the sewage disposal works at Faversham (Kent, England) is described. Before the reconstruction, the works were mainly as they had been constructed just after 1900 and tanks. Sludge settled out in the main pumping station and was desludged manually once a week and put into open sludge lagoons with no underdrainage. In 1971 alterations began on the existing pumping station involving work below Ordnance Datum and the increase in pumping capacity at that station to avoid the storm overflows functioning. The existing rising main was found to be adequate for the new flows at an increased velocity. (Merritt-FIRL)
W75-03817

THERMAL DRYING OF MECHANICALLY DEHYDRATED URBAN SEWAGE SLUDGE IN A BOILING LAYER SYSTEM (TERMICHESKAYA SUSHKA MEKHANICHESKI OBEZVOZHENNYKH OSADKOV GORODSKIKH STOCHNYKH VOD V KIPYASHCHEM SLOYE),
S. V. Yakovlev, V. I. Kalitsun, and A. P. Varlygin.
Vodosnabzheniye a Sanitarnaya Tekhnika, No 12, p 5-9, 1973. 4 fig, 4 ref.

Descriptors: *Sewage, *Sludge, *Treatment facilities, *Dehydration, Forced drying, Steam, Municipal wastes, *Waste water treatment.
Identifiers: Fluidized-bed drier.

The thermal drying of mechanically dehydrated urban sewage sludge in a slot type fluidized-bed drier was studied. Small pieces of mechanically dehydrated sewage sludge were fed into an upright cylindrical space and were kept suspended over a slot by hot gas stream entering the cylinder through that slot. The dried sludge particles entrained by the hot gas stream were separated by a cyclone. Slot type fluidized-bed driers were found highly suitable for the drying of urban sewage sludge at thermal efficiencies of 57-58 percent, at an initial moisture content of 60-65 percent and for particle sizes not larger than 20 mm. The fluidized-bed height should not be less than 250 mm, and the hot gas temperature should be between 450 and 500 C. The specific fuel expenditure was found to range from 1,200 to 1,250 kcal/kg evaporated moisture. The drying capacity, determined for final moisture contents of 20-30 percent and 6-10 percent, amounts to 500-550 kg/cu m. h and to 600-650 kg/cu m. h, respectively. (Takacs-FIRL)
W75-03818

CONTENT OF CHEMICAL SUBSTANCES IN FARM CROPS GROWN ON SOIL IRRIGATED WITH WASTE WATERS OF COKE BY-PRODUCT PLANTS, (IN RUSSIAN),
Kiev Inst. of Nutritional Hygiene (USSR). Physicochemistry Lab.
For primary bibliographic entry see Field 5B.
W75-03846

5E. Ultimate Disposal Of Wastes

WATERLESS SANITATION FOR REST AREAS,
Chrysler Corp., New Orleans, La. Space Div.
For primary bibliographic entry see Field 5D.
W75-03370

SALVAGE OF ALPHA-CONTAMINATED METALS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-03417

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.
W75-03420

CHARACTERIZATION OF ACTINIDE BEARING SOILS: TOP SIXTY CENTIMETERS OF 216-Z-9 ENCLOSED TRENCH,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-03423

POTENTIAL CONTAINMENT FAILURE MECHANISMS AND THEIR CONSEQUENCES AT A RADIOACTIVE WASTE REPOSITORY IN BEDDED SALT IN NEW MEXICO,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-03425

RECOMMENDED METHODS OF REDUCTION, NEUTRALIZATION, RECOVERY, OR DISPOSAL OF HAZARDOUS WASTE. VOLUME IX, NATIONAL DISPOSAL SITE CANDIDATE WASTE STREAM CONSTITUENT PROFILE REPORTS - RADIOACTIVE MATERIALS,
TRW Systems Group, Redondo Beach, Calif.
For primary bibliographic entry see Field 5D.
W75-03426

GUIDELINES FOR THE INTERIM STORAGE OF AEC-GENERATED SOLID TRANSURANIC WASTES.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5D.
W75-03430

WATER TREATMENT PLANT WASTES DISPOSAL-PART 2,
For primary bibliographic entry see Field 5D.
W75-03444

MUNICIPAL WASTES - A DESIGN FOR AN INTEGRATED PLANT TO MAKE A PROFIT,
New South Wales Univ., Kensington (Australia). School of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W75-03531

TALKING TANKERS.
Effluent and Water Treatment Journal, Vol 14, No 6, p 323-328, June, 1974. 7 fig.

Descriptors: *Sludge, *Sludge disposal, *Fluid mechanics, Flow, Flow resistance, Gravity, Sanitary engineering, Environmental engineering, Waste disposal, Pumps.
Identifiers: *Wet waste tankers, Positive displacement pump, *Vacuum pumps.

Choosing the correct wet waste tanker for different situations is discussed. The basic requirements must be defined but the supplier should be left with some flexibility so to offer the best equipment for the job, within the specified limits, bearing in mind cost and availability. The simplest tanker is the unit which uses gravity for both filling and discharge. The advantages of this type are the largest possible carrying capacity, the low initial cost, and the virtually free maintenance. The disadvantages are that there must be some external source for filling and the contents cannot be self-pumped into above-ground storage tanks. The other types of tanks use pumps singly or in combination either with other pumps or with gravity. Two types of pumps are relevant - the vacuum pump and the positive displacement pump. The vacuum pump is used in the case of corrosive, abrasive, or high solid content wastes because the liquid does not pass through the pump. The overall design of the tankers is also discussed. (Orr-FIRL)
W75-03560

SOME ASPECTS OF TREATMENT AND DISPOSAL OF BIOLOGICAL AND NON-BIOLOGICAL SLUDGES OF THE PAPER AND BOARD INDUSTRY (EINIGE ASPEKTE DER BEHANDLUNG UND BESEITIGUNG VON BIOLOGISCHEN UND NICHTBIOLOGISCHEN SCHLAEMMEN DER PAPIER- UND KARTONINDUSTRIE),
Cellulose Attisholz A.G., Solothurn (Switzerland).
For primary bibliographic entry see Field 5D.
W75-03580

PROBLEM-FREE CLARIFIER SLUDGE TREATMENT BY A NEW THERMAL TWO-STAGE PROCESS (PROBLEMLOSE KLAERSCHLAMMBEHANDLUNG DURCH EIN NEUES THERMISCHES ZWEISTUFEN-VERFAHREN),
For primary bibliographic entry see Field 5D.
W75-03609

GUIDELINES FOR DEVELOPMENT OF CRITERIA FOR CONTROL OF OCEAN WASTE DISPOSAL.
Interstate Electronics Corp., Anaheim, Calif.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-233 019, $4.75 in paper copy, $2.25 in microfiche. Report No IEC-4460C1544, February 1974. 86 p, 16 fig, 4 tab. EPA 68-01-0796.

Descriptors: *Waste disposal, *Monitoring, *Oceans, *Surveys, Coasts, Continental shelf, Continental slope, Management, Sites, Industrial wastes, Municipal wastes, Dredging, Water pollution control, Regulation, Liquid wastes, Disposal operations, *Water quality standards.
Identifiers: *Dredge spoil disposal, Dredge spoil.

This is the final report of a group of successive volumes related to a survey of ocean waste disposal practices in six major coastal areas of the United States: the New York Bight; Charleston, South Carolina; the Gulf Coast between Port St. Joe, Florida, and Port Isabel, Texas; Southern California; San Francisco; and Puget Sound. Specific problems were associated with disposal site selection, criteria development and control and monitoring of disposal operations. The purpose was to assist the Ocean Disposal Program of the Environmental Protection Agency in the development of criteria for the control of ocean waste disposal. (Humphreys-ISWS)
W75-03632

DAIRY MANURE MANAGEMENT METHODS,
Washington State Univ., Pullman. Environmental Engineering Section.
For primary bibliographic entry see Field 5D.
W75-03636

OCEAN DISPOSAL PRACTICES AND EFFECTS (REPORT OF MEETING HELD IN NEW YORK ON SEPTEMBER 26-29, 1972).
President's Water Pollution Control Advisory Board, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03697

5F. Water Treatment and Quality Alteration

LIME SLUDGE: SOME PROBLEMS--SOME SOLUTIONS,
Grand Rapids Municipal Water Plant, Mich.
For primary bibliographic entry see Field 5D.
W75-03378

EVALUATION OF THE GEORGIA WATER SUPPLY PROGRAM.
Environmental Protection Agency, Atlanta, Ga.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 215, $7.00 in paper copy, $2.25 in microfiche. July 1973. 192 p.

Descriptors: Water supply, *Evaluation, *Water quality standards, *Water users, Water quality, *Geogria, *Treatment facilities, Facilities, Standards, Chlorination, Distribution systems, Programs, Laboratory tests, *Potable water, Public health.
Identifiers: *Water supply surveillance, *Bacteriological surveillance standards, Regulations, Federal drinking water standards.

Program effectiveness was judged primarily on the basis of drinking water quality, adequacy and condition of water system facilities, and water supply surveillance found in a field evaluation of actual supplies. Twenty public and 81 class III (small public) supplies representing a cross-section of water supply practice were studied. Staff limitations and unresponsive administrative procedures have prevented the Water Supply Program from providing health evaluation and engineering services necessary to fulfill its responsibilities to protect residents' health. Some problems were: unmet chemical and bacteriological surveillance standards, deficient treatment facilities, unsafisfactory chlorination practice, inadequate distribution system storage, inadequate cross connection control programs, inadequate operational records, inadequate water quality testing. Recommendations include: (1) immediate upgrading of bacteriological surveillance of public water systems; (2) increased and improved engineering surveillance of all public water supplies to at least minimum levels including periodic sanitary surveys of each system, complete routine chemical analysis of all supplies; (3) elimination of present sanction of seriously deficient water systems plus revitalization of certification program to obtain compliance with adequate standards; (4) use of legally enforceable compliance order procedures if necessary; (5) designation of County Health Departments to be responsible for surveillance of small public water systems; (6) implementation of provision of new flouridation legislation as soon as possible; (7) development and distribution of a single document incorporating program policy and design systems for public water systems. Expanded funding and program redirection and revitalization are essential for the program to attain full effectiveness and to meet its responsibilities. (Diefendorf-North Carolina)
W75-03435

PACKAGED PUMPING STATIONS FOR SUBURBAN WATER DISTRIBUTION,
J. B. Rishel.
Water and Sewage Works, Vol 121, No 4, p 131-132, 134, April 30, 1974. 7 fig.

Descriptors: *Pumping plants, *Water distribution, Water works, Evaluation, Equipment, Pumps, Storage tanks.

Packaged pumping stations are available in several types and their efficient application requires an evaluation of these pumping stations as well as the types of systems that are encountered in water distribution. The three specific styles of stations are the constant speed pumps without discharge pressure control valves, constant speed pumps with discharge pressure control valves, and the variable speed pumps. Suburban water systems are of two general types with storage tanks or without storage tanks closed systems. One of the most important factors for any distribution system to be evaluated is the friction loss in the piping of the water distribution system. The basic types of distribution systems with typical system head curves are described. The packaged pumping station selected is dependent upon the size of the system, the topography of the system, and the quality of electrical power available. Also included is a description of four different water distribution systems. (Sandoski-FIRL)
W75-03451

ADVISORY REPORT ON HEALTH EFFECTS OF NITRATES IN WATER.
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 5C.
W75-03484

ALUM RECOVERY FROM WATER AND WASTEWATER TREATMENT PLANT SLUDGES,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 5D.
W75-03542

THE SEWAGE SYSTEM OF THE CITY OF RANGOON,
For primary bibliographic entry see Field 5D.
W75-03544

NOVEL METHODS OF FRESHWATER PREPARATION AND WASTE WATER PURIFICATION IN PULP AND PAPER MILLS (NEUERE METHODEN ZUR FRISCHWASSERAUFBEREITUNG UND ABWASSERREINIGUNG IN ZELLSTOFF- UND PAPIERFAKRIKEN),
For primary bibliographic entry see Field 5D.
W75-03602

CHRONIC FLUORIDE INTOXICATION FROM DRINKING WATER: PRELIMINARY REPORT,
For primary bibliographic entry see Field 5C.
W75-03695

5G. Water Quality Control

GUIDELINES FOR LAND DISPOSAL OF FEEDLOT LAGOON WATER.
Kansas State Univ., Manhattan. Cooperative Extension Service.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 591, $3.25 in paper copy, $2.25 in microfiche. 1973. 7 p, 9 fig, 7 tab, 1 ref. OWRT A-046-KAN(2). 14-31-0001-3516.

Descriptors: *Waste water disposal, *Feed lots, *Salinity, Irrigation water, *Kansas, Nutrients, Nitrogen, Phosphorus, Salts, *Water quality standards.

Guidelines are provided for feedlot operators who dispose of lagoon water on agricultural lands. The design of lagoon, pumps, and irrigation systems

are not discussed. Because lagoon water contains such plant nutrients as nitrogen, phosphorus, and potassium, its application on agricultural land, in correct amounts, can increase crop yields. However, because it also contains salts of sodium, calcium, and magnesium, too much lagoon water can pollute the soil. The salt accumulation from lagoon water is most likely to occur in dry areas where precipitation is not adequate to leach the salts downward below the root zone. Guidelines on how to dispose of such lagoon water to minimize the chance of reducing the land's productivity are given. The guidelines are based on present irrigation-water-quality standards and on data collected from various feedlots in Kansas. (Powers-Kansas State)
W75-03306

POLLUTIONAL ASPECTS AND CROP YIELDS RESULTING FROM HIGH MANURE APPLICATIONS ON SOIL,
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-03310

MOBILITY AND DEACTIVATION OF HERBICIDES IN SOIL-WATER SYSTEMS,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-03314

ON TAXATION AS A POLLUTION CONTROL POLICY,
Pittsburgh Univ., Pa. Graduate School of Business.
R. F. Byrne, and M. H. Spiro.
Swedish Journal of Economics, No 1, p 105-109, 1973. 1 fig, 7 ref. OWRT A-028-PA(2).

Descriptors: *Pollution taxes(Charges), *Economic efficiency, *Pollution abatement, *Water policy, Water pollution control, *Taxes, Model studies, *Mathematical models.

A generally held proposition is that the imposition of taxes to combat pollution is at least as efficient as the imposition of standards. Several authors have argued that taxation may not lead to an efficient outcome. This paper demonstrates that taxation may not be efficient under circumstances when the firm has at its disposal a number of production processes of the fixed proportion, constant return to scale variety. The discussion proceeds in three stages: (1) a geometrical example is presented; (2) a mathematical model is demonstrated; and (3) a discussion of the relevance of conclusions is made. The situation posed above is not uncommon. It is typical of situations faced by firms in steel, phosphate production, pulp and paper, and petroleum industries, where a number of alternative processes are technologically feasible and the selection of a particular process or combination of processes in a plant is an economic choice. Another factor reinforcing the appropriateness of the model are existing accounting practices which have treated unit costs as constant over substantial ranges whether or not such costs are constant in actuality. (Schroeder-Wisconsin)
W75-03329

HOW DO YOU EXPLAIN THE COST,
LFE Control System Industries, Santa Clara, Calif.
For primary bibliographic entry see Field 6C.
W75-03333

PURIFIED WASTEWATER-THE UNTAPPED WATER RESOURCE,
Envirotech Corp., Menlo Park, Calif.
For primary bibliographic entry see Field 5D.
W75-03337

A NOTE ON THE EVALUATION OF ACTIVITY DEPENDENT RECREATIONAL DAMAGE COST FUNCTIONS,
Texas Univ., Austin. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 6D.
W75-03341

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS,
Delaware Univ., Newark. Academy of Natural Sciences; and Rutgers - the State Univ., New Brunswick, N.J. Work Group on Economic and Social Problems of the Delaware Estuary Region.
For primary bibliographic entry see Field 6G.
W75-03352

ENVIRONMENTAL POLLUTION IN A RAPIDLY GROWING ECONOMY,
For primary bibliographic entry see Field 6G.
W75-03353

DISTRIBUTIONAL IMPACTS OF ENVIRONMENTAL MANAGEMENT: FEDERAL GRANTS FOR WATER POLLUTION CONTROL,
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Economics.
R. J. Kalter, and L. E. Gosse.
Water Resources Bulletin, Vol 10, No 13, p 498-511, 1 fig, 6 tab, 14 ref.

Descriptors: *Government finance, *Grants, Government supports, Pollution abatement, *Economic impacts, Equity, Distribution, *Water pollution control, *Management.
Identifiers: Water Pollution Control Acts, HUD Acts, Farmers Home Administration Act, Public Works and Economic Development Act, Appalachian Regional Development Act.

The distributional impacts of five federal water pollution grant programs on 50 states and the District of Columbia during the years 1957-71 are assessed. The grant programs include the EPA's Water Pollution Control Acts; the HUD Acts; the Farmers Home Administration Act; the Public Works and Economic Development Act (EDA); and the Appalachian Regional Development Act. Expenditures under each program during the period were $3,525.96, $368.70, $87.90, $263.74, and $41.57 million respectively. Two procedures to measure the equity impact are utilized. The first utilizes a net transfer approach. Expenditures for each of the federal programs under the approach are treated as gross transfer payments and are netted against tax burdens imposed to support these programs. Results suggest that substantial differences exist in both total and per capita grants and average personal income by state appears weak. Only a weak geographic pattern exists for states favored by the overall program. Applying least-squares regression to per capita tax contribution for all grant program's impact on per capita personal income indicates no significant relationship exists. The second equity approach presented hypothesizes assumptions about potential returns from the grants and then tests the sensitivity of the equity impact to program effectiveness. (Schroeder-Wisconsin)
W75-03354

THE NECESSITY OF ZONING VARIANCE OR AMENDMENTS NOTICE TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES UNDER THE SHORELAND ZONING AND NAVIGABLE WATERS PROTECTION ACT,
McBurney, Musolf and Whipple, Madison, Wis.
For primary bibliographic entry see Field 6E.
W75-03364

ENVIRONMENTAL LAW--OIL POLLUTION CONTROL--IN THE ABSENCE OF FEDERAL PREEMPTION AND ANY FATAL CONFLICT BETWEEN STATUTORY SCHEMES, A STATE MAY CONSTITUTIONALLY EXERCISE ITS POLICE POWER TO PROVIDE FOR CLEANUP OF OIL SPILLAGE AND FOR RECOUPEMENT OF COSTS CONCURRENTLY WITH THE FEDERAL GOVERNMENT,
M. E. Deal.
Georgia Journal of International and Comparative Law, Vol 4, p 216-224, 1974. 67 ref.

Descriptors: *Florida, *Judicial decisions, *Oil pollution, *Legislation, *Federal government, Governmental interrelations, State jurisdiction, Federal jurisdiction, Water pollution sources, Oil spills, Oil industry, Oil, Cost allocation, Costs, Economic impact, Government finance, Water pollution, Oceans, Environmental effects, Adoption of practices, Water Pollution Control Act, Water quality control.
Identifiers: Coastal waters, Injunctive relief, State policy.

The relationship between state and federal regulation in the admiralty area has been a source of confusion in the development of maritime law. In Askew v. American Waterways Operators, Inc., plaintiff-appellee, operators of oil terminal facilities, brought an action against the State of Florida to enjoin application of the Florida Oil Spill Prevention and Pollution Control Act. They challenged it on the grounds that the provisions for unlimited liability conflicted with the Federal Water Quality Improvement Act of 1970 and the Limitation of Liability Act. Defendant-appellant maintained that the Federal Act encouraged state regulation and cooperation. The United States Supreme Court held that the Florida Act does not invade a regulatory situation pre-empted by the Federal Act. The end result, hopefully, will be to strengthen the state's power to protect its environment by enacting stringent pollution control laws, and to allow the state power to be concurrent with the federal government. The unlimited liability provision of the Florida Act will probably be upheld because cleanup costs to the state are a separate expense not covered by the Federal Act. (Dillingham-Florida)
W75-03365

U.S. CHECKING UP ON FIRMS' SPILL-PREVENTION, CLEANUP PLANS.
The Oil and Gas Journal, Vol 72, No 30, p 117, July 29, 1974.

Descriptors: *Oil spills, *Water pollution control, *Federal government, Water policy, *Pollution abatement, Water quality control, Regulation, Water quality standards.

Spot checks are being taken of possibly hazardous oil facilities by government agents, in areas of navigable waters or their tributaries which have a pollution prevention program. Such programs, certified by registered professional engineers, were to have been completed by July 10, 1974. These plans are not required to be filed with the EPA. Oil companies are requested to build dikes around storage tanks or use any other steps for containment of oil spills. If spills should occur, the EPA would probably dictate the terms of the prevention plan required under the regulations. (Leibowitz-FIRL)
W75-03373

WILLINGNESS TO PAY FOR POLLUTION ABATEMENT: A CASE STUDY,
Guelph Univ. (Ontario).
D. A. L. Auld.
Alternatives, p 34-36, Winter 1974. 1 tab.

Descriptors: *Pollution abatement, Regression analysis, Social aspects, Economic impact, Social values, *Canada, Lake Ontario, Pollution taxes(Charges), *Attitudes.

Personal interviews were conducted in two Canadian cities, Hamilton and Guelph, to assess information on: (a) willingness-to-pay for pollution abatement in general; (b) payments for specified degrees of abatement; and (c) the relationship between willingness-to-pay and socio-economic factors such as income, age, education, and location. Hamilton, an industrial city of 300,000 located on Lake Ontario, specializing in steel, is subject to considerable air and water pollution. Guelph, a city of 60,000, is in an agricultural setting and experiences little pollution. A total of 306 and 100 householders were interviewed for each city, respectively. Results indicate that 26 and 22 percent of the respondents from Hamilton and Guelph were not willing to pay for pollution abatement, with no significant relationship found between this variable and income, age, education, or location. With respect to willingness-to-pay, an inverse relationship was discovered between age and amount willing to pay. Some relationship between willingness-to-pay and income was also discovered although it was less than proportional. No relationship between willingness-to-pay and proximity to pollution sources was found. (Schroeder-Wisconsin)
W75-03389

AQUATIC WEED HARVESTING COSTS AND EQUIPMENT--1972,
Aquamarine Corp., Waukesha, Wis.
For primary bibliographic entry see Field 4A.
W75-03391

THE ECONOMIC EFFECTS OF THE 1971 FLORIDA RED TIDE AND THE DAMAGE IT PRESAGES FOR FUTURE OCCURRENCES,
Mote Marine Lab., Sarasota, Fla.
E. J. Habas, and C. K. Gilbert.
Environmental Letters, Vol 6, No 2, p 139-147, 1974. 2 tab, 7 ref.

Descriptors: *Red tide, *Economic impact, Water pollution sources, *Gymnodinium, *Florida, Economics, Tourism, *Damages, Environmental effects, Costs.
Identifiers: Gymnodinium breve.

In the summer of 1971 the red tide devastated the west coast of Florida, creating environmental and economic chaos. The economic impact is summarized. Data collection to determine the economic impact was made difficult due to three factors: (1) the actual duration of the red tide is difficult to delineate; (2) the economy of the seven affected coastline counties was generally subordinate to the remaining unaffected sectors of the counties; and (3) 1971 was a year of substantial growth for all seven counties. Data was first sought through questionnaires to the Chambers of Commerce in affected areas, but poor responses limited its usefulness. Personal interviews with proprietors of gulf resorts and other business, local newspaper accounts, and extrapolation of Florida's Department of Commerce and Business publications were also used. Results indicate that the Red Tide caused nearly $20 million in damage, including: $6 million, hotels/motel revenues; $2.5 million, restaurants; $2.2 million, amusement; and $3.8 million, other business revenue. A number of economic factors including loss of worker income and fishing revenue were not included in the tabulation. A future Red Tide of equal severity could cause up to 40% more economic damage. (Schroeder-Wisconsin)
W75-03393

THE IMPACT OF WATER RESOURCE QUALITY CHANGES ON SURROUNDING PROPERTY VALUES,
Dornbusch, David M. and Co., Inc., San Francisco, Calif.
S. M. Barrager.
Water Resources Bulletin, Vol 10, No 4, p 759-765, 1974. 2 ref.

Descriptors: *Water pollution control, *Pollution abatement, *Property values, Economic impact, Benefits, *Regression analysis, *Oregon, Water quality.
Identifiers: Neighborhood amenities, Nuisances, *Willamette River(Ore), Clackamas County(Ore).

Multiple regression techniques are utilized to measure the impact of pollution abatement efforts on property values of proximate single-family residences along Oregon's Willamette River. The study areas, Oak Grove and Jennings Creek, located in an unincorporated portion of Clackamas County, are dominated by single-family houses over 15 years old and having an average value of $26,000. Water quality in the river has improved dramatically over the 1960 to 1970 period. To determine the change in property values over the same period in the study area, tax assessment value data were collected as a partial proxy for the years surrounding 1960 and 1970. Sales price data were also collected. Property value changes for the period were calculated by adding the capitalized value of property tax changes to the estimated change in sales or market value. Results of the regression model indicate that changes in property values attributable to water quality improvements were substantial and statistically significant. Applicability of the regression model to the responses of property values to other stationary neighborhood amenities or nuisances, including highways, airport, parks or commercial parks, is also discussed. (Schroeder-Wisconsin)
W75-03395

DETERMINING AN EQUITABLE SURCHARGE FOR INDUSTRIAL WASTES,
Gilbert Associates, Inc., Reading, Pa.
L. E. Ritter, and P. A. Podolick.
Public Works, Vol 104, No 7, p 84-88, 1973. 2 fig, 4 tab.

Descriptors: *Industrial wastes, *Pollution taxes(Charges), Economic efficiency, Planning, Industries, Effluents, Waste water treatment, Water pollution control, *Costs, Sewage treatment, Cities.
Identifiers: *Surcharges(Pollution control).

Development of a surcharge formula to equitably tax firms producing strong wastes is shown for one eastern U.S. city. Previously, the city operated on a permit system which limited industrial waste output to minimum levels set by ordinance. The permit method was unsatisfactory because of the difficulty of enforcement and potential inefficiencies resulting from pre-treatment requirements. The development of a surcharge formula began with a series of surveys of field inspection of city facilities; personal interviews with representatives of each company identified as potential producers of extra-strength waste; and actual field sampling at each company. Based on this, 24 firms were designated to be surcharged. The list included each industry discharging wastes exceeding the BOD, suspended solids and/or dissolved solids concentrations of domestic sewage specified by ordinance. From the sampling results, average concentration of the above were determined by industry. The basic approach to determine the surcharge is to determine the actual cost of treatment on a unit cost basis/waste parameter, and apply unit costs for treatment of industrial waste discharges to the portion of the waste load in excess of normal domestic waste. (Schroeder-Wisconsin)
W75-03397

ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6D.
W75-03399

EVACUATION RISKS - AN EVALUATION,
National Environmental Research Center, Las Vegas, Nev.
For primary bibliographic entry see Field 6G.
W75-03424

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-FIFTH ANNUAL REPORT, YEAR ENDED 30TH JUNE 1973.
Metropolitan Water Sewage and Drainage Board, Sydney (Australia).
(1973). 55 p, 3 fig, 12 tab, photos, 12 append.

Descriptors: *Sewerage, *Drainage systems, *Australia, *Water distribution, Reservoirs, *Water supply, Water conservation, Pumping plants, Expenditures, Budgeting, Construction, Stormwater, Storage capacity, Tunnel construction.
Identifiers: *Retriculation, *Sydney(Aust), *Stormwater drainage, Stormwater channels, South Coast area, Shoalhaven Scheme, Ocean outfall systems.

The Metropolitan Water Sewerage and Drainage Board, established by law in 1924, is responsible for conservation, preservation, and distribution of water; for the provision of sewerage facilities; and for construction, control and maintenance of certain stormwater channels in an area of some 4,000 square miles, including metropolitan Sydney, a number of outlying cities, and the South Coast areas. Water supply system consists of 6 major and 4 minor storage reservoirs, 191 service reservoirs, 116 pumping stations and 9422 miles of watermains (246 miles of new mains in 1972-3). There are 194 miles of channels in the stormwater drainage network and 7774 miles of sewers in the 19 separate sewer systems. On June 30, 1973, the Board was supplying water to an estimated 3,063,000 people, while sewerage facilities were available to an estimated 2,600,000 people. Total revenue for the year was $136,591,820 and expenditure was $136,582,093. The Board is currently engaged in a ten-year (1971-81) program to insure sufficient water storage and water and sewerage services to meet the foreseeable requirements of its area. Work on Shoalhaven Scheme to bring water from Nepean Reservoir to the South Coast by constructing a diversion tunnel is virtually completed. Other Shoalhaven contracts for earthwork dams, pumping stations and hydraulic gates, relocation of roads and railroads are progressing on schedule. Total cost of project is estimated at $104 million with Board's share approximately $86 million. (Diefendorf-North Carolina)
W75-03432

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-SECOND ANNUAL REPORT YEAR ENDED JUNE 1970.
Metropolitan Water, Sewage and Drainage Board, Sydney (Australia).
(1970). 67 p, 3 fig, 14 tab, photos, 14 append.

Descriptors: *Water distribution, *Water storage, *Sewage treatment, *Drainage systems, *Water supply, *Budgeting, Australia, Reservoirs, Pumping plants, Expenditures, Construction, Engineering structures.
Identifiers: *Sydney(Aust), Stormwater channels, South Coast area, Sewerage reticulation.

The Metropolitan Water Sewerage and Drainage Board's activities during 1969-70 and important works currently being undertaken plus a description of various water supply, sewerage and drainage systems under its jurisdiction are discussed. Established in 1924, the Board is equipped with all the resources for investigation, design, construction, and operation of large engineering projects. Water storage, water distribution, sewerage reticulation and sewage treatment are major activities. Water supply system has 6 major and 4 minor storage reservoirs, 183 service reservoirs, 112 pumping stations and 8805 miles of

watermains with 270 miles of watermains being added during 1969-70. Shoalhaven Project, involving construction of a tunnel between Nepean and Avon Dams to divert water from Nepean Reservoir to the South Coast plus building of power plants and pumping stations, is in the design work stage. There are 6804 miles of sewers and 190 miles of channels in the stormwater drainage network. Water was being supplied to an estimated 2,968,000 people, while sewerage facilities were available to an estimated 2,374,000 people. Total revenue for the year was $88,343,448 and expenditure from revenue was $88,328,341. Progressive augmentation of water storage and major supply system to insure that adequate quantities are available to meet increasing consumer demand is top priority planning item. (Diefendorf-North Carolina)
W75-03433

EVALUATION OF THE GEORGIA WATER SUPPLY PROGRAM.
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5F.
W75-03435

ENERGY EVALUATION OF WATER MANAGEMENT ALTERNATIVES IN THE UPPER ST. JOHNS RIVER BASIN OF FLORIDA,
Environmental Protection Agency, Gainesville, Fla.
For primary bibliographic entry see Field 6A.
W75-03436

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POLLUTION AND TRANSFER RELATIONSHIPS,
Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships.
For primary bibliographic entry see Field 5B.
W75-03440

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. DELAWARE RIVER ESTUARINE MARSH SURVEY,
Academy of Natural Sciences of Philadelphia, Pa.
For primary bibliographic entry see Field 6G.
W75-03441

METHOD AND APPARATUS FOR RECOVERING A SUBSTANCE FLOATING AS A SHEET ON THE SURFACE OF A LIQUID MASS,
Societe Bertin et Cie, Paris (France).
J. Mourlon, and E. M. R. Dubois.
Canadian Patent 948,120. Issued May 28, 1974. Patent Office Record, Vol 102, No 22, p 22-48, May, 1974.

Descriptors: *Floating, *Patents, *Liquid wastes, *Separation techniques, Waste water treatment, Oil wastes, Water pollution control.
Identifiers: *Recovery.

A process is described for recovering a substance, such as a hydrocarbon, spread as a thin sheet and floating on the surface of a liquid. The liquid is, in the vicinity of its surface, subjected to a local rotating movement so as to bring about the formation of a vortex-type cavity. The cavity is open and has a vertical axis; it accumulates the substance originating from the sheet; and from this cavity the accumulated substance is extracted. The amount extracted is automatically replaced, as it is being extracted, by further substance emanating from the sheet. (Prague-FIRL)
W75-03449

A SURVEY OF INTERNATIONAL CUSTOMARY RULES OF ENVIRONMENTAL PROTECTION,
Wadham Coll., Oxford (England).
I. Brownlie.
Natural Resources Journal, Vol 13, No 2, p 179-189, April 1973. 32 ref.

Descriptors: *International law, *International waters, *Pollution abatement, *Legal aspects, *Environmental control, Water law, Controls, Standards, Regulation, Jurisdiction, Political aspects, Water rights, Water policy, Water quality control, Water pollution, Water resources, Water resources development, Water management(Applied), Adoption of practices, Administration.
Identifiers: *International agreements.

Customary law provides limited means of social engineering, and, therefore, there is a particular need for development of new institutions, standards and local units to deal with the protection of the environment. Encompassed within the scope of customary or international law are three main concepts: state responsibility, territorial sovereignty of states, and, freedom of the seas. Although these three areas cover much of the critical environmental aspects of international concern, there are some areas where new solutions and practices must be fashioned to cope with the mounting problems. Solutions include forming special zones of jurisdiction as Canada has done in their 1970 Arctic Waters Pollution Prevention Act. Unilateral self-help in emergency circumstances is another practical remedy, as illustrated by Britain's actions in dealing with the Torrey Canyon disaster. Probably the most useful and lasting proposal involves the formation of new standards in general international law, promulgated, instituted and enforced on a multilateral basis by the United Nations. (Silber-Florida)
W75-03453

PEOPLE V. OCEANA TERMINAL CORP. (PROSECUTION FOR AN OIL SPILL).
For primary bibliographic entry see Field 6E.
W75-03456

UNNATURAL SHORELINE,
California State Univ., San Francisco. Dept. of Geology.
R. Pestrong.
Environment, Vol 16, No 9, p 27-35, November 1974. 2 fig, 6 photo, 15 ref.

Descriptors: *California, *Bays, *Sedimentation, *Shoreline, *Drainage basins, *Planning, Construction, Adoption of practices, Regulation, Jurisdiction, Coastal areas, Water quality, State governments, Administrative agencies, Administration, Decision making, Conservation, United States, Natural resources, Development, Silting, Water resources development.
Identifiers: *Coastal zone management, Dredging.

Before the presence of man, San Francisco Bay was already being filled in by natural causes, receiving sediment from drainage basins. Along with sediment from gold mining, and effects of agriculture, salt pond construction, dredging, subsidence, fill and urbanization have greatly altered the bay system. As a result the bay is in danger of being filled in many thousands of years sooner than might otherwise be the case. The impact of man on the alteration of the bay shoreline has been grossly out of proportion to the few short years of his presence. Careful planning must now be undertaken to save the bay. The Bay Conservation and Development Commission, a permanent regulatory agency with jurisdiction over the bay and a hundred foot shoreline land around it, was created in 1965. In addition, the regional Water Quality Control Board, the State Department of Fish and Game, the United States Department of the Interior, and a number of citizen groups have an active interest in the future of the bay. (Sperling-Florida)
W75-03459

A. H. SMITH SAND AND GRAVEL CO. V. DEPT. OF WATER RESOURCES (ACTION DEALING WITH FILLING OPERATIONS IN FLOODPLAIN).
For primary bibliographic entry see Field 6E.
W75-03464

COMMONWEALTH V. BOROUGH OF GALETON (PETITION TO ENFORCE CLEAN STREAMS LAW).
For primary bibliographic entry see Field 6E.
W75-03465

IN RE BARKER SARGENT CORP (APPEAL FROM ENVIRONMENTAL BOARD DECISION).
For primary bibliographic entry see Field 6E.
W75-03466

COMMONWEALTH V. WASHINGTON TOWNSHIP (ACTION TO ORDER COMPLIANCE WITH CLEAN STREAMS LAW).
For primary bibliographic entry see Field 6E.
W75-03468

ROBERT E. NILLES, INC. V. ILLINOIS POLLUTION CONTROL BD. (ACTION AGAINST POLLUTION CONTROL BOARD FOR DENIAL OF SEWERAGE PERMITS).
For primary bibliographic entry see Field 6E.
W75-03474

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES WATER QUALITY.
23 U.S.T. 201, T.I.A.S. No 7312, p 302-369, April 15, 1972.

Descriptors: *International Boundary and Water Comm., *International waters, *International commissions, *International Joint Commission, *Water quality control, Federal government, Water quality, Ships, Pollution, Water pollution, Sewage disposal, Waste control, Industrial wastes, Great Lakes, Great Lakes region, Lakes, Navigable waters, Administrative agencies, Adoption of practices, Environmental effects.
Identifiers: Administrative regulations, International agreements.

Pursuant to the Boundary Waters Treaty of 1909 Canada and the United States, concerned about the grave deterioration of water quality in the Great Lakes and St. Lawrence River, agreed in 1972 to a series of measures to be implemented by December 31, 1975. In order to control pollution from municipal sources, sewage treatment facilities will be constructed. Control of industrial waste discharge and elimination of discharge of toxic metals, organic contaminants and radioactive materials will be regulated and enforced. Shipping operations will be regulated to cut down on Great Lakes water pollution. Vessel design, construction, waste discharge and operations are to be subject to the principles of the agreement. The International Joint Commission will assist in the agreement's implementation establishing a Great Lakes Water Quality Control Board. The agreement is to remain in force at least for five years and will continue until terminated upon twelve months notice given by either party to the other. (Dillingham-Florida)
W75-03480

FEDERAL ACTION FOR ENVIRONMENTAL PROTECTION AND ITS POTENTIAL SIGNIFICANCE FOR HOUSING.
Rivkin/Carson, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-03485

TRANSLATIONS ON ENVIRONMENTAL QUALITY, NO. 7.
Joint Publications Research Service, Arlington, Va.
For primary bibliographic entry see Field 6E.
W75-03486

A PROGRAM FOR THE FUTURE--WATER AND SEWER IN RURAL AMERICA.
Commission on Rural Water, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-03488

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE,
Florida Univ., Gainesville. Coll. of Law.
For primary bibliographic entry see Field 4B.
W75-03489

LEGAL AND ECOLOGICAL ASPECTS OF THE INTERNATIONAL ENERGY SITUATION,
Department of State, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-03490

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM AND RESOURCE CONSERVATION AND DEVELOPMENT PROGRAM--PROPOSED WATER QUALITY MANAGEMENT GUIDELINES.
Soil Conservation Service, Washington, D.C.
Federal Register, Vol 38, No 86, p 11094-11095, May 4, 1973.

Descriptors: *Water quality, *Water resources development, *Construction, *Adoption of practices, *Water management(Applied), Water conservation, Water distribution(Applied), Water resources, Watershed management, Water supply, Water storage, Environmental sanitation, Irrigation programs, Project planning, Legal aspects, Drainage systems, Permits, Coordination, Streamflow, Administration.
Identifiers: Administrative regulations.

Water quality management measures have been authorized for implementation in watershed and resource conservation and development projects pursuant to the Rural Development Act of 1972. Criteria for such assistance includes sponsorship by units of government or non-profit organizations having legal authority and financed ability to plan, install, operate, and maintain the measure. When planned in a watershed project, works of improvement must be an integral part of a project providing substantial benefits for flood prevention, irrigation, or drainage. Sponsors must show that all necessary land and water rights have been or can be obtained. All necessary permits must also be obtained. Works of improvement include measures for the enhancement of water quality to improve the environment. They include the storage of water or other facilities to augment, divert, retain, or regulate streamflow. The Soil Conservation Service will consult with the Environmental Protection Agency and the state agency responsible for pollution control to determine flow requirements. (Sperling-Florida)
W75-03491

DISTRIBUTION OF POTENTIAL MOSQUITO VECTORS IN THE IMPERIAL VALLEY, CALIFORNIA, 1971-1972,
Walter Reed Army Inst. of Research, Washington, D.C. Dept. of Entomology.
J. W. Leduc.
Mosq News, Vol 33, No 4, p 594-599, 1973, Illus.
Identifiers: Anopheles-franciscanus, Arbovirus, *California, Culex-erythrothorax, Culex-tarsalis, Culiseta-inornata, *Distribution patterns, Encephalitis, Flavivirus, *Imperial Valley(Calif), Mosquito vectors, St-Louis, Virus.

Adult mosquito populations were monitored at 5 localities in the Imperial Valley, California, from Nov., 1971 to Oct., 1972. Culex tarsalis and Culiseta inornata were widely distributed in the areas sampled, while Culex erythrothorax and Anopheles franciscanus were limited to permanent pond habitats. SLE (Saint Louis encephalitis) virus was isolated from pools of C. tarsalis and C. erythrothorax in Aug., 1971. C. erythrothorax may be an important vector of arboviruses in the permanent pond habitat, while C. tarsalis is the most widely distributed vector.--Copyright 1974, Biological Abstracts, Inc.
W75-03498

A DEVICE FOR MAINTAINING CONSTANT OXYGEN CONCENTRATION IN FLOWING WATER,
Colorado Div. of Wildlife, Fort Collins.
J. O. Cochran, and W. H. Babcock.
The Progressive Fish-Culturist, Vol 36, No 3, p 177-178, July 1974. 1 fig, 1 ref.

Descriptors: *Dissolved oxygen, Equipment, Technology, *Design, Methodology, Oxygenation, Aeration, Laboratory tests, Brook trout.

A system for maintaining dissolved oxygen concentrations for low temperature oxygen trials on brook trout is described. Different concentrations of dissolved oxygen may be delivered simultaneously at independently variable flow rates. Dissolved oxygen levels obtainable in test operations were from 0.4 mg/liter to 9.0 mg/liter with a variation of plus or minus 0.2 mg/liter in a single chamber. Reoxygenation of water was achieved by mixing deoxygenated water with water containing 9.0 mg/liter to desired dissolved oxygen levels. (Katz)
W75-03522

A STUDY: EFFECTS OF GEOLOGY AND NUTRIENTS ON WATER QUALITY DEVELOPMENT,
Texas Univ. at Houston. Dept. of Civil Engineering.
L. J. Stone.
Journal of the American Water Works Association, Vol 66, No 8, p 489-494, August, 1974. 15 fig, 1 tab, 25 ref.

Descriptors: *Watersheds(Basins), Hydrology, *Water quality control, Environmental effects, Alkalinity, *Geology, Populations, Streamflow, Water resources, Management, *Nutrients.
Identifiers: Nutrient loading.

Two watersheds in northwest Arkansas were studied for geology and land use in order to relate stream-water-quality development to the environmental factors present in the ecosystem. Relationships established were water quality-geology and water quality-nutrient loading. Analysis included pH, alkalinity, calcium hardness, and electrical conductance of the geological formations. The areas of study contained low population density of both humans and animals. It was projected that any increase in either population will markedly increase the nutrient loadings in stream flow. Data are to be used for future basin management and water quality control. (Prague-FIRL)
W75-03539

A SLUDGE CAKE INCINERATION PROCESS AND AIR POLLUTION CONTROL SYSTEM,
Environmental Protection Agency, Chicago, Ill. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5D.
W75-03546

SEWER PIPE: INFILTRATION IS THE ISSUE,
For primary bibliographic entry see Field 5D.
W75-03548

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW),
National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div.
For primary bibliographic entry see Field 5D.
W75-03553

COMBINATION LIMESTONE-LIME TREATMENT OF ACID MINE DRAINAGE,
Environmental Protection Agency, Norton, W. Va. Norton Mine Drainage Field Site.
For primary bibliographic entry see Field 5D.
W75-03559

AEROBIC BIOLOGICAL STABILIZATION OF SANITARY LANDFILL LEACHATE,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-03564

THE ROLE OF THE CHEMICAL INDUSTRY IN THE FIGHT AGAINST WATER POLLUTION IN THE PAPER INDUSTRY (ROLE DE L'INDUSTRIE CHIMIQUE DANS LA LUTTE CONTRE LA POLLUTION DES EAUX EN PAPETERIE),
Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (Germany).
A. Bachtik.
Revue ATIP (Association Technique de l'Industrie Papetiere), Vol 28, No 4, p 189-195, 1974. 4 fig, 3 ref.

Descriptors: Water pollution sources, *Water pollution control, *Chemicals, *Pollution abatement, *Pulp wastes, *Additives, Industrial wastes, Pulp and paper industry, Waste water(Pollution), Biochemical oxygen demand, Suspended solids, Effluents, Waste water treatment.
Identifiers: Retention aids(Papermaking), White water(Paper machine effluent), Sizing(Paper).

Contributions of chemical suppliers to the abatement of water pollution by pulp and paper mills are discussed, notably the function of fiber and filler retention aids for reducing suspended solids in paper machine white waters, as well as the use of surface sizing in lieu of engine (beater) sizing agents for lowering the BOD of effluent discharges. (Speckhard-IPC)
W75-03567

WATER: ITS QUALITY OFTEN DEPENDS ON THE FORESTER,
Food and Agriculture Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 5B.
W75-03589

AIR AND WATER POLLUTION CONTROL IN CRUDE TALL OIL MANUFACTURE IN THE PULP AND PAPER INDUSTRY,
Rust Engineering Co., Birmingham, Ala.
For primary bibliographic entry see Field 5D.
W75-03598

ECOLOGY AND THE PROBLEM OF REHABILITATING WASTES FROM MINERAL EXTRACTION,
London Univ. (England). Dept. of Applied Biology.
G. T. Goodman.
Proceedings of the Royal Society, Series A., Vol 339, No 1618, p 373-387, August 13, 1974. 1 tab, 15 ref.

Descriptors: *Soil-water-plant relationships, *Mineral industry, *Environmental effects, *Vegetation regrowth, Metals, Plant breeding, Grasses, Resistance, Industrial wastes, *Mining, *Ecology.
Identifiers: United Kingdom.

The problems associated with mineral extraction and possible solutions to them in the United Kingdom are discussed. Problems include aesthetics, nuisance, health hazards and safety. The reclamation process of revegetation can take the following forms: plant highly tolerant vegetation, improve the soil at poor sites, or pre-plan excavation procedures to dump or bury harmful wastes deeply. Common spoil materials are listed with characteristics of inhibitors to revegetation. Slippage of material down a hillside, spontaneous combustion of smelter wastes, slopes too steep to work with machinery, fluctuating water supply, soil which has been compacted, temperature extremes from dark colored wastes, wind turbulence, deficiency of nutrients, stony ground, broken, uneven surfaces, erosion and absence of soil organisms are factors delaying or eliminating revegetation. The inhibitory effects of toxic materials are discussed in more detail. Toxic metals can be dealt with by pH adjustment, complexation with organic matter, or planning genetically metal-tolerant populations of common grasses. (Pulliam-Vanderbilt)
W75-03626

GUIDELINES FOR DEVELOPMENT OF CRITERIA FOR CONTROL OF OCEAN WASTE DISPOSAL.
Interstate Electronics Corp., Anaheim, Calif.
For primary bibliographic entry see Field 5E.
W75-03632

GREAT LAKES WATER QUALITY, 1973 ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-233 187, $5.25 in paper copy, $2.25 in microfiche. Report No IJC/DOS-7401, April 1974. 115 p, 4 fig, 15 tab, 3 append.

Descriptors: *Water quality, *Great Lakes, *International Joint Commission, *United States, *Canada, *Programs, Evaluation, Lake Superior, Lake Michigan, Lake Huron, Lake Erie, Lake Ontario, Monitoring, Eutrophication, Water pollution sources.
Identifiers: Lake St. Clair.

An assessment of the present water quality of the Great Lakes and their connecting channels was provided and the data collection and analysis programs available for this evaluation were critically examined. The status of remedial programs being implemented to achieve the objectives for water quality in the lakes as agreed to under the 1972 Canada-United States Agreement was reviewed. Progress in reducing pollution from municipal waste discharges was highlighted. While significant progress is being made, particularly with regard to reducing phosphorus inputs to control eutrophication, several major sewage treatment facilities will not be completed by 1975. (Humphreys-ISWS)
W75-03640

EFFLUENT NEIGHBORS: THE MEXICO-UNITED STATES WATER QUALITY DILEMMA.
California Western International Law Journal, Vol 3, p 152-172, 1972. 114 ref.

Descriptors: *United States, *Mexico, *International law, *Riparian rights, *International waters, Water pollution, Water pollution sources, Water pollution control, Water quality, Water quality control, Legal aspects, Water law, Water rights, Legislation, Treaties, Reasonable use, Relative rights, Water utilization, Rivers, Drainage systems, Colorado River, Rio Grande River, Adoption of practices, Administration, Judicial decisions.

When a river becomes polluted, the contamination is not hindered by political demarcation but destroys the quality of the entire river to the detriment of all riparians and users of the water. The United States and Mexico share three international drainage basins, the Rio Grande, Colorado, and Tijuana river systems. The pollution regulated by international law is generally that which is the result of an injurious use. Traditionally, the rights of co-riparians to use an international stream included the right to pollute provided that the polluting use would not harm a co-riparian or his use of the waters. The weight of authority considers 'equitable utilization' the predominant use doctrine with respect to both contiguous and successive international rivers. But it is unclear whether it is more effective to apply this principle on the administrative or the adjudicative level. The above concepts can be used to analyze water quality provisions of national and international laws of both Mexico and the United States. (Ritchie-Florida)
W75-03677

ESTUARIES OF OREGON-ECOSYSTEMS IN CRISIS, PROBLEMS AND LEGAL SOLUTIONS,
S. R. Schell.
Environmental Law, p 83-103, Vol 2, No 1, Winter, 1971. 71 ref.

Descriptors: *Estuaries, *Oregon, *Legislation, *Administrative agencies, *Water quality control, Estuarine environment, Navigable waters, Coastal areas, State governments, Federal government, Fisheries, Wildlife, Conservation, Natural resources, Water resources development, Recreation, Industrial wastes, Sewage discharge, Pollutants, Channelization, Submerged lands, Water policy, Water utilization, Water management.

Problems of estuaries in Oregon are discussed. Oregon's estuarine land is composed of 56,000 acres out of a total land area of 61.6 million acres, yet over 1,000 acres of this non-renewable resource have been filled in the last ten years. Oregon's commercial fishing industry is totally estuarine dependent. Each estuary in Oregon has a different salt-water/fresh-water mix, nurturing various plant and animal species. Conflicting use requirements compound the estuarine problems. Navigation demands channelization, dredging and filling, as well as waste disposal. Logging and industrial wastes contribute to the pollution problems. Landfill is the most immediate problem facing the estuary. The federal government regulates landfills of this nature through the permit system operated by the Army Corps of Engineers. State agencies supplement the federal action by regulating non-navigable waters and the control, management and disposition of submerged lands which comprise a great part of the estuarine environment. The Fish Commission regulates and prevents pollution discharges which will adversely affect fishery development. Federal and state agencies also have the power to regulate and control water quality through the regulation of discharges of waste, sewage and pollution. (Silber-Florida)
W75-03678

NEW LEGISLATION FOR WATER QUALITY.
Resources, Vol 42, No 42, p 2-4, January 1973.

Descriptors: *Legislation, *Water quality, *Water pollution control, *Water quality control, *Water pollution, Permits, Legal aspects, Effluents, Water pollution sources, Wastes, Water policy, Water law, Penalties(Legal), Regulation, Federal government.
Identifiers: Federal Water Pollution Control Act Amendments of 1972.

The effect of recent legislation on federal water pollution control programs is discussed. The Federal Water Pollution Control Act Amendments of 1972 broaden the scope of the federal program. The amendments represent a shift from effluent standards keyed to ambient water quality standards to direct imposition of effluent standards that are not connected with environmental conditions. Two national goals are set forth in the act the elimination of the discharge of pollutants into the navigable water by 1985 and the attainment of an interim goal of water quality by 1983. An emphasis is placed on research, demonstration and education projects. The act also provides for increased matching grants for construction of publicly owned waste treatment plants and increased use of the permit system. The act provides that permits can be issued by states whose criteria and procedures have received federal approval. (Gragg-Florida)
W75-03679

OHIO V. WYANDOTTE CHEMICALS CORP. RESTATEMENT OF THE ORIGINAL JURISDICTION OF THE SUPREME COURT OF THE UNITED STATES,
For primary bibliographic entry see Field 6E.
W75-03680

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX G--REGULATORY WORKS--REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission--United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 4A.
W75-03682

DEPARTMENT OF ENVIRONMENTAL PROTECTION.
For primary bibliographic entry see Field 6E.
W75-03683

A LOOK AT LEGISLATION DEFINING USE OF NATIONAL FOREST LANDS, PART TWO,
For primary bibliographic entry see Field 6E.
W75-03685

AGRICULTURE'S POLLUTION SOLUTION FOR LAKE APOPKA,
For primary bibliographic entry see Field 5C.
W75-03686

ENVIRONMENTALISTS ATTACK ADMINISTRATION, INDUSTRY PLANS TO WEAKEN NEPA AND SET BACK RECENT CLEAN AIR GAINS.
Wilderness Report, p 3, April 1974.

Descriptors: *Water pollution, *Pollution abatement, *Administrative decisions, *Water management, *Water law, Conservation, Clean Air Act, Administration, Organizations, Federal government, Regulation, State governments, Water quality, Environment, Environmental effects, Standards, Pollutants, Water pollution sources, Air pollution.
Identifiers: National Environmental Policy Act(NEPA), Energy crisis.

The Nixon Administration is proposing legislation that would extend the deadline for industry compliance with air quality standards and would permit the use of 'intermittent controls' by stationary sources of air pollutants, such as power plants. The Wilderness Society, National Wildlife Federation, National Audubon Society, Izaak Walton League and the American Forestry Association have mounted an attack against the efforts of the Administration to undermine the Clean Air Act and other environmental legislation. The groups maintain that profit margins are more than adequate to cover the costs of pollution abatement and although temporary variances were permissible during the energy crisis, any long term variances are unacceptable. The effect of variance

would weaken the National Environmental Policy Act and the Clean Air Act. Russell Train, chairman of the Environmental Protection Agency, and Russell Peterson of the Council on Environmental Quality have both come out strongly against attempts to weaken the laws. Should Mr. Train and Mr. Peterson not be able to stiffle the proposals to weaken the laws, it will be the duty of Congress to take action. (Barnes-Florida)
W75-03687

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE,
Maine State Planning Office, Augusta. Coastal Planning Group.
For primary bibliographic entry see Field 6E.
W75-03689

WINNIPESAUKEE RIVER BASIN CONTROL.
For primary bibliographic entry see Field 6E.
W75-03690

WATER STRATEGY PAPER HIGHLIGHTS EPA POLICIES.
Pollution Control Guide, Vol 3, paragraph 19783, p 19357-19371, 1974. (Reprint of EPA Water Quality Strategy Paper by Russell Train, Administrator).

Descriptors: *Water pollution control, *Federal Water Pollution Control Act, *Legislation, *Administration, Water policy, Administrative agencies, Decision making, Adoption of practices, Standards, State governments, Local governments, Oil spills, Oceans, Political aspects, Coordination, Fishing, Recreation, Water quality standards, Administrative decisions, Federal government.
Identifiers: FWPCA Amendments of 1972, Effluent limitations, Hazardous substances(Pollution).

The Environmental Protection Agency's policies in administering its water pollution control programs have been published in the Water Quality Strategy Paper. Issues addressed by the paper include the basis for effluent limitations, permits and compliance, municipal construction, antidegradation, non-point source pollution control, spills of oil and hazardous materials, and the protection of ocean and ground water. The two laws with which the strategy paper are concerned are the 1972 Amendments to the Federal Water Pollution Control Act and the Marine Protection, Research and Sanctuaries Act of 1972. The Federal Water Pollution Control Act begins a ten year program which aims at the achievement throughout this country, by 1983, of waters in which we can swim and fish. The strategy paper also functions as an exposition of policies that may be implemented in the future. An important role is envisaged for the states in carrying out this legislation not only because of the magnitude of pollution control efforts that are necessary, but also because of the special and localized nature of many problems. (Sperling-Florida)
W75-03691

WATER PROGRAM POLICY ISSUES, (EPA POLICY DIRECTIVES).
Pollution Control Guide, Vol 1, paragraph 2413, p 2222-2227, 1973.

Descriptors: *Permits, *Adoption of practices, *Decision making, Administration, *Administrative agencies, *Water pollution control, *Water quality standards, Water law, Regulation, Waste water disposal, Water quality control, Environmental sanitation, Industrial waste, Monitoring, Federal government, Water policy.
Identifiers: Effluent limitations, Administrative regulations.

There has been confusion over priorities for issuing permits. There are deep and unproductive disputes between Water Quality Standards and best practicable technology as a basis for issuing permits. The law requires that all permits be issued by December 31, 1974. Permits are issued on a best practicable technology basis, or, if more stringent controls are needed to protect water quality on a water quality standard basis. Even if water quality standards are the basis for a permit, the permit will issue on a best practicable technology basis, anyway, if the water quality analysis cannot be completed in time to meet the December 31, 1974 deadline. To do otherwise would be to put a permittee in violation of the law through an inability to complete the analysis. The priority is to work first on permits which already have, water quality standard based, load allocations or where best practicable technology based permits will definitely be written. (Sperling-Florida)
W75-03692

EXPLANATORY STATEMENT: IMPLEMENTATION OF NPDES, (EPA).
Pollution Control Guide, Vol 1, paragraph 2414, p 2227-2244, 1973.

Descriptors: *Permits, *Administrative agencies, *Adoption of practices, *Water law, Regulation, Government finance, Federal government, Water pollution control, Water policy, Planning, Water quality, Treatment facilities, Water treatment, Decision making, Administration, Water quality standards, Water quality, Abatement, State governments, Legislation.
Identifiers: *FWPCA Amendments of 1972, *Administrative regulations.

Information regarding the national permit system was released by the Environmental Protection Agency (EPA) to the public in an explanatory statement. Main features of the permit system are summarized, including the principal aspects of the statute, important regulations that have been promulgated or are being developed, and major policy directives. The background of the program is described and other factual information concerning the scope of the program and the manner of its implementation and operation is discussed. Since the issuing of the explanatory statement in this article, the EPA has adopted a policy to issue environmental explanations of major standards, regulations and guidelines established by the Administrator. The Federal Water Pollution Control Act Amendments of 1972 provide new enforcement tools for fighting pollution and increased federal grants for construction of waste treatment facilities. (Sperling-Florida)
W75-03693

TRANSLATIONS ON ENVIRONMENTAL QUALITY NO. 8.
Joint Publications Research Service, Arlington, Va.
Available from National Technical Information Service, U.S. Dept of Commerce, Springfield, Va 22161 as JPRS-61111, $4.25 in paper copy, $2.25 in microfiche. January 31, 1974, 50 p.

Descriptors: *Environmental control, *Pollution, *Ecology, *Meteorology, Water quality, Water quality control, Water pollution, Air pollution, Pollution sources, Pollution abatement, Water pollution control, Environmental sanitation, Water supply, Wastes, Sewage, Sewage treatment, Governments, Water resources development, Water law, Environmental effects, Legislation.
Identifiers: *Environmental policy.

Translations are presented from the world press of articles and press commentary on environmental pollution and its effects. Also discussed are pollution control technology, organizations and programs. The articles were written by authors from Eastern Europe, Latin America, the Near East and Africa, and the Soviet Union. With the development of the economy, forces of production and scientific technology, steps must be taken to preserve and enhance environmental quality. Engineering systems to aid in water and air pollution abatement have been developed. Despite the international energy crisis and problems of inflation several nations have undertaken concerted efforts to fight the contamination of the atmosphere by industrial pollutants. Among these control mechanisms have been the introduction of dust collection equipment to control emissions in cement plants. (Proctor-Florida)
W75-03696

OCEAN DISPOSAL PRACTICES AND EFFECTS (REPORT OF MEETING HELD IN NEW YORK ON SEPTEMBER 26-29, 1972).
President's Water Pollution Control Advisory Board, Washington, D.C.
Available from National Technical Information Service, U.S. Dept of Commerce, Springfield, Va 22161 as PB-229 808, $4.75 in paper copy, $2.25 in microfiche. September 29, 1972. 71 p, 30 ref, 5 tab, 5 append.

Descriptors: *Oceans, *Waste disposal, *Planning, *Water pollution control, *Federal government, Evaluation, Water pollution sources, Water pollution effects, Water policy, Water law, Governments, Water pollution, Water quality, Water quality standards, Coasts, Disposal, Sewage disposal, Comprehensive planning.
Identifiers: Coastal waters, Contiguous zone, Effluent limitations, Territorial seas(Jurisdiction), Environmental policy, FWPCA Amendments of 1972.

The President's Water Pollution Control Advisory Board met on September 26-29, 1972, to discuss the problem of ocean dumping pollution and to explore alternatives to ocean disposal of wastes. This report contains the official account of this meeting, including information received by the Board from representatives of federal, state and local government and various experts in the field of ocean disposal. The following are the principal recommendations made by the Board: (1) the immediate enactment of the Marine Protection, Research and Sanctuaries Act and Federal Water Pollution Control Act Amendments of 1972; (2) the establishment of Federal Water Quality Standards for the waters of the contiguous zone; (3) the establishment of pretreatment standards for industrial wastes discharged into municipal sewage systems; (4) completion of an inventory of the ocean bottom and coastal waters of the United States and its territories; (5) land disposal of dredge spoil where possible; (6) immediate action to curb the disposal of raw sewage into the ocean; (7) establishment of regional systems for the regulation and control of the coastal waters; and (8) increased research into the effects of ocean disposal pollution and the establishment of appropriate water quality standards. (Deckert-Florida)
W75-03697

DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY.
For primary bibliographic entry see Field 6E.
W75-03700

U.S. V. COLGATE-PALMOLIVE CO. (ACTION CHARGING UNLAWFUL DISCHARGE OF REFUSE MATTER INTO NAVIGABLE WATERS),
For primary bibliographic entry see Field 6E.
W75-03702

CITY OF NEW YORK V. TRAIN (ACTION BROUGHT TO COMPEL RELEASE OF FUNDS AUTHORIZED UNDER FWPCA),
For primary bibliographic entry see Field 6E.
W75-03703

STATE OF MINNESOTA V. ENVIRONMENTAL PROTECTION AGENCY (ACTION OF IMPOUNDMENT OF FWPCA FUNDS),
For primary bibliographic entry see Field 6E.
W75-03705

KENTUCKY POLLUTION ABATEMENT AUTHORITY,
For primary bibliographic entry see Field 6E.
W75-03707

INTERSTATE MINING COMPACT (AS AMENDED),
For primary bibliographic entry see Field 6E.
W75-03708

ENVIRONMENTAL PROTECTION ACT (AS AMENDED),
For primary bibliographic entry see Field 6E.
W75-03709

COMMITTEE FOR THE CONSIDERATION OF THE JONES FALLS SEWAGE SYSTEM V. TRAIN (ACTION SEEKING INJUNCTIVE RELIEF RESTRAINING THE GRANTING OF SEWER HOOK-UP PERMITS),
For primary bibliographic entry see Field 6E.
W75-03710

STATE UNIVERSITY SYSTEM OF FLORIDA SEA GRANT PROGRAM 1972.
For primary bibliographic entry see Field 6E.
W75-03714

THE NEW FEDERAL WATER POLLUTION CONTROL LAW,
George Washington Univ., Washington, D.C.
A. W. Reitze, Jr., and G. Reitze.
Environment, Vol 15, No 1, p 19-20, January/February 1973.

Descriptors: *Pollution abatement, *Water pollution control, *Environmental effects, *Enforcement, *Federal Water Pollution Control Act, Rivers and Harbors Act, Navigable waters, Legislation, Legal aspects, Administrative decisions, Administration, Federal government, Water pollution, Pollution control, Water law, Water policy, Adoption of practices.
Identifiers: Refuse Act of 1899, National Environmental Policy Act, Licenses, Adminstrative regulations.

Prior to the Federal Water Pollution Control Act (FWPCA) amendments legislation was ineffective in cleaning up the waters of the U.S. Administrative processes were too cumbersome and time consuming. The FWPCA is made more functional, subsuming nearly all federal law in this field and superceding the state programs except that existing state standards are continued. The scope of FWPCA amendments extends to all U.S. navigable waters. The discretionary powers of the administrator of the Environmental Protection Agency, are more extensive. Despite the overall positive aspects of the FWPCA amendments two major factors prevent this law from being as effective as it could be. First, the enforcement system of the act will not be functional for several years. Second, the permit system used by the 1899 Refuse Act is incorporated into the new act. Thus, all who had applied for a permit are immune from prosecution until their application is processed. (Chennault-Florida)
W75-03715

OFFSHORE TERMINAL AUTHORITY.
For primary bibliographic entry see Field 6E.
W75-03716

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE CAPE FEAR (LOWER SECTION), LUMBER, NEUSE AND WHITE OAK RIVER BASINS.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
For primary bibliographic entry see Field 4A.
W75-03717

WATER QUALITY MANGEMENT PLANS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-03718

SEA GRANT PROGRAM 1973, STATE UNIVERSITY SYSTEM OF FLORIDA.
Florida Univ., Gainesville. Marine Advisory Program.
For primary bibliographic entry see Field 9A.
W75-03720

GULF OIL CORPORATION, ET AL. V. MORTON (ACTION FOR WRIT OF MANDAMUS).
For primary bibliographic entry see Field 6E.
W75-03721

GROUNDWATER USE ACT OF 1972.
For primary bibliographic entry see Field 6E.
W75-03722

TAXATION--EXEMPTION--PROPERTY USED FOR POLLUTION CONTROL OR WATER IMPOUNDMENT.
For primary bibliographic entry see Field 6E.
W75-03724

UNITED STATES V. REPUBLIC STEEL CORP. (REFUSE DISCHARGE INTO NAVIGABLE WATERS).
For primary bibliographic entry see Field 6E.
W75-03727

POLLUTANT SPILL PREVENTION AND CONTROL ACT (AS AMENDED).
For primary bibliographic entry see Field 6E.
W75-03728

INLAND LAKES PROTECTION AND REHABILITATION.
For primary bibliographic entry see Field 6E.
W75-03730

POLLUTION CONTROL AWARDS PROGRAM.
For primary bibliographic entry see Field 6E.
W75-03731

ANTI-HEAVE PROTECTIVE SYSTEM,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France). (assignee)
For primary bibliographic entry see Field 8B.
W75-03732

POLLUTION SUCTION WATER SWEEPER,
J. DiPerna.
US Patent No 3,847,816, 3 p, 4 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 745, November 12, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, Water quality control, *Water pollution control, Equipment, *Skimming, Separation techniques, Pollution abatement.
Identifiers: *Suction water sweeper.

The pollution suction water sweeper consists of an oil tanker having a series of oil collection tanks and a floating harvesting ring towed in front of the ship by director tugs that are electronically controlled from the ship. The harvesting ring is pulled so as to gather up the oil. The ring consists of a flexible empty accordian-like hose at each end with an apron having weights to hold down the bottom of the apron. Between the ends of the ring, a central portion forms a skimmer and consists of a wide hose. The hose has a series of slotted vertical openings on the front side so that the oil slick can enter. The skimmer is connected to two flexible hoses that pass through openings in the hull and into the ship hold. Gravitation may be employed to move the collected mixture of water and oil to the tank which is below the level of the water. (Sinha-OEIS)
W75-03733

ROTARY SKIMMER,
Sun Oil Co., Philadelphia, Pa. (assignee)
G. D. Aulisa.
US Patent No 3,844,950, 4 p, 5 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2096, October 29, 1974.

Descriptors: *Patents, *Flotsam, *Skimming, *Oil pollution, *Oil spills, *Water pollution control, Water quality control, Pollution abatement, Equipment, Separation techniques.
Identifiers: *Skimmers.

A device for removing floatable material from the surface of a body of water is described. An elongated skimming blade is mounted for rotation, about a vertical axis, across the surface of a liquid, and is rotated about this axis by means of a suitable propulsion device. A collection trough attached to the blade serves as an accumulation means for the skimmed material. A float whose buoyancy is adjustable maintains the blade in a predetermined position relative to the liquid surface, the float being anchored to the bed of the body of water being skimmed. The whole constitutes a portable rotary skimmer. An air supply or inlet pipe carrying compressed air is coupled through a conventional control valve (operable from outside the housing) to a hose connection which goes to the outer end of the pipe. The valve thus serves to control the flow of compressed air to the jet propulsion devices which cause rotation of the skimming blades, together with their attached collection troughs. (Sinha-OEIS)
W75-03736

PROTECTED OFFSHORE STORAGE FACILITY,
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa. (assignee)
W. E. Bliss, Jr.
U. S. Patent No. 3,844,122, 5 p, 15 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1838, October 29, 1974.

Descriptors: *Patents, *Oil pollution, *Water pollution control, Water quality control, *Oil, *Pollution abatement, *Storage tanks, Facilities.
Identifiers: Crude oil, Offshore storage facilities.

A protected area is provided in a body of water which is subject to wave and tide action and tanks for storing crude oil and the like are moored in the protected area. The tanks are floating tanks and have fixed roofs. The use of a fixed roof instead of a floating roof eliminates the peripheral seals required between a floating roof and the side wall of the tank. The oil or the like stored in the tanks actually supports at least a portion of the weight of the roof and tank, and the unit pressure acting on the surface of the stored liquid is thus greater than that resulting from a standard floating roof. This increase in unit pressure in conjunction with the elimination of the peripheral seal results in a virtually complete prevention of any out-gassing evaporation of the light ends of the stored oil or other liquid. (Sinha-OEIS)

W75-03744

RECLAMATION OF HYDROCARBON CONTAMINATED GROUND WATERS,
Sun Research and Development Co., Philadelphia, Pa. (assignee)
For primary bibliographic entry see Field 5D.
W75-03750

MERCURY,
Bureau of Mines, Washington, D.C. Div. of Nonferrous Metals.
For primary bibliographic entry see Field 6C.
W75-03797

ENFORCEMENT UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
Environmental Protection Agency, Denver, Colo. Region VIII.
H. W. Ipsen, and J. W. Raisch.
Land and Water Law Review, Vol 9, No 2, p 369-420, 1974.

Descriptors: *Federal Water Pollution Control Act, Legislation, Legal aspects, Water pollution control, Cities, Industries, Jurisdiction.
Identifiers: Enforcement.

The 1972 Amendments to the Federal Water Pollution Control Act were passed in an effort to obtain more effective and expeditious attainment of the national goal of cleaning up the country's waters. The various standards and requirements required for compliance with the Act as well as the means which are available for enforcement are described. The jurisdictional and other procedural aspects of enforcement of the Act are discussed in addition to the various civil and criminal remedies which may be used in cases of non-compliance with the provisions of the Act. The impact of the new enforcement options on the Environmental Protection Agency is explained and an appeal is made for future voluntary compliance with the Act by affected industries and municipalities.
W75-03824

EFFECT OF WATER ON BACTERIAL MULTIPLICATION IN PLANT TISSUE,
Department of Scientific and Industrial Research, Auckland (New Zealand). Plant Disease Div.
For primary bibliographic entry see Field 5C.
W75-03831

AN ELECTRICAL BARRIER FOR PREVENTING MIGRATION OF FRESHWATER CRAYFISH IN RUNNING WATER: A METHOD TO STOP THE SPREAD OF THE CRAYFISH PLAGUE,
Uppsala Univ. (Sweden). Inst. for Physiologic Botany.
For primary bibliographic entry see Field 8I.
W75-03833

CONTROL OF SALT-MARSH MOSQUITOES WITH ABATE INSECTICIDE AT COOMBABAH LAKES, QUEENSLAND, AUSTRALIA,
Queensland Inst. of Medical Research, Herston (Australia).
B. H. Kay, K. J. Ferguson, and R. N. C. Morgan.
Mosq News 33(4): 529-535, 1973.

Descriptors: *Insecticides, Pesticides, *Australia, Mangrove swamps, *Mosquitoes, *Salt marshes, Pollution abatement, Water pollution control.
Identifiers: *Abate insecticide, Aedes-vigilax, *Coombabah Lakes(Aust), Culex-annulirostris, Culex-fatigans, Culex-sitiens, Queensland.

Four and 4.4% Abate insecticide-sand granule formulations, each applied aerially at 1 lb of formulated product/acre, were 91% and 71% effective against larval Aedes vigilax Skuse and Culex sitiens Wiedemann respectively in a 1971 trial. In 1972, even higher mortalities were indicated. At the dosages used, Abate insecticide caused minimal mortality of non-target organisms tested in natural salt-marsh conditions. Ninety-nine percent kill of larval C. annulirostris Skuse and 87% mortality of C. fatigans Wiedemann exposed in small containers were also recorded. The granules penetrated dense mangrove cover and open country with equal efficiency. A successful application was carried out during a 15-20 knot wind. The insecticide had little residual life in stimulated salt-marsh conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-03836

EFFECT OF BIOTIC AND ABIOTIC FACTORS ON THE TOXICITY OF ENTOBACTERIN FOR LARVAE OF BLOOD-SUCKING MOSQUITOES AND BITING MIDGES, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Zoologii.
For primary bibliographic entry see Field 5C.
W75-03845

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

USE OF INTERACTIVE COMPUTER GRAPHICS IN WATER RESOURCES PLANNING AND MANAGEMENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
Y. T. Chien.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 631, $3.25 in paper copy, $2.25 in microfiche. Completion Report, 1974. 16 p, 10 fig, 7 ref. OWRT A-042-CONN(5). 14-31-0001-3507.

Descriptors: *Computer programs, *Computer models, Water resources, *Planning, *Management, *Graphical techniques, Hydrologic data, Remote sensing, *Algorithms, *Graphical analysis, Graphical methods, Model studies, Massachusetts.
Identifiers: Computer graphics, Man-machine interaction, Display-oriented algorithms, ERTS imagery, Hydrological event delineation, Recursive applicability, Cape Cod Canal(Mass).

An experimental graphics system was developed to evaluate its usefulness in the area of water resources planning and management. The system included a conceptual model and a large number of computational techniques, operational programs, and utility routines. A class of display-oriented transformational algorithms were studied in relation to the NASA ERTS imagery. By combining several spectral bands of information, the possibility of delineating various classes of hydrological events (water, land, etc.) in a man-machine environment was examined. The results of a limited experimentation with a section of the Cape Cod Canal and its adjacent land indicate that (a) with the aid of a computer display, the human operator can play a direct and immediate role in selecting and analyzing the portions of the data of particular interest, and (b) speedy display and user's interaction may be achieved by putting the transformational algorithms in a recursive structure. This recursive applicability will allow the algorithms to be applied to expanded data bases without introducing excessive calculations. (de Lara-Connecticut)
W75-03301

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART I,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5D.
W75-03387

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART II,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5D.
W75-03388

MULTILEVEL APPROACH FOR REGIONAL WATER RESOURCES PLANNING AND MANAGEMENT, VOLUME I,
Case-Western Reserve Univ., Cleveland, Ohio.
Y. Y. Haimes.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 132, $9.25 in paper copy, $2.25 in microfiche. Prepared for National Science Foundation, August 1973. 294 p, 26 fig, 15 tab, 126 ref, 5 append. GI-34026.

Descriptors: *Water resources, *Planning, *Mathematical models, *Management, *Regional analysis, Optimization, Methodology, Model studies.
Identifiers: Multilevel approach, *Hierarchical modeling, Decomposition, Multilevel coordination, Supply scheduling model, Demand economic model, Co-ordination model, *North Atlantic Region.

The development and analysis of an economically-based methodology for long-range planning of regional water resource systems are discussed. Hierarchical modeling, which accounts for the complexity of regional considerations, consists of two main broad categories of techniques and structural representations. First, decomposition is the term applied to the class of techniques used to divide a complex system into smaller more easily handled components. Second, multilevel coordination complements decomposition models since it is usually necessary to account for the interactions decoupled when a complex system is decomposed. The purpose of multiple levels of optimization, simulation or control is to coordinate the decomposed solutions so that the overall sum of solutions meets a particular goal or objective. Methods of decomposition and multilevel coordination, as well as a method for solving multiple objectives, are discussed. The major planning model discussed is decomposed into three major components, supply (cost) scheduling model, demand (benefit) economic model, and co-ordination model. The North Atlantic Region, which includes all or portions of 13 states and the District of Columbia, was selected for testing the methodologies and models developed in the study. A goal has been the maximum utilization of models, data, and experience developed and obtained by the North Atlantic Region study. (Diefendorf-North Carolina)
W75-03434

ENERGY EVALUATION OF WATER MANAGEMENT ALTERNATIVES IN THE UPPER ST. JOHNS RIVER BASIN OF FLORIDA,
Environmental Protection Agency, Gainesville, Fla.
S. Bayley, and H. T. Odum.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 051, $5.25 in paper copy, $2.25 in microfiche. May 1973. 114 p, 19 fig, 15 tab, 62 ref.

Descriptors: *Water management, *Water conservation, *Energy, *Ecosystems, *Marshes, *Decision making, Land use, Planning, Cost-benefit analysis, Reservoirs, *Florida, Model studies, Water levels, Flood plains.

Identifiers: *St. Johns River Basin(Fla), Brevard County(Fla), Energy value, Energy evaluation, Energy amplifier factors, Channelization, Development trends, Energy circuit model.

A section of the upper St. Johns River basin was selected as a pilot test of energy evaluation procedure for decision making. Energy value calculations were made for present and primitive conditions and 3 alternatives for water management: a pattern of private channelization of lands for agriculture and housing; a reservoir plan that sends more water to agriculture and urban use in other districts; and a plan that retains the floodplain for water conservation areas. Proposed changes in water management and land use shift the distribution of energy values and thus change the totals of energy generated by regional scale interactions of lands, waters, cities, and outside sources of money and energy. The pilot area calculations suggest energy amplifier factors for water for alternatives of marsh use, lightly managed pasture and intensive agriculture, and urban development based on water-using industries, on light industry, and on tourism and retirement. The energy cost-benefit approach used avoids several fallacies common to other evaluations of environmental change. By considering the total system, the deceptively high amplifier effects of processes examined in isolation are avoided. Using this approach calculations showed the plan for retention of marshes produced the highest total annual energy value, suggesting this plan as the one most favorable to economic vitality. The lowest values were found with further private channelization and development of the kind of agricultural production now practiced. (Diefendorf-North Carolina)
W75-03436

BINARY TREE MODEL SIMULATION OF THE BEHAVIOR OF URBAN HYDROLOGIC SYSTEMS,
Nebraska Univ., Lincoln. Dept. of Computer Science.
For primary bibliographic entry see Field 2A.
W75-03541

RANGE OF CUMULATIVE SUMS, II. APPLICATION TO STORAGE CAPACITY OF RESERVOIRS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2H.
W75-03669

WATER QUALITY MANGEMENT PLANS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-03718

6B. Evaluation Process

USE OF INTERACTIVE COMPUTER GRAPHICS IN WATER RESOURCES PLANNING AND MANAGEMENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 6A.
W75-03301

DISPLACEMENT OF PERSONS BY MAJOR PUBLIC WORKS, ANTHROPOLOGICAL ANALYSIS OF SOCIAL AND CULTURAL BENEFITS AND COSTS FROM STREAM CONTROL MEASURES---PHASE 5,
Kentucky Water Resources Research Inst., Lexington.
P. Drucker, C. R. Smith, and E. B. Reeves.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 627, $5.25 in paper copy, $2.25 in microfiche. Research Report No 80, December 1974. 100 p, 4 tab, 16 ref, append. OWRT A-046-KY(1). 14-31-0001-3817.

Descriptors: *Social change, *Social impact, *Human population, *Relocation, Planning, Evaluation, Benefits, Costs, Utilities, Area redevelopment, Compensation, Public benefits, *Migration, *Social adjustment.
Identifiers: Emigration(Human), Cultural adaptation(Human), *Anthropological analysis.

This study is concerned with social change and social impact of a major public works project on the human population required to relocate the persons being forced to sell to the Federal Government or turn over through condemnation proceedings homes, farms, and/or businesses to facilitate completion of a Federally authorized stream control measure. It is intended to test the utility of anthropological method and concept in evaluating and explicating sociocultural impact, and in addition to check hypotheses concerning importance of impact on social and economic areas of culture of the persons to be displaced, on their emigration patterns, and their cultural adaptation, and other social effects of relocation. Application of anthropological concepts and methods yield more intelligible results than sociological studies based on data generation through highly artificial questionnaire methods with attempted quantification of what are basically non-quantifiable data. This does not mean that simple counts and raw percentage comparisons are not significant to demonstrate trends, but that complex arithmetic computations are often used to imply a degree of precision that does not exist and explains nothing. Social scientists, planners and change agents must come to realize that there are aspects of the quality of human life which must be considered which cannot be defined in numbers. (Grieves-Kentucky)
W75-03308

FACTORS INFLUENCING PARTICIPATION IN RECREATION ACTIVITIES IN SOUTHEAST IOWA, AND CAMPER ATTENDANCE AT MACBRIDE STATE PARK,
Iowa Univ., Iowa City. Recreation Education Program.
M. Glascock.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 630, $3.75 in paper copy, $2.25 in microfiche. Supplement to Completion Report, May 30, 1973. 24 p, 11 tab. OWRT B-017-IA(3).

Descriptors: *Recreation demand, *Motivation, *Iowa, Recreation, *Social participation, Social value, Decision making, *Surveys, Camping.
Identifiers: Linn County(Iowa), Johnson County(Iowa), Macbride State Park(Iowa).

Factors influencing individuals' involvement in recreation were evaluated through a mail survey conducted in two southeastern Iowa counties. The questionnaire consisted of a list of 72 recreational activities and questions which covered socioeconomic and demographic characteristics. Results indicated that the five most popular activities were passive in nature and take place within the home. These include reading, listening to the radio or music, and watching television. The most popular outdoor activities include pleasure walking, gardening, pleasure driving, swimming, and bird watching. Individuals with higher educational levels were more likely to engage in tennis, golf, sailing, civic work, or attend concerts. A majority of the recreational activities surveyed were not related to sex, age, marital status, occupational status, income level, or residential location. Results of a 1970 study of campers in Iowa's Lake Macbride State Park, utilizing data obtained from camping permits, are also summarized. A majority of the campers were from Iowa with five counties contributing over 1000 camper days in 1970. There was a strong linear increase in camping through July followed by a decline beginning in August. (Schroeder-Wisconsin)
W75-03317

AMES RESERVOIR ENVIRONMENTAL STUDY, APPENDIX 1. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE RESERVOIR SITE AND STREAM SYSTEM.
Iowa State Water Resources Research Inst., Ames; and Iowa State Univ., Ames. Engineering Research Inst.
For primary bibliographic entry see Field 6G.
W75-03318

AN ANALYSIS OF SOCIAL WELL-BEING CHANGE ASSOCIATED WITH RESOURCE DEVELOPMENT PROJECTS IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst.
M. Hackbart, G. Long, and M. York.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 634, $5.25 in paper copy, $2.25 in microfiche. Research Project Report, June 1973. 115 p, 15 fig, 28 tab, 24 ref, 2 append. OWRR A-002-WYO(7).

Descriptors: *Cost-benefit theory, *Water resources development, Planning, Measurement, Social impact, Social change, Welfare(Economics), *Wyoming, US Water Resources Council, Evaluation.
Identifiers: *Social well-being, Economic evaluation.

A recent Water Resources Council Task Force recommendation to include social well-being (SW) as an objective in addition to national economic development for water resource development projects is assessed and a series of proxies to measure social well-being are evaluated for several water resource development projects in Wyoming. The choice of proxies is important because SW cannot be measured directly. An appropriate selection should yield operationally meaningful (capable of identifying change) and feasible (those with data available) proxies. Four general categories of proxies to measure the changes in SW were evaluated: (1) real income changes and distributional impact measurement changes in per capita income, changes in the percentage of households over the poverty line, and changes in the Lorenz curve or Gini ratio; (2) changes in population; (3) changes in economic stability through an entropy measure of employment stability; and (4) changes in educational or recreational patterns. Results of comparing Wyoming counties with and without such projects reveal no consistent proxy variation pattern. The implication appears to be that the projects had not significantly changed the project region's SW, although data difficulties make this inconclusive. Appendix A provides an overview of the major river basins in Wyoming. (Schroeder-Wisconsin)
W75-03319

HYDROLOGIC SIMULATION OF A COMPLEX WATERSHED,
Washington State Univ., Pullman. Coll. of Engineering.
For primary bibliographic entry see Field 2A.
W75-03325

OPPORTUNITIES FOR WATERSHED MANAGEMENT IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 4D.
W75-03326

ECONOMIC EVALUATION AND DETERMINATION OF PLANT CAPACITY AND DAM HEIGHT,
Public Power Corp., Athens (Greece).
D. A. Xirokostas.
Water Power, Vol 26, No 1, p 17-22, January 1974. 6 fig, 5 ref.

Descriptors: *Cost-benefit theory, *Hydroelectric plants, Economic efficiency, Prices, Hydroelectric power, Peak loads, Peaking capacity, Costs, *Cost-benefit ratio, *Dam design, *Optimization, *Alternative costs, Evaluation.

A new benefit-cost ratio method for comparing different hydroelectric plants is devised to yield optimum dam height and installation capacity value. The new ratio is given by the ratio of the annual cost of the alternative plant plus the annual cost of replacing secondary energy (benefits) divided by the annual cost of the hydroelectric plant. Annual cost of the alternative thermal plant is determined through examination of the resultant costs to provide similar primary energy levels. Costs of secondary energy are assessed separately utilizing the average incremental costs of fuel consumed in a system of oil-fired steam turbines. In the past capacity of the hydrostation was chosen so that the costs of output are minimal. This criterion is unsatisfactory because of its failure to account for peak-load needs or its load duration curve. In essence, it assumes a unique price of energy for all bonds of power on the load duration curve. The appropriate approach suggested to determine capacity would equate the incremental cost of the hydroelectric station and the alternative thermal plant. Height of the dam is also varied under the model to maximize the difference between benefits and costs of the proposed system. (Schroeder-Wisconsin)
W75-03328

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY,
Resources for the Future, Inc., Washington, D.C.
J. L. Fisher, and R. G. Ridker.
American Economic Review, Vol 63, No 2, p 79-89, 1973. 1 fig, 2 ref.

Descriptors: *Environmental effects, *Growth rates, *Population, Resources, Mathematical models, Natural resources, Environmental gradient, Social aspects, Costs, Model studies, *Mathematical models.

Results of a recent Resource for the Future (RFF) study concerning the interrelationship of population, growth, natural resource demand, and environmental quality parameters are summarized. The study dealt with a selected number of raw material, pollutant, and environment pressures associated with both population and economic growth in the U.S. over a 30-50 year period. Four sets of high-low combinations of population and economic growth are traced through a mathematical model to reveal impacts of specified resources and environmental measures and on specific sectors, e.g., agriculture or energy. Modeling results indicate the U.S. is unlikely to experience a truly serious raw material shortage (defined as a greater than 50 percent relative price increase for a significant number of factors) over the study period. Several critical factors affecting the above results are noted. These include the time period of the study, the geographic region selected, regional development characteristics, institutional arrangements, and technical changes. Costs of carrying out policies to clean up the environment were relatively inexpensive. Implications of full cost raw material pricing, improved reclamation and recycling technics, and better planning and management procedures are also discussed. (Schroeder-Wisconsin)
W75-03331

A NOTE ON THE EVALUATION OF ACTIVITY DEPENDENT RECREATIONAL DAMAGE COST FUNCTIONS,
Texas Univ., Austin. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 6D.
W75-03341

MARGINAL COST ESTIMATES OF THE WATER RESOURCES OF THE USSR,
Council for the Study of Productive Forces, Alma-Ata (USSR).
A. N. Yegorov, L. N. Zylina, V. P. Ivanova, B. Yw. Istoshim, and Ye. M. Podlskiy.
Soviet Geography, Review and Translation, Vol 15, No 6, p 333-341, 1974. 2 fig, 2 tab, 3 ref. Translated for Vodnyye Resursy, No 5, p 198-204, 1973.

Descriptors: *Water resource development, *Marginal costs, Optimum development plans, Regional development, Foreign projects, Foreign countries, Water supply, Industries, *Costs, *Estimating.
Identifiers: *USSR.

A preliminary water resource development plan to meet projected water demands in the Soviet Union over the next three decades is outlined. Marginal cost estimates are also provided representing the minimum incremental development costs of a particular river system per additional disposable water resource in a given area. Water requirements for a region are based on forecasts of increased water usage corresponding to relatively moderate rates of irrigation development (30 million hectares by 2000). Proposed river development projects were based on technical, economic, and planning data obtained from the appropriate engineering design and scientific research institutes. Results of the marginal cost estimates varied significantly among regions ranging from 0 to over 25 kopecks/cubic meter. The wide divergence will affect location plans to many industries, especially those heavily water-intensive industries where water costs represent 40-50% of the total cost differences between locations. (Schroeder-Wisconsin)
W75-03342

ECONOMIC DEVELOPMENT AND WATER RESOURCES INVESTMENTS,
Rivkin/Carson, Inc., Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-225 935, $10.50 in paper copy, $2.25 in microfiche. Report August 1973. 11 maps, 27 tab, 56 ref, 6 append. Bu Rec 14-06-D-7336.

Descriptors: *Regional economics, *Water resources development, *Economic impact, Regional analysis, Regional development, *Investment, Planning, Data collections, Boundary processes, Econometrics, Cost-benefit analysis, *Rocky Mountain Region, Arizona, New Mexico, Colorado, Utah, Wyoming.
Identifiers: Economic growth.

Three studies involving: (1) development and growth analysis of subregions within defined study areas; (2) community case studies; and (3) public investment analysis are utilized to examine and conceptualize the relationship of regional growth and water and other public economic development investments. The study areas include 21 subregions in Arizona, Colorado, New Mexico, Utah, and Wyoming and communities presently receiving Bureau of Reclamation water. Central to the approach is recognition that project impacts do not coincide with political boundaries. To compensate, multi-locational relationships of population, economics, and physical characteristics were used to develop new investigation regions. Case studies indicate that water resource investment is only one of several factors affecting growth, and its impact varies in size and location over time. Subregional analysis also indicates that population, urban centers, accessibility, environmental factors, available institutional resources, markets, and technological characteristics affect growth patterns. Three econometric investment analyses of the relationship between regional economic activities, employment, population growth, and public investment indicate that water-related investment affects both the level of economic activity and growth; with the latter's effect dependent on the state of the regional economy and the presence of other non-water investments. (Schroeder-Wisconsin)
W75-03343

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS: A STAFF STUDY,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W75-03347

THE INFLUENCE OF RECENT TRENDS IN WATER LEGISLATION ON THE STRUCTURE AND FUNCTIONS OF WATER ADMINISTRATION,
Fordham Univ., Bronx, N.Y. School of Law.
For primary bibliographic entry see Field 6E.
W75-03363

WILLINGNESS TO PAY FOR POLLUTION ABATEMENT: A CASE STUDY,
Guelph Univ. (Ontario).
For primary bibliographic entry see Field 5G.
W75-03389

RECONCILING CONFLICTS AMONG DIFFERENT ECONOMIC INTEREST GROUPS IN THE MANAGEMENT OF FISHERIES,
Fisheries and Marine Service, Ottawa (Ontario).
W. C. MacKenzie.
Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2065-2069, 1973. 6 ref.

Descriptors: *Fisheries, *Fish management, Fish harvest, Economic efficiency, Planning, Optimum development plans, International waters, Treaties, *Marginal costs, Management.
Identifiers: *Social costs.

It is argued that the diverse interests involved in fisheries can best be served if fish are harvested to the point where the marginal social resources equal the marginal social cost. Often, the implementation of such policies by regulatory agencies are made after the industries' development. A rational management approach in such cases should assure that it does not contribute to the distortion of imputs, that it does not diminish technological innovation, it is capable of being applied at varying rates for different grounds and seasons, it is capable of being imposed gradually to minimize industrial disruption, and it does not discriminate against any unity of the fishing fleet. Management of fisheries is complicated because fleets of many countries may harvest the same ground. Countries often place differing values on capital, labor, and the fishery output creating difficulties in establishing a unified management approach. For the present, establishment of annual catch quotas for interested countries appears to be the most reasonable solution. The setting of quotas among countries is fraught with difficulties. Several alternative methods to reconcile the conflicts arising among fishing nations are discussed including quota-shore trading, compensation for abstention, and exchange of (fleet and port) services. (Schroeder-Wisconsin)
W75-03392

THE ECONOMIC EFFECTS OF THE 1971 FLORIDA RED TIDE AND THE DAMAGE IT PRESAGES FOR FUTURE OCCURRENCES,
Mote Marine Lab., Sarasota, Fla.
For primary bibliographic entry see Field 5G.
W75-03393

GREAT LAKES-ST. LAWRENCE SEAWAY SYSTEM AND THE MID-CONTINENT ECONOMY,
Great Lakes Basin Commission, Ann Arbor, Mich.
L. J. Goodsell.

Water Resources Bulletin, Vol 8, No 5, p 1061-1067, 1972.

Descriptors: *Great Lakes, Environmental effects, Economics, Regional development, Navigable rivers, *Income, Institutions, *Transportation, *St. Lawrence River, Inland waterways, River basin development.

Since the time of early explorers, the Great Lakes-St. Lawrence River complex has represented a major link in the U.S. transportation system. Three aspects surrounding the complex are explored: (1) the economic impacts, (2) environmental impacts, and (3) the institutional milieu. Since 1966, seaway traffic has grown from 49 million tons to 51.1 in 1970 (44.6 in bulk and 6.5 in general cargo). A summary of several recent studies indicates total direct and indirect income resulting from the complex's activity came to $643 million in 1968 and provided employment for over 85,000 families. Several environmental benefits resulting from waterborne transportation, including lower energy consumption than rail, and minimal atmospheric emission, are noted. Impacts on water quality of spills, discharges, and floatation of vessels are minimized. A number of institutional changes brighten the complex's economic future. These include a reexamination of water and rail freight rates to bring about a more equitable distribution of traffic, and extension of the navigation season, and development of new facilities and vehicles. (Schroeder-Wisconsin)
W75-03394

THE IMPACT OF WATER RESOURCE QUALITY CHANGES ON SURROUNDING PROPERTY VALUES,
Dornbusch, David M. and Co., Inc., San Francisco, Calif.
For primary bibliographic entry see Field 5G.
W75-03395

PROPOSED NATURAL AREAS, SALT RIVER SALT BANKS, REPORT NO 2,
Arizona Academy of Science, Tempe.
E. L. Smith, and G. L. Bender.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-225 218, $3.25 in paper copy, $2.25 in microfiche. Arizona Office of Economic Planning and Development, Phoenix, Report OEPAD-EP-73-2, June 1973. 10 p.

Descriptors: *Natural resources, *Arizona, *Conservation, Preservation, Land management, Land classification.
Identifiers: *Salt River Salt Banks(Ariz).

Arizona's Academy of Science has recommended the establishment of the Salt River Salt Banks as a Scientific Natural Area (NA). The banks are on the Fort Apache Indian Reservation on the north shore of the Salt River. The area of salt deposition is nearly one mile in length, 100 feet in width, and between 50-75 feet above the river bed. Three nearby springs flowing over the bank form stalactites. Formerly existing springs may have been the source of the depositions. Climate of the area is typical of southern Arizona desert areas. Terrestrial fauna likely to be encountered are representative of lower Sonoran desert areas. Rare and endangered species of native fish including the Colorado River squawfish, loach minow, and humpback sucker are also found in the area. Past disturbances have been minimal. Presently a camping area and jeep trail have been located near the salt bank. The level of utilization of these facilities is yet unknown. The unique geology of the salt bank plus the character of the Salt River, a wild free-flowing river, are important reasons to establish the site as a scientific NA. Its inaccessibility prohibits its usefulness as an educational NA. (Schroeder-Wisconsin)
W75-03396

ALTERNATIVES IN AQUACULTURAL DEVELOPMENT: CONSIDERATION OF EXTENSIVE VERSUS INTENSIVE METHODS,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
R. A. Neal.
Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2218-2222, 1973.

Descriptors: *Economic impact, *Fish management, Social impact, Political aspects, Fisheries, *Aquiculture.
Identifiers: Extensive culture, Intensive culture.

Legal, biological, economic, environmental, and social aspects arising from the development of extensive versus intensive aquaculture practices are surveyed. Extensive practices raise fish or shellfish in natural settings with little environmental modification; intensive practices involve sizable environmental manipulation. Extensive practices face sizable legal problems though their use of public land; the need to restrict passage through navigable waters to restrain aquatic species; and their inability to claim legal ownership of stocked species placed in natural water bodies. Biologically, the benefits from each practice depend on the species, feeding habits, behavior, and environmental requirements. Herbivorous filter feeders which utilize a wide range of plants are best raised through extensive methods. Four economic aspects, facility cost, competing uses of the natural waters, operational costs, and dependability, were also examined. Initial facility costs are generally higher for intensive practices, while indirect costs to other water resource users are higher for extensive culture practices. Extensive culture systems are notably more subject to losses due to environmental changes. Both practices are subject to externalities arising from the use of a common property. Under present conditions, for most carnivorous and omnivorous species of interest to aquaculturalists, expenditures for extensive practices are not found justified. (Schroeder-Wisconsin)
W75-03398

TACNA MARSH. NATURAL AREA REPORT NO. 35,
Arizona Academy of Science, Tempe.
E. L. Smith, and G. L. Bender.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-225 249, $3.25 in paper copy, $2.25 in microfiche. Report No OEPAD-EP-73-35, June 1973. 11 p, 1 fig. HUD CPA-AZ-09-16-1008.

Descriptors: *Conservation, *Freshwater marshes, *Arizona, Natural resources, Land management, Preservation, Land classification, *Marsh management, Wildlife management.
Identifiers: Gila River(Ariz), *Tacna Marsh(Ariz), Educational natural area, Recreational natural area.

Tacna Marsh on the Gila River in Yuma County, Arizona is recommended as an educational or recreational natural area. The marsh contains the largest water bodies along the lower Gila River. One area of open water, five acres in size and about two feet deep, is surrounded by cattails, arrowweed, and salt cedar. A second area of more than ten acres, located immediately upstream from the first, has brush scattered throughout the pond. Both ponds provide water for wildlife and vegetation, but each benefits different species. Also, several species now known to nest in either pond are rarely found elsewhere in the state. Channelization, irrigation, and reservoir projects in the area have had varying impacts on the marsh's ecological state. Rising water tables, increased salinity, and uprooted trees are among the physical changes resulting from increasing activities in the region. Establishment of the marsh as a natural area would benefit students and bird watchers in addition to maintaining the habitat of nesting birds rarely found outside of the marsh. (Schroeder-Wisconsin)
W75-03400

MULTILEVEL APPROACH FOR REGIONAL WATER RESOURCES PLANNING AND MANAGEMENT, VOLUME I,
Case-Western Reserve Univ., Cleveland, Ohio.
For primary bibliographic entry see Field 6A.
W75-03434

EVALUATION OF THE GEORGIA WATER SUPPLY PROGRAM.
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5F.
W75-03435

ENERGY EVALUATION OF WATER MANAGEMENT ALTERNATIVES IN THE UPPER ST. JOHNS RIVER BASIN OF FLORIDA,
Environmental Protection Agency, Gainesville, Fla.
For primary bibliographic entry see Field 6A.
W75-03436

EAST BRIMFIELD AND WESTVILLE RESERVOIRS. QUANTITY AND VALUE OF WATER SUPPLY STORAGE. QUINEBAUG RIVER--MASSACHUSETTS.
Public Health Service, New York.
For primary bibliographic entry see Field 6D.
W75-03437

PERSPECTIVES ON COASTAL MANAGEMENT--MARINE TRADES AND THE COASTAL CRISIS,
Rhode Island Univ., Kingston. Coastal Resources Center.
M. J. Grant.
Marine Bulletin Series No 18, 1974. 8 p, 1 tab.

Descriptors: *Coasts, *Distribution, *Competing uses, *Recreation demand, *Economic impact, Political contraints, Institutional constraints, Governments, Regulation, Comprehensive planning, Planning, Water resources development, Economics, Legal aspects, Political aspects, Water rights, Water policy, Social impact, Water demand, Recreation, Decision making, Land tenure, Public rights, Public access, Evaluation, Water uses.
Identifiers: *Coastal zone management, *Coastal waters.

Some of the problems facing the nation's shorelines and their present and future effect upon the marine trades are examined. Despite the growing demand for marine recreation activities, the marine trades are hampered by the present system of land distribution and the frequently fragmented and disjointed efforts of government to improve conditions in the coastal zones. The present system for distributing coastal lands among the various competing uses breaks down both in the marketplace and in the political arena. Recreational uses are at a competitive disadvantage in a market that distributes the limited supply of a coastal lands to those most able and willing to pay for it. The political system fails to identify and protect the interests of the public due to parochialism within government and apathy on the part of the public. Only through a united effort of the many independent marine trades pressuring government for a comprehensive coastal management program will the interests of the industry, and of the public, be effectively protected. (Deckert-Florida)
W75-03458

A PROGRAM FOR THE FUTURE--WATER AND SEWER IN RURAL AMERICA.
Commission on Rural Water, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-03488

THE PLANNING AUDIT: A FRAMEWORK WITH PARTICULAR REFERENCES TO RIVER BASIN PLANNING,
H. P. Odegard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 721, $7.00 in paper copy, $2.25 in microfiche. Peter Odegard, St. Croix Cove, Hudson, Wis., 1974. 198 p, 171 ref. ISBN 0-9600524-2-9. OWRT C-3084(3683)(1). 14-31-0001-3683.

Descriptors: *Planning, *Evaluation, *Methodology, *Social participation, *Systems analysis, *River Basin Commissions, *Analytical techniques, Coordination, Decision making, Creativity, Analyses, Control, Data collections, Education, Water Resources Planning Act, River basin development, Legislation, Governments, Forecasting, Benefits, Testing, Administration, Management, Political aspects, Institutions, Regional analysis.
Identifiers: Audit, Rules, Bargaining, Intention, Plan formulation, Democracy, Comprehensiveness, Planning organization, Planning procedure, Needs, Goals, Policy, Alternatives, Clarity, Mediator, Problems approach, Public interest, Experiment, Inquiry, Sensors, Pathors.

Planning is a political process. It is grounded in bargaining and self-education (inquiry). It must be democratic. Planning audit pushes beyond criticism and evaluation, concentrating instead on repairing whatever may have gone amiss. Here is a theory for systematic planning audit. The framework of sensor and pathor questions provides the basic auditing tool. It is designed to stimulate rethinking of sustaining philosophies and accepted procedures, and to identify specific pathologies. A two-pronged approach is recommended--with auditors from inside the planning process enlisting outside help. Test-out of this system indicates need for far-reaching reform of planning theory and methodology. Major changes are urged: (1) a new direct democracy of citizen participation based on transparency of the planning process; (2) a top-down, pragmatic, problem-centered approach emphasizing general systems theory and displacing the goal-centered approach; (3) diverting effort away from devising make-believe alternatives and into developing policies for simple acceptance or rejection at higher levels; (4) using Rules of Release (listed here)--counterpart to Rules of Order (Robert's)--for administrative bargaining situations, rules designed to combat secrecy, conformance, and horsetrading, and to promote creativity. Major objective: to improve river basin planning. Basic understandings, applications and illustrations are drawn from water resources planning experience.
W75-03525

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. II. AN ECONOMIC ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 3B.
W75-03573

WATER QUALITY MANGEMENT PLANS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-03718

RECENT LIMNOLOGICAL STUDIES OF OKANAGAN BASIN LAKES AND THEIR CONTRIBUTION TO COMPREHENSIVE WATER RESOURCE PLANNING,
Fisheries Research Board of Canada, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 2H.
W75-03769

CATEGORY VERSUS SUCCESSIVE-INTERVALS SCALES,
California Univ., Berkeley. School of Public Health.
W. H. Bruvold.
Perceptual and Motor Skills, 1974, Vol 38, p 207-210, (California Water Resources Center Project UCAL-WRC-W-359). 1 fig, 8 ref.

Descriptors: *Reclaimed water, *Recirculated water, Water reuse, *California, Potable water, Swimming, *Attitudes, Evaluation.

The relationship between scale values of magnitude obtained from category and successive-intervals scaling procedures is expected to be nonlinear in many cases. This research presents the hypothesis that the relationship will be linear if discriminal dispersions are constant and specifiably concave if these dispersions systematically increase or decrease with magnitude. The data represent the case of constant discriminal dispersions and the prediction for this condition are supported. (Snyder-California,Davis)
W75-03802

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ON TAXATION AS A POLLUTION CONTROL POLICY,
Pittsburgh Univ., Pa. Graduate School of Business.
For primary bibliographic entry see Field 5G.
W75-03329

HOW DO YOU EXPLAIN THE COST,
LFE Control System Industries, Santa Clara, Calif.
D. G. Ridgeway.
Water and Wastes Engineering, Vol 11, No 2, p 49-50, 60, 1974. 2 fig, 2 tab.

Descriptors: *Public utilities, *Automatic control, *Control systems, Water works, Data collections, *Costs, Digital computers, Automation, Capital costs, *Treatment facilities, Operating costs.

Savings from installation of an automated control system (DIGIDAC--digital data acquisition and control) in a water or waste water system are explored. Only a small number of DIGIDAC systems have been installed making cost performance data scarce. The overall approach to cost justification comes from LFE/CSI's computer system experience, extensive review of water/waste industry literature, and comments by senior systems engineers at the American Water Works Service Company. Several benefits are noted. Estimates indicate that an effective management information system should improve overall management by two to five percent. Cost savings include: (1) capital development cost savings resulting from reduction of over- or under-design of capital facilities, (2) chemical cost savings by the elimination of measurement errors, (3) power savings, and (4) economic dispatch savings. Some labor savings are also noted. Use of the automatic control system is also valuable in providing data on the need for rate increases, thereby reducing much of the subjectivity involved in that decision. (Schroeder-Wisconsin)
W75-03333

PURIFIED WASTEWATER-THE UNTAPPED WATER RESOURCE,
Envirotech Corp., Menlo Park, Calif.
For primary bibliographic entry see Field 5D.
W75-03337

FINANCING RESOURCES FOR FISHERY DEVELOPMENT,
Inter-American Development Bank, Washington, D.C.
J. Luna-Munoz.
Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2059-2064, 1973.

Descriptors: *Fish management, Fishing, Fish harvest, Commercial fishing, Financing.
Identifiers: *Fisheries financing, *Fishery development, Developing countries.

The sources of, needs for, problems related to, and analysis undertaken in the provision of financial arrangements for fishery development are outlined. In general, three types of development projects are considered: (1) specific projects related to a particular fishery area and independent of areas; (2) integrated projects involving almost all areas in the fishery sector; and (3) integrated projects which attempt to aid fishery development as part of the integrated economy. Each of the general forms have differing financial requirements and differing available financial sources. Failures or difficulties in financial arrangements for each may be attributed to lack of data about the resource or the recipient, inadequacy of the infrastructure or supportive services, low technical management or skills, and lack of marketing or distribution systems. Funding sources continue to supply money, however. Major contributors include local resources from the private sector, national resources, private foreign investment or credit by equipment suppliers, and resources from bilateral or multilateral agreements. Financing of fishery development is generally undertaken following an attempted thorough analysis. Three steps are involved in the multilateral analysis: pre-investment data collection and project designing; technical, financial, economic, institutional, and legal analysis of alternative project designs; and execution and feedback of information. (Schroeder-Wisconsin)
W75-03339

HOUSTON SUBURBS PROFITS FROM BUILDING THE STATE'S WASTEWATER TREATMENT PLANT.
For primary bibliographic entry see Field 5D.
W75-03340

ECONOMIC DEVELOPMENT AND WATER RESOURCES INVESTMENTS,
Rivkin/Carson, Inc., Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-03343

1971 SALMON RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10345, $3.25 in paper copy, $2.25 in microfiche. Report November 1973. 24 p, 6 fig, 16 tab. NO4-3-208-55, NOAA N208-0073-72(N), DACW 57-72-C-0138.

Descriptors: *Estuaries, *Recreation, *Oregon, Fish management, Fishing, Sculpins, Crabs, Shrimp, *Fisheries.
Identifiers: *Resource use, Tideflat, *Salmon River Estuary(Ore).

In March-October, 1971 the Oregon Fish Commission conducted a comprehensive study of marine food fish, shellfish, and miscellaneous invertebrates within the Salmon River Estuary. The estuary, located 119 miles south of the Columbia River, consists of a 204 acre bay with 126 acres of tideland. During the study, 285 boat, shore, tideflat, and scuba resource users were interviewed to aid in the construction of a series of marine resource maps. These maps illustrate principal boat fishing areas, clambeds, eel grass beds, food production areas, fish feeding areas, and fish migration routes. Recreation user data compiled

indicates that 3,000 user trips (800 boat, 2,100 shore, and 100 tideflat) harvested 4,500 animals (1,900 fish, 1,700 shrimp, and 900 crabs) in the estuary during the study period. Dungeness crabs comprise 54% of the boat anglers' catch and finfish, primarily Pacific staghorn sculpin, was the major catch of the shore anglers. Shrimp was the only species harvested by the tideflat users. No commercial fisheries exist in the estuary. (Schroeder-Wisconsin)
W75-03344

1971 SAND LAKE ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10341, $3.25 in paper copy, $2.25 in microfiche. Report November 1973. 24 p, 6 fig, 16 tab.

Descriptors: *Estuaries, *Oregon, Fish management, *Fisheries, Eels, Clams, Crabs, Invertebrates, Mapping.
Identifiers: *Resource use, *Marine resource map, *Sand Lake Estuary(Ore).

In March-October 1971, the Oregon Fish Commission conducted a comprehensive study of marine food fish, shellfish, and miscellaneous invertebrates (with the exception of anadromous species resources) in the Sand Lake Estuary. The 528-acre estuary, located 90 miles south of the Columbia River, contains 397 acres of tidelands. During the study 938 boat, shore, tideflat, and scuba resource users were interviewed to aid in the construction of a series of marine resource maps illustrating principal boat fishing areas, clam beds, eel grass beds, food production areas, fish feeding areas, and fish migration routes. Recreation data compiled indicates that 9,800 resource user trips (200 boat, 6,000 shore, and 3,600 tideflat) harvested 94,900 marine animals (88,500 shrimp, 5,800 fish, 500 crabs, and 100 miscellaneous invertebrates) in the estuary during the study period. Dungeness crabs and starry flounders were the only identifiable species caught by boat anglers, while the pacific staghorn sculpin and starry flounders were the principal fish species caught by shore anglers. Ghost and mud shrimp comprised 93% of the tideflat users harvest. Tideflat users harvested 94% of the total number of animals taken from the estuary. (Schroeder-Wisconsin)
W75-03345

1971 ALSEA RIVER ESTUARY RESOURCE USE STUDY,
Oregon Fish Commission, Salem. Div. of Management and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10339, $3.75 in paper copy, $2.25 in microfiche. Report November 1973. 28 p, 6 fig, 16 tab. DACW 57-72-C-0138, NOAA N208-0073-72(N), NO4-30-208-55.

Descriptors: *Estuaries, *Oregon, Fish management, *Fisheries, Crabs, Shrimp, Clams, Eels, Mapping, Invertebrates.
Identifiers: *Marine resource map, Resource management, *Alsea River(Ore).

In March - October 1971, the Oregon Fish Commission conducted a comprehensive study of marine food fish, shellfish, and miscellaneous invertebrates, with the exception of anadromous species, in the Alsea River Estuary. The estuary, located 167 miles south of the Columbia River, consists of a 2,146 acre bay with 979 acres of tideland. During the study 3,401 boat, shore, and tideflat resource users were interviewed to assist in the design of a series of marine resource maps. These maps illustrate the principal boat fishing areas, clambeds, eel grass beds, food production areas, fish feeding areas, fish migration routes, and known herring spawning areas. Recreational data compiled indicates that 27,500 resource user trips (13,900 boat, 10,000 shore, and 3,600 tideflat) harvested 134,500 animals (55,900 shrimp, 31,400 fish, 23,600 crabs, 23,400 clams, and 200 miscellaneous invertebrates) in the estuary during the study period. Dungeness crabs comprised the majority of the boat anglers' catch; Pacific staghorn sculpin, starry flounder, and shiner perch the principal shore anglers' catch. Ghost shrimp and cockle and softshell clams were the primary catch of tideflat users. Commercial shellfish landings also accumulated 10,791 pounds valued at $8,000. (Schroeder-Wisconsin)
W75-03346

EXPANSION AND EVALUATION OF AN ARTIFICIAL REEF OFF MURRELL'S INLET, SOUTH CAROLINA,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
R. B. Stone, C. C. Buchanan, and R. O. Parker.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-73-10395, $4.25 in paper copy, $2.25 in microfiche. Report CPRC-72009, February 1973. 2 fig, 16 tab, 17 ref. 10140032.

Descriptors: *Fish management, *Fishing, Fish establishment, *South Carolina, Recreation, Reefs.
Identifiers: *Artificial reef, Paradise Reef(SC), Murrell's Inlet(SC).

In the spring of 1971, local businessmen, the National Marine Fisheries Service, and the South Carolina Marine Resources Division engaged in a cooperative effort to expand and study the Paradise Fishing Reef. The expansion phase of the project consisted of assembling and adding over 20,000 scrap tires to the reefsite. A number of studies were conducted to determine the effect of the artificial reef on the distribution and abundance of fish. Migration habits of reef fish were traced through tagging. Fishing was surveyed by counting private boats leaving the inlet during selected periods, while angler success was surveyed through mail questionnaires. Results indicate the artificial reef has provided a favorable fish habitat. One of the experimental reefs increased fish-carrying capacity 300-1800 times over the prior open bottom. The ten-tire compressed bale proved to be the easiest unit to use in expanding the reef. Catch per angler hour for pelagic fish was higher over the reef but not statistically different from the natural habitat. The reef attracted a number of new anglers (16%) to the area, but future expansion is necessary to accommodate the fishing pressure it receives. (Schroeder-Wisconsin)
W75-03348

COMMERCIAL OYSTER FISHERY DEVELOPMENT INVESTIGATION,
Hawaii State Dept. of Land and Natural Resources, Honolulu.
P. Y. Kawamoto, and H. M. Sakuda.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-73-11754, $3.75 in paper copy, $2.25 in microfiche. Report No NOAA-73090614, May 1973. 37 p, 14 fig, 3 tab, 16 ref. H-2-R and H-13-R.

Descriptors: *Oysters, *Shellfish farming, Aquiculture, *Hawaii, Fish management, *Commercial shellfish, Biological properties, *Feasibility studies.
Identifiers: West Loch(Hawaii), *Pearl Harbor(Hawaii), Oahu(Hawaii), Crassostrea virginica.

Biological factors and aquicultural practices were examined over the 1963-1972 period to determine the feasibility of developing a Hawaiian commercial oyster industry utilizing the American oyster, Crassostrea virginica. American oysters used in this study came from West Loch in Pearl Harbor. Bed samplings were conducted for gonad development. Routine hydrographic and bacteriological observations were also made at study sites. Experimental oysters were also studied in various fish-ponds and tidal areas to determine their viability as growing areas. Results indicate that West Loch oysters reach maturity in two months. Spawning occurs primarily from March through October and 15 months is required to attain commercial sizes. The annual mortality rate was estimated at 68.7%. Oysters from West Loch reached commercially acceptable quality in 3 weeks utilizing artificial feeding conditions. Studies of the impact of thermal pollution on oysters indicate that growth is slower in warm water than in the cooler intake water. A serious problem faced by existing West Loch beds was a drastic depletion of the stock due to undetermined causes in 1972 which may require restocking from other areas. (Schroeder-Wisconsin)
W75-03350

THE TRANSITION FROM SMALL-SCALE TO LARGE-SCALE INDUSTRY,
United Nations Development Program, Lagos (Nigeria).
C. Campleman.
Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2159-2165, 1973.

Descriptors: *Fisheries, *Fish management, Regional development, Water resources development, *Economic feasibility, Benefits, Planning.
Identifiers: *Developing countries, *Fishing industry.

Because general economic growth lags behind improved food production efficiency, developing countries have great incentives to push for large scale fisheries. Improving the artisanal fisheries productivity is complex, involving improvement of technology, marketing, education, and communications. Provision of the institutions, the infrastructure, capital assistance, and extension of the fishery is also necessary. While these measures can greatly improve the artisanal fishery's production, they cannot turn it into a large-scale industry in a short period of time. Instead, developing countries have attempted to create a modern capital-intensive firm co-existing with the artisanal sector. The new sector benefits the old through expansion of the markets, technical adoption, and improvements of the intrastructure. Such benefits are limited, however, unless the new sector exploits new fishery resources. Principal constraints to the new sector are similar to those limiting development of the old: lack of capital; lack of foreign exchange; lack of managerial and technological skills; and lack of an adequate infrastructure. Several forms of governmental intervention including multilateral and bilateral agreements, joint ventures, and managerial contracts are suggested as means to eliminate the above constraints. (Schroeder-Wisconsin)
W75-03351

ENVIRONMENTAL POLLUTION IN A RAPIDLY GROWING ECONOMY,
For primary bibliographic entry see Field 6G.
W75-03353

DISTRIBUTIONAL IMPACTS OF ENVIRONMENTAL MANAGEMENT: FEDERAL GRANTS FOR WATER POLLUTION CONTROL,
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W75-03354

THE ROLE OF AQUACULTURE IN FISHERY DEVELOPMENT AND MANAGEMENT,
Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries.
T. V. R. Pillay.

Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2202-2217, 1973. 11 tab, 18 ref.

Descriptors: *Aquiculture, *Fish management, *Mollusks, Cost-benefit analysis, Fish farming, Foods, Regional development, Natural resources, Water resources development, Return(Monetary).
Identifiers: Fishery conservation.

Although aquaculture has had differing developmental patterns throughout the world, it presently represents a viable and growing industry. With world production difficult to assess, FAO statistics indicate that 36 countries produced by culture over three million tons of finfish and one million tons of mollusks in 1970. In the U.S. alone, $80 million of ornamental fish are imported annually. Presently, aquaculture is used for food production; improvements of natural stocks; production of sportsfish, baitfish, and ornamental fish; fertilizers; and feeds. It also provides a number of jobs, and assists in the improvement of fishery management practices by lessening the strain on the wild stocks through the development of new supply sources. With seed, feed, and labor representing major costs, a summary of a number of cost-benefit studies of several commercial aquaculture firms indicates that government subsidies are not necessary for their development. Although no world-wide survey has been conducted, it is known that extensive areas are readily available for aquaculture in many developing countries. Constraints limiting further aquaculture development are lack of adequate planning, financing, and shortage of trained personnel. (Schroeder-Wisconsin)
W75-03355

FUTURE OF DESALTING IS BRIGHT BUT COSTS MUST DROP,
Water and Wastes Engineering, New York.
For primary bibliographic entry see Field 3A.
W75-03356

DETERMINING AN EQUITABLE SURCHARGE FOR INDUSTRIAL WASTES,
Gilbert Associates, Inc., Reading, Pa.
For primary bibliographic entry see Field 5G.
W75-03397

MERCURY,
Bureau of Mines, Washington, D.C. Div. of Nonferrous Metals.
V. A. Cammarota, Jr.
Available from Superintendent of Documents, Washington, DC 20402, for $0.25 per copy. In: 1972 Bureau of Mines Minerals Yearbook, US Government Printing Office, Washington, DC, 1972, 11 p. 1 fig, 13 tab, 18 ref.

Descriptors: *Mercury, *Legislation, Regulation, *Toxicity, Water pollution, Federal Water Pollution Control Act, Pollutants, Mining, Heavy metals, Organic compounds, Inorganic compounds, Public health, Industrial wastes, Water pollution sources.

A general overview of mercury covers the areas of legislation and government programs, domestic production, consumption and uses, prices, foreign trade, a world review of mercury, and recent technology. Because of restrictions on the use of mercury in certain industrial processes imposed by the EPA, sales and prices of mercury dropped to a new low in 1972, and many mines were closed or partially closed. However, consumption in 1972 was 1% higher than in 1971. Increased consumption was noted for agriculture, dental preparations, and industrial and control instruments. Electrical apparatus, down 8%, showed the largest decline of the major uses, mainly because of a fall in consumption for batteries. Mercury exports decreased significantly to 400 flasks from 7232 flasks in 1971. Because of the concern over the level of mercury in the environment, available data on mercury content in rocks, ores, minerals, soil, water and plants were compiled with a view toward elucidating the role of natural processes in releasing mercury to the environment. A process was developed to remove mercury from the sulfuric acid produced from roasting zinc ores, and a method of determining traces of mercury in liquids, sensitive to about 1 part per billion, was developed. (Jernigan-Vanderbilt)
W75-03797

LONG TERM INVESTMENT CONSIDERATIONS OF CONJUNCTIVE DESALTING SYSTEMS,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 3A.
W75-03807

6D. Water Demand

FACTORS INFLUENCING PARTICIPATION IN RECREATION ACTIVITIES IN SOUTHEAST IOWA, AND CAMPER ATTENDANCE AT MACBRIDE STATE PARK,
Iowa Univ., Iowa City. Recreation Education Program.
For primary bibliographic entry see Field 6B.
W75-03317

A NOTE ON THE EVALUATION OF ACTIVITY DEPENDENT RECREATIONAL DAMAGE COST FUNCTIONS,
Texas Univ., Austin. Dept. of Chemical Engineering.
M. Bundgaard-Nielsen, and D. M. Himmelblau.
Water Resources Bulletin, Vol 10, No 3, p 580-585, 1974. 2 fig, 5 ref.

Descriptors: Recreation, *Water resources development, *Recreation demand, Water quality, Planning, *Costs, *Evaluation, *Benefits.

Determination of recreation benefits arising from improved water quality is an important aspect of water resources management. To develop the functional relationship three steps must be undertaken: identify the form of the function; estimate the coefficients of the functions through nonlinear estimation; and validate the function. Several approaches to developing recreational functions for water quality have been utilized. In the first, using attitude surveys, recreationists' perceptions of water quality are surveyed. Information from such surveys is generally difficult to relate to quantitative water quality factors, although they do isolate quality characteristics important to the public. A second postulates demand over supply functions for water quality, but difficulties in functional form and data generally limit such studies to qualitative interests. A third approach classifies benefits from water quality arising from water based activities requiring certain minimum water quality, but independent otherwise, and water based activities which rise proportionately to improved quality. Such an approach envisions a family of recreation functions. Estimation of coefficients under this approach can be facilitated through factual information on the physical characteristics of the water system combined with socio-economic investigations and/or subjective assessments of the specific recreation activity's value to yield a quantitative functional form. (Schroeder-Wisconsin)
W75-03341

ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION,
Oak Ridge National Lab., Tenn.
E. Hirst, and T. Healy.
Available from the National Technical Information Service, Springfield, Va. 22161, as CONF-730205-4, $4.00 in paper copy, $2.25 in microfiche. Presented at the Conference on Energy: Demand, Conservation and Institutional Problems, Massachusetts Institute of Technology, Cambridge, February 12-14, 1973. 20 p, 1 fig, 4 tab, 36 ref.

Descriptors: *Electric power demand, *Environmental effects, Conservation, Environmental engineering, Waste water treatment, *Pollution abatement, *Energy, Electric power production.
Identifiers: Electric mass transit, Solid waste disposal, Air pollution control, Waste heat dissipation, Electricity conservation.

Potential energy savings or expenditures resulting from six environmental quality strategies--electric mass transit, waste water treatment, solid waste disposal, air pollution control, waste heat dissipation, and electricity conservation--are summarized. Increased utilization of urban electric mass transit to 10% of the 1970 urban auto traffic; primary-secondary treatment of all 1970 waste water; 100% of incineration of 1970 solid waste (collection, transportation, and land filling having little electricity consumption); air pollution controls utilizing electrostatic precipitators and limestone scrubbers; and waste heat dissipation using cooling towers at power stations would result in increased energy consumption of 21, 25, 5, 39, and 14 billion KW hr/year respectively. Two strategies to handle solid waste are examined as methods to reduce total electricity consumption and adverse environmental effects of power production. Incineration to generate electricity or recycling of solid wastes could have reduced energy consumption in 1970 by 25 and 23 billion KW hr/year. Shifts in home heating to gas, increased insulation, and utilization of more energy-efficient air conditioners could also have reduced energy consumption by 60 billion KW hr/year. Energy costs of construction of such systems are not discussed. (Schroeder-Wisconsin)
W75-03399

EAST BRIMFIELD AND WESTVILLE RESERVOIRS. QUANTITY AND VALUE OF WATER SUPPLY STORAGE. QUINEBAUG RIVER--MASSACHUSETTS.
Public Health Service, New York.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-778 564, $3.75 in paper copy, $2.25 in microfiche. July 1959. 23 p, 4 tab, 1 fig.

Descriptors: *Water sources, *Water resources, *Water supply, *Water demand, *Massachusetts, Storage, Water storage, Reclaimed water, Water reuse, Resources, Water quality, Watershed management, *Management, Water utilization, Water yield, Water yield improvement, Supply, Water policy, Resources development, Watersheds(Basins), Potential water supply, Electric power, Electric power demand, Utilities, Reservoirs.
Identifiers: *Quinebaug River(Mass), *Southbridge(Mass), *Hatchet Brook watershed(Mass), *East Brimfield Dam(Mass), Westville Dam(Mass).

Two major water sources available to Southbridge, Massachusetts, are the Hatchet Brook watershed which furnishes 1.3 MGD and the Quinebaug River which provides 9.8 MGD of reclaimed industrial water. The Southbridge Water Supply Company will need additional water since future demand exceeds the safe yield of the existing system. These requirements probably can be best served by developing the Breakneck Brook watershed rather than from storage on the Quinebaug River. However, Southbridge's major industrial water users depend on water from that river and require storage. The value of supplying a minimum flow in the Quinebaug River of 22 cfs from the East Brimfield Dam and Reservoir was investigated in terms of costs of alternate single-purpose water supply reservoirs and the cost of electric power that may be purchased to substitute

for power generated in existing steam plants. The latter method of evaluation gave the lowest reasonable value for the assured flow. Cost of substituting electric power in maintaining a minimum flow of 22 cfs in the Quinebaug River is $7,400 per year. The present worth of $7,400 annually for 50 years at 4 per cent interest is $159,000. (Grden-North Carolina)
W75-03437

6E. Water Law and Institutions

DISTRIBUTIONAL IMPACTS OF ENVIRONMENTAL MANAGEMENT: FEDERAL GRANTS FOR WATER POLLUTION CONTROL,
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W75-03354

STUDY AND SURVEY OF LAKE MICHIGAN SHORE LINE,
Smith and Hurd Annotated, Ch 19, secs 1141-1146, p 35-36 (Supp 1973). (Illinois).

Descriptors: *Erosion control, *Lake Michigan, *Illinois, *Administrative agencies, *Coordination, *Public health, Safety, Federal government, Local governments, Adoption of practices, Administration, Economic aspects, Research, Shoreline, Inter-agency cooperation, Water resources development, Evaluation, Land management, Water management(Applied), Surface runoff, Erosion.
Identifiers: Administrative regulations, Environmental policy, State policy.

The Illinois Division of Water Resource Management of the Department of Transportation in coordination with federal and local agencies will study and devise means of preventing erosion of the shore of Lake Michigan. An attempt will be made to prevent or minimize, in the immediate future, damage to homes and other buildings and danger to human life resulting from such erosion. Agreements between cooperating agencies, organizations, and individuals may be made to assign specific projects, phases of particular projects, as well as joint undertakings and contributions of funds. The Division of Water Resource Management will work with the federal government to evaluate the influence of the construction at the Great Lakes Naval Training Facility upon the southerly movement of littoral material along the west shore of Lake Michigan. No contract may be entered into for any expenditure of funds appropriated and made available to implement and carry out this legislation without the prior written approval of the Governor. (Sperling-Florida)
W75-03357

UNITED STATES V. CHESAPEAKE AND DELAWARE SHIPYARD, INC. (SUIT BY GOVERNMENT TO RECOVER UNDER THE 'WRECK ACT').
369 F Supp 714 (DC Md 1974).

Descriptors: *Maryland, *Judicial decisions, *Rivers and Harbors Act, *Neglience, *Navigable waters, Legal aspects, Water law, Legislation, Navigation, Canals, Channels, Inland waterways, Non-consumptive use, Water policy, Federal government, Common law, Law enforcement, Non-structural alternatives, Damages, Administrative agencies, Administration, Adjudication procedure.
Identifiers: Navigation obstructions, Presumptions(Legal).

The United States, pursuant to section 409 of the Rivers and Harbors Act, the 'Wreck Act' sued the defendant corporation to recover costs incurred in raising and removing the defendant's barge from a navigable channel of the Chesapeake and Delaware Canal. The barge had been intentionally sunk and moored by employees of the defendant. One evening the barge inexplicably broke its moorings and settled in the channel. When asked to remove the barge, the defendant's president refused, stating that it was abandoning the barge. The Corps of Engineers subsequently removed the barge. The government asserted that the sunken barge was a 'vessel' under the Wreck Act and that under the doctrine of res ipsa loquitur the defendant was held negligent and therefore liable under the Act. The U.S. District Court of Maryland sustained the government and held that the defendant failed to overcome the inference of negligence under res ipsa loquitur. The court ruled that where a vessel sinks in a navigable waterway due to owner's negligence, thereby creating an obstruction to navigation, the owner may not shift the burden of removing the vessel to the government by abandoning the vessel. Judgment was for the government. (Deckert-Florida)
W75-03358

SCHINE ENTERPRISES, INC. V. ASKEW (DECLARATORY JUDGMENT ACTION CONCERNING FLORIDA INLAND NAVIGATION DISTRICT).
291 So 2d 130 (1st D C A Fla 1974).

Descriptors: *Florida, *Judicial decisions, *Contract administration, *Legislation, *Claims(Contracts), Legal aspects, Water law, Legal review, Equity, State jurisdiction, State governments, Administrative agencies, Water resources development, Constitutional law, Water policy, Comprehensive planning, Inland waterways, Conservation, Recreation, Area redevelopment, Land tenure, Contracts, Land development, Land management.
Identifiers: Declaratory judgments, State policy, Coastal waters, *Coastal zone management.

Plaintiff corporation sought a declaratory judgment as to its rights under a contract which its predecessor had entered into with the Florida Inland Navigation District, a state agency. The contract concerned a parcel of property through which the Intercoastal Waterway ran. The contract was an option agreement giving the plaintiff the right to 'meet and match' any satisfactory purchase offers respecting the property. The plaintiff contended that a dedication of the land to another state agency, made pursuant to a state statute directing development of the property for recreation and conservation purposes, violated the agreement and that the authorizing statute deprived it of property without due process of law. The trial court ruled in favor of the defendants, and the plaintiff appealed. The District Court of Appeal of Florida, affirming the lower court, ruled that the plaintiff's contract right was in the nature of a 'right of first refusal' contingent upon receipt by the District of a satisfactory offer to purchase from a third party. It further held that the dedication agreement was not a transfer within the meaning of the contract, and thus the plaintiff's contractual rights were not impaired. (Deckert-Florida)
W75-03359

CANAL AUTHORITY OF STATE OF FLORIDA V. CALLAWAY (INJUNCTION TO STOP CONSTRUCTION).
489 F 2d 567 (5th Cir Fla 1974).

Descriptors: *Florida, *Judicial decisions, *Environmental effects, *Canal construction, *Inland waterways, Federal government, State governments, Federal jurisdiction, Water management(Applied), Legal aspects, Governmental interrelations, Political aspects, Water law, Flooding, Federal-state water rights conflicts, Ecology, Impoundments, Lakes, Multi-purpose reservoirs, Legal review, Administration, Rivers, Post-impoundment, Administrative decisions, Recreation, Adjudication procedure, Administrative agencies.
Identifiers: Injunctive relief, Presumptions(Legal), Dam effects, National Environmental Policy Act.

The plaintiffs, a state canal authority and others, sought an injunction against several federal agencies to prevent the termination of the Cross Florida Barge Canal project, and also requested a preliminary injunction preventing the proposed drawdown of Lake Ocklawaha which had been created as part of the canal project. The plaintiffs contended that the drawdown would result in the loss of recreational use of the lake, loss of tourism, and alteration of the lake ecology. The defendants argued that creation of the lake had already damaged the original tree swamp ecology of the Ocklawaha Valley and that continued maintenance of the lake would result in the permanent destruction of the Ocklawaha Valley. A federal district court in Florida granted the injunction. When subsequent attempts to have the injunction lifted failed, and defendants appealed. The Fifth Circuit Court of Appeals held that the district court erred in placing the burden on the defendants to prove that their interests would suffer irreparable harm if the preliminary injunction was granted. The appellate court ruled that the burden of persuasion was at all times upon the plaintiffs and instructed the lower court to re-examine its order under the proper standards and without delay. (Deckert-Florida)
W75-03360

ENVIRONMENTAL DEFENSE FUND, INC. V. CORPS OF ENGINEERS OF THE UNITED STATES ARMY (ACTION TO RESTRAIN CORPS FROM FURTHER CONSTRUCTION OF NAVIGATION PROJECT).
492 F 2d 1123 (5th Cir 1974).

Descriptors: *Judicial decisions, *Federal jurisdiction, *Environmental effects, *Inland waterways, *Canal construction, Canals, Mississippi, Tennessee, Alabama, Water management(Applied), Ecology, Federal government, Administrative agencies, Federal project policy, Project planning, Engineering structures, Legal aspects, Water law, Legal review, Navigation, Rivers, Navigable waters, Administrative decisions, Project benefits, Project purposes, Adjudication procedures.
Identifiers: Injunctive relief, *Environmental impact statement, National Environmental Policy Act, Private interest groups.

Certain individuals and environmental groups sought an injunction against the Army Corps of Engineers and others to halt construction of the Tennessee-Tombigbee Waterway. The project was authorized prior to passage of the National Environmental Policy Act of 1969. Work on the project was halted by a preliminary injunction issued in 1971 by the federal district court for the District of Columbia, and the action was transferred to a federal district court in Mississippi. That court dismissed the complaint and dissolved the preliminary injunction. Construction has been underway since that dissolution. The plaintiffs contended that the Corps had failed to adequately consider environmental factors in its planning decisions and thus had not complied with the requirements of the NEPA. On appeal from the dismissal, the Fifth Circuit Court of Appeals ruled that an environmental impact statement prepared by the Corps complied with the NEPA requirements, and affirmed the lower courts ruling. The court further held that, although it had authority to review substantive agency decisions concerning environmentally controversial projects, Congress itself, by appropriating funds for this project after consideration of its environmental impact, had supplanted the Corps' decision and had thereby precluded such review. (Dekert-Florida)
W75-03361

ENVIRONMENTAL DEFENSE FUND V. TENNESSEE VALLEY AUTHORITY (ACTION TO ENJOIN TVA FROM COMPLETING CONSTRUCTION OF TELLICO DAM).
492 F 2d 466 (6th Cir 1973).

Descriptors: *Tennessee, *Judicial decisions, *Environmental effects, *Tennessee Valley Authority, *Adjudication procedure, Multiple-purpose projects, Rivers, Federal jurisdiction, Legal aspects, Legislation, Law enforcement, Dam construction, Impoundments, Flooding, Water management(Applied), Water law, Legal review, River basin development, Water supply, Watershed management, Multiple-purpose reservoirs, Federal government, Flood control, Recreation, Hydroelectric power.
Identifiers: Dam effects, *Environmental impact statement, Injunctive relief, National Environmental Policy Act, FWPCA Amendments of 1972, Environmental policy, Private interest groups.

An appeal was made from a Federal District Court decision dissolving a preliminary injunction and granting judgment for the defendant. The plaintiff environmental group sought to enjoin the defendant federal agency from completing construction of the Tellico Dam Project. This sixty-nine million dollar project admittedly would entail considerable ecological damage. The lower court granted a preliminary injunction on the finding that the defendant had not complied with the National Environmental Policy Act by filing an adequate impact statement. This preliminary injunction was upheld on appeal. After a hearing on the merits and consideration of the final impact statement, the district court dissolved the injunction and rejected the contention that the project was in violation of the N.E.P.A., or any other federal laws. The Sixth Circuit Court of Appeals affirmed, and held that the district court correctly applied the proper balancing test between ecological damage and economic and social benefits. The court also held that the N.E.P.A. did not require perfection, and that in assessing the adequacy of impact statements, practicability and reasonableness are to be considered along with the broad purpose of the Act. (Deckert-Florida)
W75-03362

THE INFLUENCE OF RECENT TRENDS IN WATER LEGISLATION ON THE STRUCTURE AND FUNCTIONS OF WATER ADMINISTRATION,
Fordham Univ., Bronx, N.Y. School of Law.
L. A. Teclaff.
Land and Water Law Review, Vol 9, No 1, p 1-19, 1974. 77 ref.

Descriptors: *River basin commissions, *River basin development, *Interstate commissions, *Comprehensive planning, *Water resources development, Governments, Water supply development, Water policy, Water law, Legislation, Local governments, Water pollution, Water pollution control, Water supply, Federal government, Water utilization, Water conservation, Water quality control, Adoption of practices.
Identifiers: *International agreements, Water rights(Non-riparians), Administrative regulations.

Common trends are developing internationally in water legislation. The common increasing demand for water means common problems of regulation. From conferences such as the International Conference on Water for Peace, 1968, a large body of data on water law and administration has become available. The common trends are most clearly manifest in the legalizing of the river basin as the basis for cooperation between states. International commissions of the Nile, Indus, and La Plata have authority only to advise and supervise the execution of previously approved water works. These commissions are more influential upon national water development than upon international cooperation. Both the Niger treaty and the 1972 Ramsar convention were concerned with detrimental effects of water development on other elements of the environment. On a world-wide scale, consolidation of water administration, preferably independent of existing agencies, is taking place very slowly. Recent water law tends to extend administrative control over all water uses. The goal is to co-ordinate the water control activities of a series of river basin agencies under one national water control agency. (Dillingham-Florida)
W75-03363

THE NECESSITY OF ZONING VARIANCE OR AMENDMENTS NOTICE TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES UNDER THE SHORELAND ZONING AND NAVIGABLE WATERS PROTECTION ACT,
McBurney, Musolf and Whipple, Madison, Wis.
C. H. Whipple.
Marquette Law Review, Vol 57, p 25-38, 1973. 85 ref.

Descriptors: *Wisconsin, *Judicial decisions, *Riparian rights, *Zoning, *Water pollution, Legal aspects, Navigable waters, Lakes, Navigable rivers, Flood plains, Water quality control, Water quality, State jurisdiction, Land use, Watersheds(Basins), Land management, Riparian land, Water pollution control, Water policy, Water law, Water management(Applied), Water allocation(Policy), Environmental effects.
Identifiers: Private interest groups, Public trust doctrine, Water rights(Non-riparians), State policy.

An important dimension has been added to zoning variance or amendment application procedure for all land either exhibiting or in proximity of navigable waters in Wisconsin. The uses made of land adjacent to water bodies and in flood plains and watersheds affect water quality. The Wisconsin Supreme Court established the state's right as trustee of shorelands to restrict private land use for water quality protection. This trusteeship when considered in light of the Shoreland Zoning Act, places the Department of Natural Resources (DNR) in the role of an interested person within the mandatory notice provision of municipal and county zoning statutes. Notice of application for a zoning variance as a condition precedent to establishing the jurisdiction of the board of review must be given to the DNR. Failure to do so will render void any action taken by the board of review. (Dillingham-Florida)
W75-03364

ENVIRONMENTAL LAW--OIL POLLUTION CONTROL--IN THE ABSENCE OF FEDERAL PREEMPTION AND ANY FATAL CONFLICT BETWEEN STATUTORY SCHEMES, A STATE MAY CONSTITUTIONALLY EXERCISE ITS POLICE POWER TO PROVIDE FOR CLEANUP OF OIL SPILLAGE AND FOR RECOUPEMENT OF COSTS CONCURRENTLY WITH THE FEDERAL GOVERNMENT,
For primary bibliographic entry see Field 5G.
W75-03365

U.S. CHECKING UP ON FIRMS' SPILL-PREVENTION, CLEANUP PLANS.
For primary bibliographic entry see Field 5G.
W75-03373

RECONCILING CONFLICTS AMONG DIFFERENT ECONOMIC INTEREST GROUPS IN THE MANAGEMENT OF FISHERIES,
Fisheries and Marine Service, Ottawa (Ontario).
For primary bibliographic entry see Field 6B.
W75-03392

A SURVEY OF INTERNATIONAL CUSTOMARY RULES OF ENVIRONMENTAL PROTECTION,
Wadham Coll., Oxford (England).
For primary bibliographic entry see Field 5G.
W75-03453

FISHERY PROPOSALS IN THE UNITED NATIONS SEABED COMMITTEE: AN EVALUATION,
Utrecht Rijksuniversiteit (Netherlands). Inst. of Public International Law.
A. W. Koers.
Journal of Maritime Law and Commerce, Vol 5, No 2, p 183-209, January 1974. 145 ref.

Descriptors: *United Nations, *Organizations, *Fisheries, *Fish management, *International law, *Commercial fishing, *International waters, Foreign trade, Aspects, Law of the sea, Fish conservation, Fish migration, Fish populations, Fish types, Research.
Identifiers: *Resource allocation, *International agreements, *Coastal zone management, *Territorial waters, *Territorial seas(Jurisdiction).

The developed international law of marine fisheries deals with five major problem areas: allocation of marine fisheries resources among the nations of the world; prevention of the exploitation of the living resources of the sea from exceeding biological regenerative potential; full use of the resources; inplementation of economic efficiency of marine fishing operations; and research. Proposals submitted to the United Nations Seabed Committee to deal with these problems are examined. The most important factor in determining the allocation of fishery resources is the width coastal nations have established for exclusive fishery waters. The objective of most international fisheries agreements and organizations to facilitate conservation is to limit the catch of fishery stocks. Effective conservation measures have been applied to only a small number of fishes. The degree of utilization of specific stock should be determined by economic factors. Overcapitalization occurs in most commercially attractive high seas fisheries due partly to non-regulation of fishing operations on the high seas. Research requires international cooperation. Proposals of Kenya, Australia, and New Zealand, Canada, Soviet Union and the United States to deal with fishery problems are included. The respective projects are evaluated by their local and international effects. (Sperling-Florida)
W75-03454

MOSS ROSE MANUFACTURING CO. V. FOSTER (ACTION FOR RECOVERY OF WATER DAMAGE CAUSED BY SEEPAGE).
314 A.2d 25 (1974).

Descriptors: *Pennsylvania, *Judicial decisions, *Water storage, *Cisterns, *Seepage, Storage tanks, Water tanks, Water control, Seepage control, Negligence, Damages, Percolation, Groundwater movement, Percolating water, Subsurface drainage, Adjudication procedure.
Identifiers: Absolute liability, Water rights(Non-riparians).

Appeal was made to the Superior Court of Pennsylvania from a judgment for the plaintiff-appellee for property damage caused by water seepage from appellants' underground cistern. The parties in this action were manufacturing companies located adjacent to each other. Appellants maintained a large cistern below the basement of their premises. It overflowed and the water percolated through the soil column and, seeping into the appellee's basement caused considerable property damage to plaintiff's property. Appellants contend that there was insufficient evidence to support a finding of negligence. Appellees contend that their neighbors are liable on negligence principles for failing to reasonably maintain the cistern. The lower court found appellants liable for negligently maintaining the cistern and on a theory of absolute liability of the landowner. The Superior Court affirmed the negligence count and declined to rule on the absolute liability. (Dillingham-Florida)
W75-03455

PEOPLE V. OCEANA TERMINAL CORP. (PROSECUTION FOR AN OIL SPILL).
352 N.Y.S.2d 818 (1974).

Descriptors: *New York, *Judicial decisions, *Oil spills, *Water pollution sources, *Enforcement, Oil industry, Oil pollution, Legislation, Navigable waters, Water pollution, Water law, Civil law, Storage tanks, Water quality control, Waste disposal, Local governments, Water pollution control, Adjudication procedure, Water rights, Administrative agencies, Adoption of practices, Administrative decisions, Environmental effects, Legal aspects.
Identifiers: *Hazardous substances(Pollution).

An oil storage terminal company was prosecuted for an oil spill. The prosecution alleged that the spill violated the statute proscribing the disposal of offensive matter into navigable waters. The spill occurred when an 8-inch check valve with no prior indicated defect broke at the terminal, leaking a large quantity of oil into the river. The trouble point had been inspected only 20 minutes before the break occurred. The whole system was constantly under surveillance. The prosecution contended that the spill was within the purview of a statute intended to punish the dumping of garbage and like wastes and that terminal owners were civilly liable. The defendants were willing to plead guilty but the court dismissed the case. The court held that the statute proscribing the disposal of waste matter into the river was not intended to include oil spills and that the defendants could not be held civilly liable for environmental damage caused when pipes suddenly break without prior indicated defect. (Dillingham-Florida)
W75-03456

MCCALL V. PRESLEY (SEEKING MANDAMUS FOR ISSUANCE OF BUILDING PERMIT).
512 S.W.2d 693 (Tex App 1974).

Descriptors: *Texas, *Judicial decisions, *Legal aspects, *Regulation, *Water supply, *Construction, Permit, Land tenure, Municipalities, Administrative agencies, Decision making, Adoption of practices, Conduit, Water distribution(Applied), Water shortage, Water system, Administration, Planning, Equity, Adjudication procedure, Water allocation(Policy), Water management(Applied), Comprehensive planning.
Identifiers: *Injunctive relief.

Property owners sought a writ of mandamus requiring the issuance of a building permit. The district court rendered a judgment in favor of the property owners. On appeal the city prevailed. The court held there was not enough water to supply a house which the owners proposed to build. There was also no water line sufficient to provide fire protection for the proposed house. This reversal on appeal was in accordance with the decision of the city board of appeals which denied the permit, notwithstanding an arrangement whereby a neighbor had given owners permission to connect the water facilities of the proposed house to the neighbor's line which was connected with the city water system. Orders of the water commission are presumed legal and valid and the burden is on the party appealing from the order of the commission to show that the order is not reasonably supported by substantial evidence. (Sperling-Florida)
W75-03457

PERSPECTIVES ON COASTAL MANAGEMENT--MARINE TRADES AND THE COASTAL CRISIS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 6B.
W75-03458

PEOPLE EX REL GAZLAY V. MURRAY (ACTION TO ENJOIN FILLING PARCEL OF SUBMERGED LAND).
221 N.W.2d 604 (Ct App Mich August 13, 1974).

Descriptors: *Land tenure, *Federal government, *Michigan, *Administrative agencies, *Legal aspects, *Submerged lands, Beds, Bay, Meanders, Ownership of beds, State governments, Land reclamation, Land use, Land development, Real property, Conservation, Natural resources, Water law, Accretion(Legal aspects), Boundaries(Property).
Identifiers: Fill permits.

Action was brought by the Michigan Department of Natural Resources to enjoin the defendant from filling a parcel of submerged land located in Mallard Bay. The circuit court found that the defendant's federal land patent covered neither the Bay nor the land claimed. The court of appeals held that unless the land in question was transfered by the federal government by patent prior to Michigan's admission to the Union, the land in question belonged to the people of the state. The court also held the patent did not cover the land in question, that the state was not estopped from claiming title to the land because it approved the supervisor's plat which contained part of the land in question, and that the Marketable Record Title Act doesn't apply against the state. The federal government did not patent land by entire sections where the section was cut off by navigable water, but only conveyed fractional parts up to a meander line or at most to the water's edge. (Sperling-Florida)
W75-03460

PACIFIC NORTHWEST BELL TELEPHONE CO. V. U.S. (ACTION SEEKING DAMAGES FOR DAMAGE TO SUBMARINE TELEPHONE CABLE).
378 F Supp 297 (WD Wash, July 9, 1974).

Descriptors: *Judicial decisions, United States, *Legal aspects, *Legislation, *Permits, Economic aspects, Washington, Navigation, Ships, Decision making, Conservation, Admiralty, Adoption of practices, Jurisdiction, Lakes, Planning, Federal government, Adjudication procedure.
Identifiers: Liability(Legal aspects), Immunity(Legal aspects), Sovereign immunity.

Action was brought by the Pacific Northwest Bell Telephone Company against the United States of America in the Western District of Washington. The company alleged damage to a submarine telephone cable allegedly caused by the negligence of the United States Coast Guard. There was a clause in the permit to lay submarine telephone cable in navigable waters of the lake, which attempted to immunize the United States from liability from future navigation, conservation or improvement operations. The court held the clause to be invalid, both under the Public Vessels Act, and under the 1960 amendments to the Suits in Admiralty Act. These acts were designed to subject the United States to maritime tort liability to the same extent as private persons, so the clause could not immunize the United States from liability for alleged negligence in causing damage to a cable. (Sperling-Florida)
W75-03461

UNITED STATES V. RAVEN (APPEAL FROM CONVICTION FOR FAILING TO REMOVE SUNKEN VESSEL AND OBSTRUCTING NAVIGABLE WATERWAY).
500 F 2d 728 (US Ct Ap, 5th Cir 1974).

Descriptors: *Florida, United States, *Rivers and Harbors Act, *Judicial decisions, *Navigable waters, Ships, Vessels, Legislation, Safety, Public health, Environmental sanitation, Legal aspects, Channel, Adoption of practices, Decision-making, River, Bodies of water, Water law, Adjudication procedure.
Identifiers: Navigational obstruction, Liability(Legal aspects), Injunctive relief, Information(Prosecution).

An appeal was made of a conviction, in Florida, for failing to properly mark a sunken vessel, obstructing a navigable waterway, and failing to remove a sunken vessel. The court held that the legislation prohibiting obstruction of navigable waters generally applied to a sunken vessel. The Rivers and Harbors Appropriation Act of 1899 prohibited obstruction of navigable waters by vessels. However, this statute is not limited to those vessels that are sunk as the result of wrecks, but extends to derelicts sunk from other causes. If violating this statute requires a deliberate act then proof that the vessel after being severely damaged in a storm was left in a river for three months was sufficient to show a deliberate act. The purpose of the statute, requiring sunken vessels to be marked and removed in a navigable channel is the protection of other vessels plying the same waters. (Sperling-Florida)
W75-03462

JACKSON V. TEXAS WATER RIGHTS COMMISSION (SUIT SEEKING CANCELLATION OF COMM'N. ORDERS DESIGNATING UNDERGROUND WATER CONSERVATION DISTRICT).
512 SW 2d 696 (Tex App 1974).

Descriptors: *Texas, *Judicial decisions, *Legal aspects, *Water conservation, *Administration, *Administrative agencies, Adoption of practices, Planning, Groundwater, Legislation, Decision making, Regulation, Political subdivisions, Water resources, Water resources development, Comprehensive planning, Enforcement, Conservation, Adjudication procedure.
Identifiers: Administrative regulations, State policy, *Environmental policy, Liability(Legal aspects).

Action was brought seeking the cancellation of orders of the Texas Water Rights Commission designating an underground water conservation district. The lower court held against the plaintiffs. On appeal it was held the suit was moot in that the orders were cancelled when an election refused to confirm the district. The Court of Civil Appeals is not empowered to write advisory opinions. Section 51.034(a) of the Texas Water Code provides that if the majority of those voting at an election vote in favor of the confirmation of the district, the district is confirmed and ratified. However, if the majority of those voting at the election vote against the confirmation of the district, the district shall have no further authority, except that any debts incurred shall be paid and the organization of the district shall be maintained until all the debts are paid. (Sperling-Florida)
W75-03463

A. H. SMITH SAND AND GRAVEL CO. V. DEPT. OF WATER RESOURCES (ACTION DEALING WITH FILLING OPERATIONS IN FLOODPLAIN).
313 A 2d 820 (Md App 1974).

Descriptors: *Maryland, *Judicial decisions, *Flood plain, *Flood plain zoning, *Flood control, Deposition(Sediments), Floods, Non-structural alternatives, Eminent domain, State jurisdiction, Legal aspects, Administrative agencies, Water pollution control, Pollution abatement, Industrial effluents, Industrial wastes, Sedimentation, Administrative decisions.
Identifiers: Administrative regulations.

Appeal was made by a sand and gravel company from a Circuit Court order which affirmed the order of the Maryland Department of Water Resources (DWR) requiring that no filling operations should take place on appellant's land which is situated within a fifty-year flood plain. The

court modified DWR's order by redefining the boundaries of the floodplain established by DWR. DWR had appropriated a portion of appellant's land for flood control purposes. Appellant contended that this action constituted an unreasonable restriction upon the use of its property. DWR argued the appropriation was necessary for flood control. The Court of Appeals held that the order did not deny the appellant all reasonable use of its property within compensation. The redetermination of the floodplain boundaries was warranted because new information indicated flood periodicity was less than 50 years. The Circuit Court's decision was affirmed. (Dillingham-Florida)
W75-03464

COMMONWEALTH V. BOROUGH OF GALETON (PETITION TO ENFORCE CLEAN STREAMS LAW).
312 A 2d 812 (1973).

Descriptors: *Pennsylvania, *Judicial decisions, *Law enforcement, *Penalties(Legal), *Water quality control, State governments, Administrative agencies, Local governments, Legislation, Water law, Legal aspects, Management, Legal review, Regulation, Governmental interrelations, Non-structural alternatives, Water resources development, Water policy, Adjudication procedure, Water pollution control, Municipal wastes, Local governments.
Identifiers: State policy.

Petitioner Pennsylvania state agency brought action seeking enforcement of an order issued pursuant to the Clean Streams Law (CSL) and asking that the respondents, the borough and named public officials thereof, be adjudged in contempt pursuant to that law. The respondents filed a motion to strike for petitioner's failure to name all those officials in office at the time the petition was filed. The petition named those individuals in office at the time the original department order was issued. The Commonwealth Court found that the dominant purpose of the contempt procedure under the Clean Streams Law is remedial in nature, as a means of coercing local authorities into compliance. Accordingly, the court ruled that the petitioner must include in its petition all those persons who are members of the concerned local governing body or bodies at the time of the filing of the petition, but need not include former public officials. The petition was dismissed with leave to amend. (Deckert-Florida)
W75-03465

IN RE BARKER SARGENT CORP (APPEAL FROM ENVIRONMENTAL BOARD DECISION).
313 A 2d 669 (Vt 1973).

Descriptors: *Judicial decisions, *Land use, *Landfills, *Sanitary engineering, *Environmental effects, Environmental sanitation, Environmental engineering, Land development, Land management, Air pollution, Aesthetics, Noise pollution, Administrative agencies, *Vermont, Land use, Permits, Public rights, Public benefits, Legal aspects, Administrative decisions, Social aspects, Wildlife, Wildlife conservation, Conservation.
Identifiers: Administrative regulations, State policy, Licenses, Nuisance(Legal aspects).

An appeal was made by adjacent landowners from an administrative decision of the Vermont Environmental Board granting a land use permit to a sanitary landfill in the town of Thetford. In evaluating the validity of the issuance of the land use permit, the court examined the applicable sections of the state statute. The statute provides that the town must show that undue air or water pollution will not result before granting the permit. The appellant argues that the Board was in error in finding that the proposed landfill would not create air pollution. Appellants contend that air pollution can be caused by the creation of noise, and that such noise would be created by development of the landfill. Appellants asserted that wildlife and local scenery would suffer. Appellee argued that any adverse wildlife and visual effects would be minimal, and noise would be subdued. The court sustained the ruling of the Environmental Board concluding that it is necessary to place sanitary landfills somewhere, and merely offending the feelings of adjacent landowners has no validity. (Sperling-Florida)
W75-03466

CAPPTURE REALTY CORP. V. BOARD OF ADJUSTMENT (SUIT CHALLENGING DENIAL OF SPECIAL EXCEPTION USE–CONSTRUCTION IN FLOOD PLAINS).
313 A 2d 624 (1973).

Descriptors: *New Jersey, *Flood plains, *Flood plain zoning, *Flood control, *Judicial decisions, Zoning, Flood protection, Streams, Civil engineering, Drainage systems, Reasonable use, Surface runoff, Comprehensive planning, Long term planning, Decision making, Legislation, Legal aspects, Water law, Administration, Administrative decisions, Water zoning, Water policy, Land use, Land management, Regulation.

Plaintiff landowner was denied a special exception to an interim moratorium for construction in flood prone areas by the defendant Board of Adjustment. In seeking reversal of that denial plaintiff contended that the moratorium, imposed while the municipality considered options for flood control improvements, represented an unconstitutional taking of property under the fourteenth amendment by denying plaintiff the right to improve his lands. The defendant responded that the moratorium was a stopgap measure to allow time for construction and design of adequate flood prevention mechanisms, and as such was a legitimate exercise of police power exercised for the public welfare. The court noted that plaintiff, if allowed to construct his industrial area, would increase rain water runoff into already over-burdened streams as well as subjecting himself to future flooding. The length of the moratorium, limited to one year, was a reasonable exercise of zoning powers to allow proper study and construction of the improvements, and therefore was not an abuse of police powers. However, since the value of the land zoned for industrial use was limited by the moratorium, the court agreed with plaintiff that it was inequitable not to adjust the tax rate imposed on that land for the duration of the moratorium. The considerable problems that periodic flooding posed to the general welfare justified the reasonable imposition of construction limitation through temporary zoning, and plaintiff's claim of right to an exception was denied. (Salley-Florida)
W75-03467

COMMONWEALTH V. WASHINGTON TOWNSHIP (ACTION TO ORDER COMPLIANCE WITH CLEAN STREAMS LAW).
316 A 2d 107 (Pa Cmwlth 1974).

Descriptors: *Pennsylvania, *Judicial decisions, *Sewage effluents, *Local governments, *Adjudication procedure, Streams, Sewerage, Sewage disposal, Sewage treatment, Water pollution, Water pollution sources, Administrative agencies, Ecology, Law enforcement, Penalties(Legal), Jurisdiction, Water law, Water pollution control, Pollution abatement, Legislation Water policy.
Identifiers: Administrative regulations, Effluent limitations, State policy.

An action was brought by the Commonwealth of Pennsylvania against various local government agencies to enforce the final orders of the Department of Environmental Resources (DER) requiring the respondents' agencies to negotiate and enter into agreements for the planning, designing, financing and operating of sewage facilities within their respective territories. The Commonwealth contended that the respondents failed to comply with the various orders of the DER and that they should be compelled to do so under the Clean Streams Law (CSL). The Respondents countered that the pertinent section of CSL did not provide for the enforcement of sewage pollution abatement procedures and that the suit had been brought improperly. The Court held that it did not have the jurisdiction to enter the Commonwealth's petition as filed because the section of the CSL under which the Commonwealth sought relief did not expressly provide for direct enforcement of an order. The Court ordered the case dismissed without prejudice so that the Commonwealth might institute an action under the proper enforcement sections of CSL. (Dillingham-Florida)
W75-03468

MUSUMECI V. STATE (ACTION BY DOWNSTREAM LANDOWNERS TO RECOVER FLOODING DAMAGES CAUSED BY RELOCATION OF HIGHWAY).
351 NY S 2d 211 (1974).

Descriptors: *New York, *Judicial decisions, *Floods, *Streams, *Highway relocation, Highways, Right-of-way, Surface runoff, Vegetation effects, Drainage water, Surface drainage, Riparian land, Riparian rights, Construction, Road construction, Engineering structures, Drainage engineering, Channeling, Culverts, Legal aspects.
Identifiers: Nuisance(Legal), Water rights(Non-riparian).

Action was brought by downstream landowners against the State of New York to recover for damages caused by flooding allegedly caused by the State's relocation of a highway. During the construction and relocation of Route 57 the vegetation on the right-of-way was removed. Drainage ditches collecting surface run-off water from the highway were constructed, and culverts concentrating and channeling these waters into a nearby creek were built. These measures taxed the stream beyond its capacity and caused it to overflow onto the claimants' property. Landowners contended that the flooding was caused by the construction of the highway while the State claimed it was caused by an abnormally heavy rainfall. The New York Supreme Court held that the State has no greater right than an individual to collect surface water from its lands into an artificial channel and to discharge it upon the lands of another, nor has it any legal immunity for creating nuisances. The State was held liable to the downstream owners for the flooding of their lands. (Dillingham-Florida)
W75-03469

SMITH V. HADAD (PETITION TO REGISTER AND CONFIRM TITLE TO LAND).
314 NE 2d 435 (Sup Jud Ct Mass 1974).

Descriptors: *Massachusetts, *Judicial decisions, *Legal aspects, *Land tenure, *Boundary disputes, Streams, State governments, Decision-making, Planning, Adoption of practices, Measurement, Watercourse, Water resources, Water law, Boundaries(Property), Water policy.
Identifiers: Easements.

Action was brought to confirm title to land. The land court ordered registration as applied for except for a thirty-three foot strip. On appeal the court held that in the absence of a clear showing of a contrary intent, where the boundary of a tract was described in a deed as running westerly one-hundred and seventy-five feet from a named street, there was a presumption that the measurement was from the sideline of the street. Massachusett's rights in the street were by way of easement rather than in fee simple absolute. After the taking of an easement for a public way the fee to the underlying land remains in adjoining property owners. The court after reviewing the weight of

authority held in the absence of a clear showing of a contrary intent, a measurement given from a stream or public or private way shall be presumed to begin at the side line of that stream or way. (Sperling-Florida)
W75-03470

JEWETT V. REDWATER IRRIGATING ASSOCIATION (ACTION FOR ADJUDICATION OF WATER RIGHTS).
220 NW 2d 834 (S Ct SD 1974).

Descriptors: *South Dakota, *Judicial decisions, *Water rights, *Water allocation(Policy), *Adjudication procedure, Water requirements, Irrigation, Water demand, Water delivery, Legal aspects, Land tenure, Streamflow, State governments, Rivers, Water resources, Water supply, Water shortage, Water utilization, Legal review, Water distribution(Applied), Water supply development.
Identifiers: Standing(Legal aspects).

An action was brought for the adjudication of water rights against the Redwater Irrigating Association and the South Dakota Water Resources Commission. The plaintiffs demanded delivery of irrigation water from the irrigation association. The Commission sought a declaratory judgment asserting their control over the water rights in the entire river irrigation system. The Circuit Court entered judgment for the plaintiffs. The Supreme Court affirmed holding where plaintiff's predecessor in title to land did not succeed to the water right located by another, the water used for irrigation of the land did not gain the status of an appurtenance. Therefore, the water was not used as a matter of right by the landowner. Where the grant or refusal to grant additional water to plaintiffs did not affect other water users above or below the stream, the state was not required to join the other claimants of water rights as parties in order to obtain a complete adjudication of the entire river irrigation system. (Sperling-Florida)
W75-03471

CAMPBELL V. VILLAGE OF OQUAWKA (ACTION TO ENJOIN CITY FROM MAINTAINING A LEVEE ABUTTING ITS PROPERTY).
307 N.E.2d 418 (Ill App 1974).

Descriptors: *Illinois, *Judicial decisions, *Levees, *Relative rights, *Local governments, Water management(Applied), Flood protection, Legal aspects, Equity, Flood routing, Flood control, Legal review, Public rights, Water policy, Land tenure, Eminent domain.
Identifiers: Injunctions(Mandatory).

Plaintiff landowner sought an injunction against defendant municipal corporation compelling removal of an emergency levee constructed by the defendant along the street abutting the plaintiff's property. The lower court ordered removal of the levee from a portion of the street in front of the plaintiff's premises, but refused to compel removal along the entire block in which the plaintiff's property was located. On appeal by the plaintiff, the Appellate Court of Illinois affirmed the lower court ruling. In a memorandum opinion, the appellate court ruled that owners of property abutting a street have a right to use of their property, including the right of ingress and egress over and by means of the adjacent portion of the street, but the rights of such owners, particularly riparian landowners, are subservient to the public need for protection from floodwaters. In the absence of any arbitrary action or abuse of police power by the village in constructing a levee for emergency flood protection, such owners are limited to an action for damages. (Deckert-Florida)
W75-03472

STATE EX REL. INDIANAPOLIS WATER CO. V. BOONE CIR. CT. (ACTION BY WATER COMPANY FOR WRIT OF PROHIBITION).
307 N.E.2d 870 (Ind 1974).

Descriptors: *Public utilities, *Legal review, *Adjudication procedure, *Administrative decisions, *Indiana, Water law, Legal aspects, Water allocation(Policy), Judicial decisions, Public rights, Equity, Contract administration, Administrative agencies, Water distribution(Applied), Governments, Regulation, Water supply.
Identifiers: Class action suits, Administrative regulations.

Plaintiff, water company and its wholly owned subsidiary, brought action for a writ of prohibition barring the Circuit Court from further proceedings in a pending class action, brought by customers of the water company to recover damages for alleged misconduct and improper rate charging. The realtors contended that the conduct in question was at all times known to the Public Service Commission and the Commission did, in fact, consider the disputed conduct in determining the rates to be charged. The respondents position was that an Indiana statute and prior decisions of the Indiana Supreme Court allowed them to pursue a judicial remedy when dissatisfied with rates charged by a business affected by the public interest. The Supreme Court held that this rule did not apply where the legislature has provided a regulatory structure, in this case the Public Service Commission, and where there was no fraudulent concealment of information on the part of the regulated business. The court held that the proper remedy for the respondents was an administrative appeal from the action of the Commission rather than an action for damages. An alternative writ was issued. (Deckert-Florida)
W75-03473

ROBERT E. NILLES, INC. V. ILLINOIS POLLUTION CONTROL BD. (ACTION AGAINST POLLUTION CONTROL BOARD FOR DENIAL OF SEWERAGE PERMITS).
308 N.E.2d 640 (Ill App 1974).

Descriptors: *Illinois, *Judicial decisions, *Water quality control, *Non-structural alternatives, *Legal review, Waste water(Pollution), Permits, Water management(Applied), Legal aspects, State governments, Administrative agencies, Legislation, Waste water disposal, Water quality, Water law, Adjudication procedure, Sewage, Water pollution, Water pollution control, Water pollution sources, Water resources development, Adoption of practices.
Identifiers: *Administrative regulations, Presumptions(Legal).

Petitioner corporation sought a variance without hearing from an order of the Illinois Pollution Control Board withdrawing sewer connection permits previously granted to the petitioner. The petition for a variance was summarily dismissed by the Board on the grounds that there was no proof that compliance with the order would impose an arbitrary or unreasonable hardship on the corporation. The Appellate Court of Illinois overturned the Board's decision. The court ruled that the corporation's petition alleged facts sufficient to support a claim of arbitrary or unreasonable hardship and thus petitioner was entitled to a hearing on the merits. A condition imposed on issued permits, that if any statement in the application was found to be incorrect, the permit might be revoked and all rights thereunder lost, did not limit the petitioner's future right to seek a variance or a new permit, nor did it interfere with the petitioner's right to claim equitable estoppel or estoppel in pais. Administrative boards have broad discretionary powers, but such powers must be exercised judiciously, not arbitrarily. (Deckert-Florida)
W75-03474

MEHLING V. DEINES (ACTION TO COMPEL DEFENDANT TO REOPEN DITCH TO PROVIDE PROPER DRAINAGE).
214 N.W.2d 627 (Neb 1974).

Descriptors: *Groundwater, Management, *Nebraska, *Judicial decisions, *Prescriptive rights, *Water law, Water flow, Groundwater movement, Runoff, Water sources, Groundwater runoff, Potential flow, Discharge, Prescriptive rights, Legal aspects, Water rights, Water policy, Irrigation, Irrigation canals, Irrigation ditches, Water management(Applied), Irrigation practices, Administration, State governments.
Identifiers: Presumptions(Legal), Water rights(Non-riparians).

Action was brought by the plaintiff-appellant, a landowner, to compel the defendant-appellee, an adjacent landowner, to reopen a ditch to provide drainage for the plaintiff's land. Defendant closed the ditch after sustaining crop damage from the run-off of plaintiff's irrigation water. Plaintiff contended that he had acquired an easement by prescription to drain water from his land through the extension ditch on the defendant's land. The court affirmed the lower court and held that plaintiff's proof failed to establish his prescriptive right for drainage across the defendant's land. The court explained that the common practice in the local area was to use drainage ditches established by the regional management district to dispose of irrigation waste water. The plaintiff used the ditch on the assumption that it was a district ditch. Therefore the use was permissive and not adverse and no claim of right was established. A use by express or implied permission or license cannot repen into an easement by prescription. (Sperling-Florida)
W75-03475

PIERCE V. RILEY (ACTION BY LAKE OWNERS FOR INJUNCTIVE RELIEF).
215 N.W.2d 759 (Mich App 1974).

Descriptors: *Michigan, *Riparian rights, *Relative rights, *Reasonable use, *Equity, Judicial decisions, Legal aspects, Water law, Land tenure, Non-structural alternatives, Adjacent landowners, Easements, Riparian land, Water rights, Land use, Legal review, Central United States, Canals, Water resources development, Water allocation(Policy), Preferences(Water rights), Water distribution(Applied), Water policy.
Identifiers: Injunctive relief, Water rights(Non-riparian).

Owners of lake property sought declaratory and injunctive relief against owners of a single lot through which a canal was constructed to provide access to the lake to ninety non-riparian lots. These lots were also owned by the defendants and were being developed as if the entire project had riparian rights. This plan would have increased the number of residents having access to the lake by sixty-six percent. The lower court enjoined the defendants from granting any of the non-riparian lot owners right-of-way easements to the canal, but refused the plaintiffs' request that the canal be ordered filled. Plaintiffs appealed, contending the lower court's order could not be effectively enforced. Defendants asserted that since the plaintiffs did not specifically request the canal be filled in their prayer for relief, the courts had no power to issue such an order. The Court of Appeals of Michigan ruled that since this action was equitable in nature, the courts were not bound by the prayer for relief. Finding the proposed project sufficiently injurious to the riparian owners as to constitute an unreasonable use, the Court of Appeals reversed the lower court and ordered the canal filled. (Deckert-Florida)
W75-03476

COMMONWEALTH OF KENTUCKY, DEPARTMENT OF HIGHWAYS V. FITZPATRICK

(EMINENT DOMAIN ACTION FOR TAKING OF RIVER BOTTOM LANDS).
504 S.W.2d 687 (Ky 1974).

Descriptors: *Kentucky, *Judicial decisions, *Road construction, *Property values, *Adjudication procedure, Right-of-way, River basins, Highways, Roads, Market value, Land appraisals, Pricing, Real property, Land tenure, Land use, Evaluation, Land, Eminent domain, Administrative agencies, Administration, Compensation, State policy.

Condemnation action was brought by the Kentucky Department of Highways to acquire right-of-way for construction of a highway through respondent's land. The Circuit Court awarded landowners $150,000.00 The Department on appeal contended that the award was excessive. The landowners countered that the award for taking 29.89 acres of river bottom land and level-to-rolling land located in a county where level land was in short supply was not excessive. The Court of Appeals held that the issue of the award was a jury issue and that the verdict rendered was supported by the evidence. The land, that the state had taken, was a portion of the most valuable in the county and therefore the verdict was not excessive. Judgment was affirmed. (Dillingham-Florida)
W75-03477

BEANE V. PRINCE GEORGE'S COUNTY (ACTION FOR DAMAGES FOR UNNATURAL WATER FLOW).
315 A.2d 777 (Md App 1974).

Descriptors: *Maryland, *Judicial decisions, *Outlets, *Discharge(Water), *Damages, Surface runoff, Surface waters, Drainage, Drainage effects, Drainage systems, Drainage engineering, Local governments, Urban drainage, Drainage water, Road construction, Pipes, Subsurface drains, Legal aspects, Water, Water policy.
Identifiers: Injunctive relief, Nuisance(Legal).

Landowners brought action against owners of adjacent property for alleged invasion of privacy, interference with pursuit of business, and slander of plaintiffs' title. The subject of the controversy was the improvement of a road near the litigants' property which involved installation of catch basins and a metal drainage pipe extending from that road past four residences including defendant's onto plaintiff's property, where it terminated in an outfall. Defendant landowners counterclaimed for water damages whereupon plaintiffs counterclaimed for damages and injunction prohibiting the county from further allowing unnatural surface water to flow on plaintiffs' land. Plaintiffs asserted that the outfall caused continuing damage to his property. The county asserted that there was no actual damage but merely a technical violation whose correction did not justify the county's effort and expense. The court did not agree that of the remedial alternatives proposed by the county none was practicable and at the same time reasonable in cost in proportion to the continuing damage suffered as a result of the continuing discharge of surface water. The court granted injunctive relief to the plaintiffs against the county. (Dillingham-Florida)
W75-03478

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES WATER QUALITY.
For primary bibliographic entry see Field 5G.
W75-03480

OLIVER V. MILLIKEN AND FARWELL, INC. (ACTION INVOLVING DIVISION AMONG RIPARIAN OWNERS OF ALLUVIAL DEPOSITS).
290 So. 2d 738 (La 1974).

Descriptors: *Louisiana, *Judicial decisions, *Accretion(Legal aspects), *Riparian rights, *Ownership of beds, Beds under water, River beds, Bottom sediments, Navigable rivers, Rivers, Navigable waters, Riparian land, Property, Surveys, Legal aspects, Prescriptive rights, Boundaries(Property), Mapping, Topography, Erosion, Sediments, Bank erosion, Beds.

The action involves the division among riparian owners of alluvial deposits known as Solitude Point which contains approximately 3,500 acres and is located on the west bank of the Mississippi River in the Parish of West Baton Rouge. Plaintiff-appellant and defendant-appellee are adjacent plantation owners who both alleged acquisitive prescription of various portions of Solitude Point. The trial court and the 1st Circuit Court of Appeal held that the evidence presented by the principal defendant did not establish its continuous, uninterrupted, actual, physical and corporeal possession of all of the controverted property, nor did it establish the location and extent of the batture that it allegedly possessed for 30 years. The court further held that the alluvion as an entirety should be apportioned as of the time that the suit to divide that alluvion was commenced. In dividing it among riparian owners the frontage to frontage method was properly used where it would produce the fairest results for all of the riparian owners, other methods resulted in inequitable division. (Dillingham-Florida)
W75-03481

ASKEW V. TAYLOR (ACTION FOR EQUITABLE RELIEF AGAINST STATE FOLLOWING DENIAL OF APPLICATION FOR DREDGE AND FILL PERMITS FOR BOTTOMLANDS).
299 So. 2d 72 (1st D.C.A. Fla 1974).

Descriptors: *Florida, *Judicial decisions, *Legal aspects, *Land tenure, *Fill permit, Regulation, Environmental effects, Administration, Planning, Decision making, Economic aspects, Administrative agencies, Water resources, Application methods, Water resources development, Adjudication procedure, Permits, Local governments, Equity, Contracts.
Identifiers: State policy.

Action was brought by a successor in interest to a purchaser of bottomlands against Reuben Askew, the governor of Florida. The plaintiff prevailed in the lower court and on this appeal from that decision in his request for relief against the state following the denial of his application for a dredge and fill permit. Plaintiff's predecessor had paid the purchase price to the Internal Improvement Fund. It was clearly intended that filling would take place out to the then-established bulkhead line and it was on that basis that the trustees fixed the price. Before executing the deed it is assumed the trustees of the fund had made findings to make their acts legal. No loss or legal injury would be suffered by the trustees of the fund of the state by granting relief seven years after the sale of state-owned submerged land. The slight, if any, changes in ecological conditions which had taken place could not impair the legal rights of the plaintiff. (Sperling-Florida)
W75-03482

EVOLUTION OF THE SMALL WATERSHED PROGRAM, CHANGES IN PUBLIC LAW 566--WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM, 1954-72,
Economic Research Service, Washington, D.C. National Resource Economics Div.
For primary bibliographic entry see Field 4D.
W75-03483

ADVISORY REPORT ON HEALTH EFFECTS OF NITRATES IN WATER.
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 5C.
W75-03484

FEDERAL ACTION FOR ENVIRONMENTAL PROTECTION AND ITS POTENTIAL SIGNIFICANCE FOR HOUSING.
Rivkin/Carson, Inc., Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161 as PB-230 209, $3.75 in paper copy, $2.25 in microfiche. Report HUD-PDR-001C, June 1973. 24 p, 11 ref, 1 tab. HUD H-2095-R.

Descriptors: *Federal government, *Administrative agencies, *Legislation, *Economic impact, *Environmental control, Inter-agency cooperation, Water policy, Water Quality Act, Federal Water Pollution Control Act, Regulation, Administration, Governmental interrelations, Environmental effects, Adoption of practices, Comprehensive planning, Water law, Legal aspects, Water resources development, Forecasting, Social impact, Prices, Administrative decisions.
Identifiers: *National Environmental Policy Act, Environmental policy, Administrative regulations, Environmental impact statement, FWPCA Amendments of 1972.

Many aspects of the Department of Housing and Urban Development's activities are affected by recently passed federal environmental protection legislation. The effects of this legislation upon the Department's present activities and upon the future production and preservation of the nation's housing supply are analyzed. Examined specifically are the effects of the National Environmental Policy Act, Executive Order 11514, and the guidelines promulgated by the Council for Environmental Quality. Also analyzed are the effects of recent legislation and regulatory action in the areas of air and water quality control and waste disposal. Also discussed are the actions taken by the Department to implement the Environmental Protection Act. While the environmental legislation and standards may lead to better quality housing, they may also result in a slow-down in the production of new housing, an increase in housing costs, and increased urban sprawl. (Deckert-Florida)
W75-03485

TRANSLATIONS ON ENVIRONMENTAL QUALITY, NO. 7.
Joint Publications Research Service, Arlington, Va.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161 as JPRS-61048, $4.00 in paper copy, $2.25 in microfiche. January 23, 1974. 37 p, 10 ref.

Descriptors: *Environmental control, *Pollution, *Ecology, Meteorology, Water quality control, Governments, Pollution sources, Environmental sanitation, Water supply, Wastes, Sewage, Sewage treatment, Disposal, Environmental engineering, Water resources development, Water law, United States, International law, International joint commission, Environmental effects, Pollution abatement, Governmental interrelations, Federal government.
Identifiers: *International agreements, *Environmental policy.

The serial report contains translations from the world press of articles and press commentary on environmental pollution and its effects. Also discussed are pollution control technology, organizations, and programs. The articles were written by authors from Eastern Europe, Latin America, and the Soviet Union. Several themes run through the collection of articles. In order to avert an ecological crisis in the world, cooperation of Soviet and American scientists is necessary. Steps must be taken by both individual governmental entities and by nations working together to overcome rising pollution problems. Related to the world pollution problems is a discussion of the influences of future sanitation works as part of regional pollution abatement plans. Also discussed is the conser-

vation of available natural resources and the restoration of depleted resources where possible in order to protect the health and welfare of all. (Proctor-Florida)
W75-03486

REGULATORY MANAGEMENT PROGRAMS FOR FLORIDA MARINE FISHERMEN,
F. J. Prochaska, and J. R. Baarda.
Florida Sea Grant Publication SUSF-SG-74-003, 1974. 13 p, 1 tab.

Descriptors: *Fish management, *Commercial fishing, *Regulation, *Conservation, *Administration, Florida, Economic aspects, Cost-benefit analysis, Shellfish, Water resources, Administrative agencies, Planning, Aquiculture, Water resources development, Water management(Applied), Economic aspects, Regulation, Comprehensive planning.
Identifiers: Administrative regulations, State policy.

The management of a fishery is very different from the management of a business. Within a given fishing season a fisherman can manage his own operation for the greatest economic benefit to himself. Also, a factor in this business is maintaining the fishery for future production, however, because of a lack of property rights in the fishery resource he cannot, acting alone, manage the fishery resource in the long run. There is a common property ownership among the citizens of the State with fishery resources. As a consequence, management of fisheries falls largely on governmental bodies. The fishery management programs administered by the State of Florida to fishermen, marine extension agents, and others concerned with marine commercial fishing are described. The institutional framework and current regulatory systems of Florida fisheries management programs are summarized. Separate sections deal with lobsters, shrimp, and oysters. (Sperling-Florida)
W75-03487

A PROGRAM FOR THE FUTURE--WATER AND SEWER IN RURAL AMERICA.
Commission on Rural Water, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-03488

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE,
Florida Univ., Gainesville. Coll. of Law.
For primary bibliographic entry see Field 4B.
W75-03489

LEGAL AND ECOLOGICAL ASPECTS OF THE INTERNATIONAL ENERGY SITUATION,
Department of State, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-03490

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM AND RESOURCE CONSERVATION AND DEVELOPMENT PROGRAM--PROPOSED WATER QUALITY MANAGEMENT GUIDELINES.
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03491

DI VOSTA RENTALS INC. V. LEE (REVIEW OF DENIAL OF FILL PERMIT).
488 F.2d 674 (5th Cir 1973).

Descriptors: *Judicial decisions, *Florida, *Rivers and Harbors Act, *Legislation, *Decision-making, Adoption of practices, Navigation, Planning, Lakes, Construction, Navigable waters, Legal aspects, Administration, Administrative agencies, Estuarine environment, Water conservation, Water quality control, Water law, Water resources development.
Identifiers: Administrative regulations, Navigation obstructions, Fill permits, *Licenses.

Court action sought review of an order of the Secretary of the Army denying application for a permit to fill navigable waters of a lake. On the filled land an apartment building was to be constructed. The U.S. District Court for the Southern District of Florida ordered the permit issued. The Court of Appeals for the Fifth Circuit held the agency action could not be set aside unless appellee had shown arbitrary, capricious action or an abuse of discretion. The Secretary's denial was not improper in view of objections of other government agencies and private citizens that the filling would damage the lake which was a valuable estuarine area. The Fifth Circuit vacated the prior opinion and held that under the Rivers and Harbors Appropriation Act of 1899, which banned the obstruction of navigable waters, subject only to exceptions authorized by the Secretary of the Army, the court may review the legality of the Secretary's exercise of discretion but may not substitute its own judgment for that of the Secretary. (Sperling-Florida)
W75-03492

BONELLI CATTLE CO. V. ARIZONA (QUIET TITLE ACTION).
94 S. Ct. 517 (1973).

Descriptors: *Arizona, *Judicial decisions, *Riparian land, *Legal aspects, *Accretion, Channelling, Colorado River Basin, Rivers, River beds, River training, Federal jurisdiction, Avulsion, Navigable rivers, Channels, Width, Riparian rights, Land, Land tenure, Submerged Lands Act, Channel improvement, Public lands, Water law, Water rights, Riparian land, Ownership of beds, Navigable rivers, Navigable waters.
Identifiers: Territorial waters, State policy.

Action was brought by riparian owner against the State of Arizona to quiet title to land which had once been submerged when the Colorado River had moved eastward, but which had reemerged as a result of a federal rechannelling project. Defendant claimed title as the owner of beds under navigable streams within its borders. Plaintiff asserted that whether river changes were accretive or avulsive, he held title as riparian owner. The U.S. Supreme Court granted certiorari and held that the ownership of subject land was governed by federal law. Land emerging by narrowing the river channel belongs not to the defendant state, as owner of the riverbed, but to the plaintiff riparian owner. The state could not claim the land which reemerged following the federal rechannelling project because public purpose was no longer served by state ownership. In view of the respective interests of plaintiff and defendant and in light of the rationale for the federal common law doctrines of accretion and avulsion, the surfacing would be treated as an accretion. Title vests in the riparian owner. (Dillingham-Florida)
W75-03493

THE PLANNING AUDIT: A FRAMEWORK WITH PARTICULAR REFERENCES TO RIVER BASIN PLANNING,
For primary bibliographic entry see Field 6B.
W75-03525

GREAT LAKES WATER QUALITY, 1973 ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5G.
W75-03640

LANDS LYING UNDER PUBLIC WATERS.
Vt Stat Ann Title 29, secs 401-409, (1967).

Descriptors: *Vermont, *Legislation, *Water law, *Water resources, *Water management, *Water structures, *Lakes, *Ponds, Land use, Land management, Filling, Dredging, Boundaries, Public rights, Water resources development, Wildlife conservation, Recreation, Recreation demand, Scenery, Dams, Navigation, Structures.
Identifiers: Public trust doctrine.

Public lands lying under lakes and ponds which are public waters of Vermont are a public trust. It is a policy of the state that these lands be managed in the public trust and to promote the general welfare by the Vermont water resources board (board). Unless authorized by the board, a person shall not in any manner place any material in or displace the public or boundary waters of the state with construction, fill or other artificial encroachment. Nor shall any person alter the bed of any lake or pond underlying such public or boundary waters. This act shall not be construed to prohibit erection of temporary removable seasonal type structures or construction of temporary or permanent private piers if ordinary navigation is not impeded. This act shall not apply to construction of dams. Any person desiring to construct a structure, or place any material upon the bed of a lake or pond which is a public water shall apply in writing to the board for authority to do so. In acting upon applications the board shall determine the public good based upon the effect to scenic and recreational values, fish and wildlife, hazards to navigation, and other public uses. (Silber-Florida)
W75-03671

DAMS.
Vt Stat Ann tit 30, secs 401-406, (1967).

Descriptors: *Dams, *Reservoirs, *Water levels, *Legislation, *Vermont, *Water law, *Water fluctuation levels, *Water utilization, Water control, Levees, Water resources, Water storage, Water management, Flood prevention, Watershed protection, Watersheds(Basins), Water management(Applied), Water levels, High water mark, Low water mark.

The Vermont public service board shall determine the maximum and minimum water levels of Lake Seymour, at the outlet, and have these levels certified and recorded. The waters of Lake Seymour shall not by any artificial means be raised higher or drawn lower, or permitted through neglect to become lower or higher, than the maximum and minimum levels established by the board. The board shall establish maximum and minimum levels of Great Averill Pond, Little Averill Pond, and Norton Lake, at their outlets. When such levels are so established, the board shall certify and record these levels. These waters shall not by any artificial means be raised higher or drawn lower, or permitted through neglect to become lower or higher, than the maximum and minimum levels established by the board, and penalties are prescribed for so doing. (Silber-Florida)
W75-03672

SCENERY PRESERVATION COUNCIL.
Vt Stat Ann, Title 10 secs 261-265, (1973).

Descriptors: *Vermont, *Legislation, *Conservation, *Preservation, *Natural resources, Land use, Scenery, Recreation, Resources planning, Natural use, Land resources, Land development, Land management, Land conservation, Scenic highways, Aesthetics.

The scenery preservation council (council) was established to preserve and enhance Vermont's scenic value. In conjunction with this enactment, the departments of highways, parks, fish and game, water resources and the board of historic sites may acquire land or rights and interests

therein to facilitate this goal. These departments may also improve the land acquired as to accommodate the traveling public. The council shall carry on a continuing comprehensive planning process to inventory and classify scenic corridors, areas and sites; to analyze the scenic values including the general location of areas of special need; and to make specific proposals for such new areas. The council shall also advise the state planning director in regard to the scenery preservation plan; encourage and assist in fostering public awareness, understanding, and participation in the objectives and functions of scenery preservation; and report biennially to the governor and general assembly upon the effectiveness of this act and any recommendations regarding scenic preservation. (Silber-Florida)
W75-03673

INTERAGENCY COMMITTEE.
Vt Stat Ann, Title 10, secs 21-23, (1973).

Descriptors: *Legislation, *Vermont, *Conservation, *Natural resources, *Planning, Development, Management, Control, Administration, Administrative agencies, Adoption of practices, State governments, Coordination, Cooperation, Operations.

This act establishes an interagency committee in the office of the governor to be the coordinating branch of state government among the departments related to and concerning natural resources. The duties of the committee are to coordinate the activities of the various member agencies for the proper development, management and preservation of Vermont's natural resources, to develop policies for the proper development of resources in harmony with the state's comprehensive planning program, and to promote effective application of these policies by the departments affected. (Silber-Florida)
W75-03674

CONSERVATION--ALTERATION OF STREAMS.
Vt Stat Ann tit 10 sec 671-675, (1973).

Descriptors: *Vermont, *Legislation, *Water law, *Streamflow, *Routing, *Structures, *Alteration of flow, Flood control, Riparian rights, Wildlife conservation, Obstruction to flow, Erosion control, Bank stabilization, Bank protection, Fish, Wildlife, Currents(Water), Streams.

No person or municipality shall change, alter or modify the course, current or cross section of any stream containing ten or more square miles of drainage area, or along the boundaries of Vermont by use of construction equipment or similar mechanical devices. Fill or excavations of ten or more cubic yards is prohibited unless authorized by the water resources department (department). This act shall not apply to proper stream bank stabilization measures for protection of existing property or to construction of dams. A person or municipality proposing to change or diminish the course, current or cross section of a stream shall apply in writing to the department for authority to do so. The fish and game commission shall investigate each application to determine the effect of the proposed change upon the fish life. If the department finds the proposed change is reasonable, will not adversely affect the public safety by increasing flood hazards, will not damage fish, wildlife or the rights of riparian owners and is consistent with the public good, the applications will be approved. (Silber-Florida)
W75-03675

COMPENSATORY STORAGE,
C. J. Beise.
Rocky Mountain Law Review, Vol 22, p 453-461, 1950. 9 ref.

Descriptors: *Legislation, *Colorado River Basin, *Compensation, *Water storage, *Colorado, Water resources development, Reservoirs, Reservoir storage, Water distribution(Applied), Drainage areas, River basins, River basin development, Interagency cooperation, State governments, Legal aspects, Constitutional law, Hydroelectric power, Diversion tunnels, Distribution systems, Water management(Applied), Water distribution(Applied), Rocky Mountain Region.
Identifiers: *Administrative regulations, *Water rights(Non-riparians).

Compensatory storage has had a variety of applications and poses a problem to the full utilization of Colorado's water resources. The term refers to the problem of equitable apportionment of water between various parts of the state, notably the Eastern and Western slopes. Legislation during this century has attempted to provide replacement water through reservoir construction for the slope, from which water has been diverted for either a federal irrigation or hydroelectric power project. The recent Gunnison-Arkansas Project has sought to implement the technique of compensatory storage by creating committees to consider such issues as municipal demands, subordination of irrigation uses to power generation, water available for diversion, engineering problems and the principles of the project's operation. By creating a commission of representatives from the state, the federal government, the East and West slopes, it is hoped that in the public realm the state water distribution program will be based on equitable apportionment rather than priority. The priority doctrine written into the state constitution gives the first in time the first in right. An equitable apportionment policy best serves the interests of the state although its constitutionality can by questioned. (Dillingham-Florida)
W75-03676

EFFLUENT NEIGHBORS: THE MEXICO-UNITED STATES WATER QUALITY DILEMMA.
For primary bibliographic entry see Field 5G.
W75-03677

ESTUARIES OF OREGON-ECOSYSTEMS IN CRISIS, PROBLEMS AND LEGAL SOLUTIONS,
For primary bibliographic entry see Field 5G.
W75-03678

NEW LEGISLATION FOR WATER QUALITY.
For primary bibliographic entry see Field 5G.
W75-03679

OHIO V. WYANDOTTE CHEMICALS CORP., RESTATEMENT OF THE ORIGINAL JURISDICTION OF THE SUPREME COURT OF THE UNITED STATES,
D. K. Lloyd.
Environmental Law, p 358-367, Vol 2, No 2, Spring, 1972. 52 ref.

Descriptors: *Water law, *Judicial decisions, *Legal aspects, *Water pollution, *Ohio, Public rights, Nuisance(Water law), Discharge, Lakes, Pollution, Abatement, Mercury, Water policy, Pollutants, Water pollution sources, Jurisdiction, Federal government, State governments, Federal-state water rights conflict, Political aspects, Industrial waste, Industrial pollution, Regulation, Water management, Natural resources.

The State of Ohio sought to invoke the original jurisdiction of the United States Supreme Court in an action to abate a nuisance. The corporate defendants were all citizens of other states and countries. The alleged nuisance was the defendants' dumping of mercury into streams that eventually entered Lake Erie, resulting in contamination and pollution of the lake's water, vegetation, fish and wildlife. The U.S. Supreme Court declined its jurisdiction, noting probable jurisdiction of the Ohio state courts. Furthermore the Court stated that the capacity of trial courts to engage in fact finding procedures was more developed than that of the Supreme Court, notwithstanding their power to appoint masters and scientific experts to facilitate their own fact finding functions. Without referring to the list of positive and negative implications arising from the Wyandotte decision, the result seems to be an unequivocal statement that, at least in suits to abate nuisances, the Court will refuse to exercise jurisdiction where a state is suing the citizens of another state or country. (Silber-Florida)
W75-03680

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX G--REGULATORY WORKS--REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission--United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 4A.
W75-03682

DEPARTMENT OF ENVIRONMENTAL PROTECTION.
Me Rev Stat Ann Ch 2, tit 38, sec 341-342 (Supp 1973).

Descriptors: *Environmental control, *Legislation, *Maine, Quality control, Natural resources, Environment, Public rights, Legal aspects, Ecology, Social aspects, Environmental effects, Land development, Resources, Water, Water quality, Conservation, Land resources, Land use, Water resources, Water resources development.
Identifiers: *Environmental protection.

The Department of Environmental Protection is designated as an agency for the state of Maine to perform all duties the state may undertake regarding environmental control. The Department is established to protect and improve the quality of natural environment and resources, and to enhance the public's opportunity to enjoy the environment by directing growth and development which will preserve an ecologically sound and aesthetically pleasing environment. The Department shall consist of a commissioner appointed by the Governor and a Board of Environmental Protection, which will have broad powers to grant licenses, initiate enforcemental actions, negotiate and enter into agreements and to enforce other delegated duties. (Daniels-Florida)
W75-03683

MISSISSIPPI AND MISSOURI RIVER ISLANDS ARE PROPERTY OF STATE.
Mo Stat Ann, sec 241.291 (Supp 1973).

Descriptors: *Missouri, *Legislation, *Land forming, *Islands, Land, Land tenure, *Mississippi River, *Missouri River, Wildlife, Recreation, Wildlife habitats, Wildlife conservation, Legal aspects, State jurisdiction, State governments.

All lands which belong to the state of Missouri, which have been created by the formation of islands in the Missouri and Mississippi rivers have been granted and transferred to the Missouri conservation commission for wildlife protection purposes. If the islands are deemed to have no present or future value for wildlife use, they shall then be transferred to the state park board for recreational purposes. If they have no value for recreational purposes, they shall be transferred to the counties in which they are located. All islands created and formed in the Missouri and Mississippi rivers subsequent to enactment of this statute are also the property of the state and will be treated as indicated above. (Ritchie-Florida)
W75-03684

A LOOK AT LEGISLATION DEFINING USES OF NATIONAL FOREST LANDS, PART TWO,
R. Reid.
Forest Industries, p 32-33, December 1973.

Descriptors: *National forests, *Land use, *Preservation, *Water conservation, Forestry, *Watersheds(Basins), Adoption of practices, Environment, Environmental effects, Administrative agencies, Comprehensive planning, Water management(Administrative), Water resources development, Judicial decisions, Project planning, Federal project policy.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements, *Wilderness Act, Council on Environmental Quality.

The Wilderness Act of 1964 has been interpreted by judicial decision to mean that the Forest Service is obligated to study areas contiguous to primitive areas for possible inclusion in the Wilderness Preservation System. Another court indicated that the above ruling was faulty. The contention that study of contiguous areas is obligatory is not supported by evidence of Congressional intent. The proposed wilderness system is to be confined to those areas of public land that have already been set aside for recreational use. The National Environmental Policy Act of 1969 was not intended to control every action by the Federal Government in the environmental field. Environmental impact statements were not intended to be an end in themselves. The Council on Environmental Quality was not established as an administrative group or to pass judgment on environmental impact statements beyond their completeness. The contention that the Act requires the Council on Environmental Quality to hold public hearings and approve impact statements is not supported by law. The criticism can be analogized to any type of environmental impact statement including those concerned with water use. (Barnes-Florida)
W75-03685

ENVIRONMENTALISTS ATTACK ADMINISTRATION, INDUSTRY PLANS TO WEAKEN NEPA AND SET BACK RECENT CLEAN AIR GAINS.
For primary bibliographic entry see Field 5G.
W75-03687

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE,
Maine State Planning Office, Augusta. Coastal Planning Group.
H. P. Henry.
December 1973. 76 p, 307 ref, 14 photo.

Descriptors: *Maine, *Shorelines, *Comprehensive planning, *Legal aspects, *Adoption of practices, Water management(Applied), Administrative agencies, Decision making, State governments, Legislation, Planning, Water policy, Adjacent landowners, Recreation, Boating, Access routes, Economics, Fishing, Natural resources, Scenery, Tourism, Environmental effects, Water law, Ecology, Resources development, Water resources development, Resource allocation, Property values.
Identifiers: State policy, *Coastal zone management.

A general appraisal is presented of the current conditions, laws, and influences on the use of the Maine coastline, with specific recommendations for legislation to remedy present weaknesses and provide a workable framework for resource protection and conservation. The Maine legislature has expressly designated recreation as the highest and best use for the coastal areas. The effects of tourism in encouraging development and overcrowding are reviewed. To maximize public access to the beaches while minimizing the loss to adjacent landowners, an open beaches act is espoused which would require the state to maintain not only accessibility but also police protection, and conserve the beaches to preclude despoilation by the public. Emphasized is the need for comprehensive state policy and planning to integrate conservation efforts and allocate resources on other than an ad hoc basis. A systematic overview of current state environmental legislation is presented and contrasted against new requirements to bring the state within the federal Coastal Management Act requirements, which would then make available federal financial support for future programs. The analysis concludes with suggestions for a conceptual approach to coastal management and a legal and administrative framework for that management. (Salley-Florida)
W75-03689

WINNIPESAUKEE RIVER BASIN CONTROL.
New Hampshire Session Laws, Ch 41, Subsection 41:1-41:5, p 187-189, 1974.

Descriptors: *New Hampshire, *Governmental interrelations, *Rivers, *Administrative agencies, Administration, Legislation, Planning, Construction, Economic aspects, Government finances, Federal government, State governments, Sewage disposal, Sewage treatment, Water pollution, Treatment facilities, Pumping, Sewage districts, Sewers, Water law, Water policy, Regulation.
Identifiers: Administrative regulations, State policy, Environmental policy.

The New Hampshire water supply and pollution control commission is authorized to acquire plan, construct, and operate any and all sewage and waste disposal facilities eligible for federal and state aid. All operations will be in accordance with basin and regional treatment needs consistent with federal and state requirements. The authority to construct includes all engineering services in addition to the construction of new sewage or waste treatment plants, pumping stations, and intercepting sewers. In order to achieve reliability and efficiency the commission is authorized to locate sewer and related facilities in all public roadways, whether owned or controlled by the municipality or the state. The commission will annually assess each municipality served by the regional sewage disposal facilities a sum sufficient to recover its proportional share of the total costs. (Sperling-Florida)
W75-03690

WATER STRATEGY PAPER HIGHLIGHTS EPA POLICIES.
For primary bibliographic entry see Field 5G.
W75-03691

WATER PROGRAM POLICY ISSUES, (EPA POLICY DIRECTIVES).
For primary bibliographic entry see Field 5G.
W75-03692

EXPLANATORY STATEMENT: IMPLEMENTATION OF NPDES, (EPA).
For primary bibliographic entry see Field 5G.
W75-03693

DAMS AND RESERVOIRS.
Maine Legislative Service, Vol 1, Ch 787, Subsection 251-254, and 180-186, p 332-336, approved April 1, 1974 (1974).

Descriptors: *Maine, *Dams, *Reservoirs, *Regulation, *Safety, *Public health, Legislation, Wildlife conservation, Fisheries, Water quality control, Environmental sanitation, Local governments, Federal government, Administration, Adoption of practices, Water management(Applied), State governments, Administrative agencies, Legal aspects.
Identifiers: Administrative regulations, State policy.

Many dams in Maine have unknown owners. Some dams are in such a state of disrepair that they are dangerous to life and property, including wildlife, fisheries, and waters, as well as the public's health, safety, and welfare. There are people who will accept ownership of these dams, along with maintaining and repairing them. Legislation now provides that any person may petition the Soil and Water Conservation Commission to be awarded ownership of any dam, the owner of which is unknown. The Commission will give notice of the petition to the municipality in which the dam is located, and also by publication. Emergency plans and actions for the safe operation of dams and reservoirs are necessary to protect life and property. No person, except the federal government, will exercise any authority over the emergency regulation of any dams or reservoirs in the state, where such exercise would conflict with the powers and authority vested in the Bureau of Civil Defense. (Sperling-Florida)
W75-03694

TRANSLATIONS ON ENVIRONMENTAL QUALITY NO. 8.
Joint Publications Research Service, Arlington, Va.
For primary bibliographic entry see Field 5G.
W75-03696

OCEAN DISPOSAL PRACTICES AND EFFECTS (REPORT OF MEETING HELD IN NEW YORK ON SEPTEMBER 26-29, 1972).
President's Water Pollution Control Advisory Board, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03697

RIVERS, STREAMS AND BROOKS--ALTERATION.
Maine Legislative Service, Vol 1, Ch 786, secs 2206-2212, p 330-331, approved April 1, 1974 (1974).

Descriptors: *Maine, *Permits, Rivers, *Streams, *Dredging, Construction, Regulation, Legal aspects, Legislation, Adoption of practices, Administration, Water supply, Administrative agencies, Decision making, State governments, Wildlife conservation, Recreation, Navigable waters, Soil conservation, Natural flow, Water quality control, Local governments, Water quality, Pollution abatement.
Identifiers: *State policy, *Injunctive relief.

In Maine it is unlawful for any person or state agency to dredge, fill, or construct any structure in the state's rivers, streams, or brooks, without a permit. The applicant for the permit must demonstrate that the proposed activity will not interfere with existing recreational or navigational uses, cause unreasonable soil erosion, interfere with the natural flow of water, harm fish or wildlife, or lower the quality of any waters. If the water source is currently being utilized as a source of water supply by any water company or municipality, then a copy of the application for the permit should be forwarded to the company or municipality. If an application for a permit is denied the applicant may have a hearing within thirty days and within another thirty days appeal to the Superior Court. Anyone who engages in the prescribed activities without a permit will be punished with a fine of $100-$200 for each day in violation. Injunctive relief is also available to compel restoration of the affected area to its condition prior to the occurrence of the violation. (Sperling-Florida)
W75-03698

WATER RESOURCES (AS AMENDED).
Acts of the Kentucky General Assembly, H.B. 67, Approved March 28, 1974, effective June 21, 1974, p 480-485 (1974).

Descriptors: *Kentucky, *Legislation, *Water permits, *Administrative agencies, *Regulation, State governments, Irrigation, Water distribution(Applied), Water demand, Water supply, Industrial water, Administration, Water utilization, Water law, Water resources, Injection wells, Oil industry, Steam turbines, Water allocation(Policy), Water policy.
Identifiers: *Administrative regulations.

Kentucky legislation prohibits any person, business, or political subdivision from withdrawing or diverting public water from a stream, lake, groundwater source, or other body of water. Withdrawals and diversions have been allowed when accompanied by a permit. Permits are issued by the Department for Natural Resources and Environmental Protection, Division of Water Resources. No permit is required with the use of water for agricultural and domestic purposes. Neither will a permit be required when the amount withdrawn or diverted is less than an amount established by regulation. A permit is also not required for water used in steam generating plants or water injected underground for the production of oil and gas. All public water used pursuant to a permit must be recorded and a report submitted to the department. The willful failure to keep records shall subject the permit holder to possible revocation. (Sperling-Florida)
W75-03699

DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY.
Arkansas Stat Ann, Vol 2, Title 5, Ch 9, sec 5-908, p 196-197 (Supp 1971).

Descriptors: *Arkansas, *Legislation, *State governments, *Environmental control, *Administrative agencies, Regulation, Administration, Water law, Water policy, Environment, Conservation, Preservation, Ecology, Control, Pollution abatement, Water pollution control, Legal aspects, Law enforcement, Governmental interrelations, Management, Non-structural alternatives, Environmental effects, Resources development, Jurisdiction, Administrative decisions.
Identifiers: Environmental policy, State policy.

There is hereby created an Arkansas Department of Pollution Control and Ecology. The head of the department shall be the Director of Pollution Control and Ecology, who shall be appointed by the Governor upon nomination by the Commission on Pollution Control and Ecology. The Director shall serve at the will of the Governor. The Pollution Control Commission and its functions, powers, and duties are transferred to the Department of Pollution Control and Ecology. There is hereby created a new Division of Environmental Preservation under this department. The new division shall be responsible for reviewing and making specific ecologically oriented recommendations on all plans, programs, and projects of all other state departments and agencies, and upon all federal actions affecting this state. The Director of the Department, with the advice and consent of the Governor, shall appoint the heads of the respective divisions. Each division shall be under the direction and control of the Director, and the Director may delegate his functions, powers, and duties to various divisions of the Department as he deems desirable. (Deckert-Florida)
W75-03700

WATER MANAGEMENT DISTRICTS IN NORTH DAKOTA,
K. K. Ayers, and R. E. Beck.
North Dakota Law Review, Vol 43, p 361-381, 1972. 80 ref.

Descriptors: *North Dakota, *Legislation, *Water management(applied), *Water policy, Administrative agencies, Administration, Management, Drainage programs, Irrigation programs, Eminent domain, Jurisdiction, Water resources development, Water allocation(Policy), Watershed management, Planning, Regulation governments, Legal aspects, Water districts, Water conservation.
Identifiers: Administrative regulations, Dam effects, State policy.

Water management districts are meant to provide local guidance in dealing with the water management problems of a specific area. Their most typical problems are the removal of surplus water from agricultural lands, regulating flood waters, augmenting stream flow and constructing dams. In order to construct and maintain these projects, the water management district has the powers of eminent domain, to assess serviced property for moneys to pay for its services and to make rules and regulations concerning recreational, agricultural and industrial water use. Although water is not owned by the landowner, the North Dakota Century Code provides that the landowner receives preferential treatment in organizing or dissolving a water management district. The water management district is an adjunct to the State Water Commission, the Board of county commissioners, and the drainage districts. The latter's functions are to be absorbed into the water management district's functions. If a party is dissatified with a district's determination of the necessity of a particular project, he may contest the district's decision in a hearing before the State Water Commission. (Dillingham-Florida)
W75-03701

U.S. V. COLGATE-PALMOLIVE CO. (ACTION CHARGING UNLAWFUL DISCHARGE OF REFUSE MATTER INTO NAVIGABLE WATERS),
375 F. Supp. 962 (D. Kan. 1974).

Descriptors: *Water pollution sources, *Judicial decisions, *Navigable waters, *Rivers and Harbors Act, Water pollution, Industrial wastes, Waste water disposal, Waste water treatment, Sanitary engineering, Water quality, Water quality control, Rivers, Pollution abatement, Regulation, Water pollution control, Water resources development, Water law, Adjudication procedure.
Identifiers: *Notice, *Liability(Legal aspects).

A soap manufacturer was charged with unlawfully discharging refuse matter into naviagble water in violation of Rivers and Harbors Appropriation Act. Defendant's plant manufactures soap and related products, the byproducts of which are discharged untreated into the Kansas River. Defendant's were warned that the discharges were in violation of Rivers and Harbors Act and have had ample time to comply with the requirements of the statute. The defendant has filed no application for a permit to discharge wastes. The government took samples of discharged materials to determine their environmental impact. Defendant contends that it was misled by alleged government representations that the government would use the samples taken only in civil proceedings for abatement and not in criminal prosecutions. The court determined that the defendant understood that noncompliance might result in both abatement proceedings and criminal prosecution. The court held that the wastes discharged were industrial and therefore not included in the exception to the prohibition against discharges made for some domestic wastes. (Proctor-Florida)
W75-03702

CITY OF NEW YORK V. TRAIN (ACTION BROUGHT TO COMPEL RELEASE OF FUNDS AUTHORIZED UNDER FWPCA),
494 F.2d 1033 (D.C. Cir. 1974).

Descriptors: *Federal Water Pollution Control Act, *Allotments, *Financing, Economics, Administration, Decision making, Investigations, Judicial decisions, New York, Legislation, Adjudication procedure, Government finance, Economic aspects.
Identifiers: FWPCA Amendments of 1972, *Environmental policy.

Class action was brought by the City of New York on behalf of other municipalities against the Administrator of the Environmental Protection Agency to compel the allotments of funds authorized to be appropriated by the Federal Water Pollution Control Act. The Administrator contends that fund allotment is discretionary under the specific terms of the Act. The court examined the relevant statutory language and analyzed the pertinent legislative history in reaching a decision. It held that the specific section of the Act requires the Administrator to allot the full sums authorized to be appropriated. The decision of the trial court that the Administrator was not acting within his discretionary capacity was affirmend. (Proctor-Florida)
W75-03703

STATE EX REL. MCLEOD V. MURRELL'S INLET CAMP AND MARINA, INC. (QUIET TITLE ACTION INVOLVING RIPARIAN LAND),
192 S.E.2d 199 (S.C. 1972).

Descriptors: *South Carolina, *Judicial decisions, *Coastal marshes, *Land fills, *State governments, Land development, Conservation, Land management, Water management(applied), Land use, Administration, Public land, Water law, Water policy, Legal aspects.

Appellant, State of South Carolina, claims jurisdiction over low marshes or tidal marshes that are inundated twice daily. Appellee had backfilled a marsh for its own private use. Appellee contended it had the right to fill because it owned the marsh. Appellee's contention was premised on its assertion that the marsh was not inundated twice daily, but only periodically, and that appellant had no valid claim. The appellant's motion for a direct verdict was denied by the trial court and the jury held for the appellee. The trial judge had excluded from evidence two plats of appellee's property, which identified the high water mark appellant wished to prove. On appeal the South Carolina Supreme Court affirmed the denial of a directed verdict because the issue was one of fact and therefore to be decided by the jury. The court also affirmed the exclusion of the plats from evidence. Since the plats were not drawn to depict the mean high water mark and so were irrelevant, they were properly excluded from evidence. (Barnes-Florida)
W75-03704

STATE OF MINNESOTA V. ENVIRONMENTAL PROTECTION AGENCY (ACTION OF IMPOUNDMENT OF FWPCA FUNDS),
1 Pollution Control Guide, Vol 3, paragraph 15011, p 15122-15129, 1973.

Descriptors: *Judicial decisions, *Government finance, *Jurisdiction, *Administrative agencies, Administration, Budget, Economic aspects, Federal Water Pollution Control Act, Sewerage, Treatment facilities, Waste water treatment, fFederal government, *Minnesota, Legal aspects, Adjudication procedure.
Identifiers: *Sovereign immunity, Impoundment(Legal aspects), Administrative regulations, FWPCA Amendments of 1972.

A federal district court in Minnesota held that the Environmental Protection Agency Administrator is required under the 1972 Amendments to the Federal Water Pollution Control Act to allot all sums Congress authorized to be appropriated, thereby making sums available for sewage treatment works construction approved for federal funding. The court explained whatever discretionary control over the funding of such projects the administrator may have is circumscribed by statutory language. The doctrine of sovereign im-

munity does not bar the court from having jurisdiction where the allegation is that the administrator acted beyond the scope of his authority. In an action for declaratory and injunctive relief, the constitutional requirement of a justiciable case or controversy proscribes hypothetical or political questions. By refusing to make a full allotment of Minnesota sewage treatment construction projects injuries are produced which are sufficiently concrete and interests are created sufficiently adverse to create a justiciable controversy. (Sperling-Florida)
W75-03705

KENTUCKY POLLUTION ABATEMENT AUTHORITY,
Acts of the Kentucky General Assembly, H.B. 560, Approved March 28, 1974, Effective June 21, 1974, p 552-556, 1974.

Descriptors: *Kentucky, *Legislation, *Treatment facilities, *Construction, *Government finance, Waste water treatment, Water pollution control, Economic aspects, Federal government, Administrative agencies, Administration, Public health, Safety, Water resources, Adoption of practices, Water resources development, State governments, Waste treatment, Treatment facilities, Grants, Cost-sharing, Costs.
Identifiers: Administrative regulations, State policy.

The pollution of Kentucky's water resources has endangered the public's health and safety. To preserve the natural water resources, and the economic potential of the state, the state should assist governmental agencies so that waste water treatment works may be constructed. Federal law providing for grants for waste water treatment works provides that in order to obtain maximum federal grant participation, a state must also furnish some aid. Without state aid, governmental agencies undertaking construction of waste water treatment works in the state must receive a smaller proportion of the necessary costs from the federal government. The Kentucky Pollution Abatement Authority will make the grants in a manner calculated to maximize the total amounts of federal grant participation received, or to be received. All governmental agencies are given power to undertake eligible projects, and to apply and receive state and federal grants. (Sperling-Florida)
W75-03707

INTERSTATE MINING COMPACT (AS AMENDED),
Acts of Indiana, Public Law No 51, S. 65, Approved Feb. 12, 1974, Ch. 212, p 214-223, 1974.

Descriptors: *Mining, *Indiana, *Legislation, *Water quality control, *Interstate compacts, State governments, Water pollution sources, Public health, Safety, Mine wastes, Economic, Aspects, Water resources, Water pollution coordination, Soil structure, Standards, Water resources development, Interstate waters, Pollution abatement, Water law, Water policy.
Identifiers: State policy, Environmental policy.

The effects of mining on the availability of water and other resources for other uses present problems which can properly be approached by considering the interests of those engaged in mining, those proposing to use these resources for other purposes, and the public. Variables such as soil structure and composition, physiography, climate, and the needs of the public make impracticable the application to all mining areas of a single standard. The state of Indiana has joined this interstate compact to advance the protection and restoration of water and other resources affected by mining. Other states will be assisted in their efforts to facilitate the use of resources affected by mining so that such use may be consistent with sound land use, public health, and safety. Assistance will also be given in the form of studies and recommendations, and techniques for the improvement, restoration or protection of water and other resources. (Sperling-Florida)
W75-03708

ENVIRONMENTAL PROTECTION ACT (AS AMENDED),
Acts of the Kentucky General Assembly, S.B. 242, Approved March 29, 1974, Effective June 21, 1974, p 445-449, 1974.

Descriptors: *Kentucky, *Legislation, *Planning, *Environmental sanitation, *Environmental effects, Cost-benefit analysis, Water resources, Water allocation(Policy), Water requirements, Water pollution sources, Pesticides, Water quality control, Radioactivity, Thermal pollution, Pollution abatement, Government finance, Monitoring, Federal government, State governments, Administrative agencies, Water resources development, Water quality control.
Identifiers: State policy, Environmental policy, Administrative regulations.

The Kentucky Department of Environmental Protection (DEP) has the authority to develop a comprehensive plan related to the environment. Development which provides the best usage of land areas, maximizes environmental benefits, and minimizes the undesirable environmental effects will be encouraged. A program will be developed for the management of water resources to assure their protection, and to balance their utilization. The Department will provide guidelines for the prevention, abatement, and control of all water pollution including particulates, pesticides, radiation, and heated liquids. The DEP also has the power to administer grants of other funds or gifts from public and provate agencies including the federal government for the purpose of carrying out any functions of the department. The environment will be monitored to afford more effective and efficient control practices, to identify changes and conditions in ecological systems, and to warn of emergency conditions. (Sperling-Florida)
W75-03709

COMMITTEE FOR THE CONSIDERATION OF THE JONES FALLS SEWAGE SYSTEM V. TRAIN (ACTION SEEKING INJUNCTIVE RELIEF RESTRAINING THE GRANTING OF SEWER HOOK-UP PERMITS),
375 F. Supp. 1148 (D. Maryland 1974).

Descriptors: *Water pollution sources, *Sewage, *Sanitary engineering, *Sewage effluents, Sewage treatment, Water pollution, Sewage disposal, Waste water disposal, Judicial decisions, Water quality, Water quality control, Water law, Water resources development, Adjudication procedure, treatment facilities, Federal Water Pollution Control Act.
Identifiers: *Injunction, *Nuisance(Lega aspects), FWPCA Amendments of 1972, *Immunity(Legal aspects), Private interest groups.

Action was brought by individuals and citizens associations for injunctive relief to restrain defendant city and Environmental Protection Agency (EPA) from granting permits for sewer hookups into the sewer system and requiring them to revoke certain existing hookup permits. Plaintiffs also sought an order to compel the Administrator of the EPA to require the owner or operator of any point source to maintain records, sample effluents, and provide other information in accordance with the Federal Water Pollution Control Act Amendments of 1972. The defendants, a private citizen and the Mayor and City Council of Baltimore submitted a motion to dismiss the complaint. The District Court held that the discharge permit application filed by the city for the waste water treatment plant included the sanitary sewer system and pumping stations for the purposes of the statute granting immunity from suit. The Court further held that the cause of action for public nuisance would not extend to private plaintiffs. The plaintiffs would be allowed to amend the complaint to assert that discharges constituted an eminent danger to the health of persons under the FWPCA. (Proctor-Florida)
W75-03710

YONGE V. ASKEW (CERTIORARI TO REVIEW DENIAL OF APPLICATION TO DREDGE NAVIGABLE WATERS),
293 So. 2d 395 (Fla. App. 1974).

Descriptors: *Florida, *Judicial decisions, *Dredging, *Permits, *Legal review, Administrative agencies, Environmental effects, Water resources development, Navigation, Rivers, Water law, Legal aspects, Riparian rights, Water policy, Preservation, Water management(Applied), Land tenure, Water rights, Water utilization, State jurisdiction, Control, Adjudication procedure, Regulation, Environmental control, Governments, Adoption of practices.
Identifiers: Administrative regulations, Declaratory judgements, Environmental policy.

Petitioner landowner brought action seeking a writ of certiorari to review an order rendered by a state administrative agency, the trustees of which are respondents herein. The order denied petitioner's request for a permit to dredge three navigational connections into the Crystal River. The connections were part of petitioner's plans for development of 700 acres of uplands owned by the petitioner. The petitioner contended that the application met all requirements of law and therefore the respondents were mandatorily required to issue the permit as a ministerial duty. In the alternative, the petitioners contended that the respondents' refusal to grant the permit was an abuse of discretion in that it was unsupportable by any competent or substantial evidence. The First District Court of Appeal ruled that the order rendered by the respondent was not subject to judicial review under the Administrative Procedure Act. In addition, the court ruled that the issuance of the permit was not a ministerial duty and that the petitioner had failed to meet its burden of showing that the works requested were in the public interest. Thus the denial was not an abuse of discretionary power. Certiorari was denied and petitioned dismissed. (Deckert-Florida)
W75-03711

JONES V. SCOTT (ACTION CLAIMING PRESCRIPTIVE RIGHT IN PUBLIC OVER NAVIGABLE WATER).
509 S. W. 2d 831 (Sup. Ct. Ark. 1974).

Descriptors: *Arkansas, *Judicial decisions, *Prescriptive rights, *Public access, Water law, Land tenure, Legal aspects, State jurisdiction, Legal review, Public rights, Easements, Real property, Common law, Equity, Recreation, Navigable waters, Right-of-way, Adjudication procedure, Public rights.
Identifiers: *Water rights(Non-riparians), *Public trust doctrine.

Plaintiffs, appellees in this action, brought su against the defendant landowner claimi prescriptive rights in public with respect to the u of a gravel bar outside a 30-foot right-of-way. T gravel bar had been used for more than 30 yea for launching of boats, fishing, camping and oth activities. Such use had continued until recent when defendant had erected a fence. The defe dant contended that the use of the land had be permissive and not adverse. The trial court fou no prescriptive right to camp, picnic, or fish, b did find a prescriptive right to launch boats. On a peal, the Supreme Court of Arkansas reversed t lower court and ruled that the evidence tended show all use to be permissive on the part of t landowner and not of such frequency that owner would be presumed to know that such us was adverse. The court also ruled that

vidence failed to establish the navigability of the iver and that a flowage easement obtained by the overnment in connection with construction of a am did not give the public any right to use the nd. (Deckert-Florida)
V75-03712

HILLER LAND CO., INC. V. LIBERTY OWNSHIP (ACTION FOR INJUNCTION TO EMOVE DRAIN TILE AND RESTORE CONDI-ION OF LAND).
10 S. W. 2d 473 (Sup. Ct. Mo. 1974).

escriptors: *Missouri, *Judicial decisions, Surface drainage, *Drainage effects, *Adjacent nd owners, Local governments, Drainage, Land nure, Legal aspects, Water law, Common law, quity, Legal review, Water manage-ent(Applied), Tile drainage, Engineering struc-res, Drainage practice, Drainage water, Repul-on(Legal aspects), Adjudication procedure, Ad-inistrative decisions.
entifiers: *Injunctive relief, Common enemy le, Water rights(Non-riparian).

aintiff, landowner, sought a mandatory injunc-on requiring the defendant township, and named embers of its board, to remove drainage tiles hich they had installed through an abandoned ilroad bed and to refill and restore the bed to its tural height and condition. The defendants had stalled the tiles at the request of an adjacent lan-wner, in order to drain off excess water which uld no longer flow through the existing drainage tch due to the installation of a stop gate by the jacent landowner. This excess flowed onto the aintiffs land. The trial court granted the injunc-on and denied the defendant' motion for a new al. The Supreme Court of Missouri affirmed. e court held that it was not a proper exercise of ownship governmental functions to install tile the boundary of the plaintiff's land to protect other party's land against surface waters drain-from a third party's land. (Deckert-Florida)
75-03713

ATE UNIVERSITY SYSTEM OF FLORIDA A GRANT PROGRAM 1972.
72). 24 p, 12 photo, 19 ref.

scriptors: *Florida, *Government finance, esearch and development, *Estuaries, eaches, *Fishing, Shellfish, Mineral resources, rbors, Natural resources, Administration, Ero-n, Water pollution effects, Pesticides, Water llution sources, Recreation grants, Federal vernment, State governments, Water policy, vernmental interrelations.
entifiers: Coastal zone management, Coastal ters, Administrative regulations, State policy.

rida's natural environment is experiencing the ess that urban systems place on natural ecologi-systems. Florida is characterized by clear, pical seas, productive estuaries, extensive sand ches, fish, shellfish, mineral resources, and ural harbors and waterways. Sea Grant, with its ic mission of utilizing, understanding, conserv-, and enhancing the nation's marine resources provided a natural means for the universities become more involved in evaluating pressures these resources. This report covers progress de since the initiation of the State University tem of Florida's union with the office of Sea nt in 1972. Some of the specifics of research advisory services in estuarine management, ch erosion, aquaculture, and the social studies detailed. In 1972 research projects addressed following areas: degradation of marine ources; chlorinated hydrocarbon pesticide in-nce on estuarine animals; economic evaluation ublic recreation sites; and modeling of coastal lities to optimize human management of ources. (Sperling-Florida)
5-03714

THE NEW FEDERAL WATER POLLUTION CONTROL LAW,
George Washington Univ., Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03715

OFFSHORE TERMINAL AUTHORITY.
Louisiana Session Laws, Vol 3, Act No 358, approved July 12, 1974, p 662-669 (1974).

Descriptors: *Louisiana, *Legislation, *Offshore platforms, *Port authorities, *Administration, Harbors, Economic aspects, Coastal structures, Oil spills, Coastal engineering, Construction, Planning, Environmental effects, Monitoring, Regulation, Mississippi River, Tributaries, Navigation, Water pollution sources, Permits, Administrative agencies.

The Offshore Terminal Authority will plan, develop, construct, license, regulate, and operate offshore terminal facilities to promote the economic welfare ot the citizens of Louisiana, and that area served by the Mississippi River and its tributaries. The Authority with incorporate the technological changes occuring in world and domestic shipping industries to increase efficiency and the flow of commerce through the terminal facilities. In addition to port operations, the Act will promote scientific and all other uses in the public interest. The Authority has exclusive and plenary power to issue licenses, certificates, and permits, and otherwise regulate all phases of the construction and operation by any person of offshore terminal facilities. Throughout all aspects of the Authority development program there will be in existence an environmental protection plan, which will include monitoring and operational guidelines for environmental protection. (Sperling-Florida)
W75-03716

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE CAPE FEAR (LOWER SECTION), LUMBER, NEUSE AND WHITE OAK RIVER BASINS.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
For primary bibliographic entry see Field 4A.
W75-03717

WATER QUALITY MANGEMENT PLANS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 99, p 13567-13571, May 23, 1973.

Descriptors: *Federal Water Pollution Control Act, *Regulation, *Planning, *State governments, *Adoption of practices, Federal government, Administrative agencies, Administration, Coordination, Decision making, Water quality control, Treatment facilities, Natural resources, Standards, Water resources, Water pollution control, Water management(Applied), Water conservation, Water utilization, Water treatment, Water allocation(Policy).
Identifiers: *Administrative regulations, *Effluent limitations.

The Environmental Protection Agency has proposed regulations designed to assist the states in the preparation of water management plans. The Federal Water Pollution Control Act requires each state to have a continuing planning process for pollution control. The purpose of preparing basin plans is to provide the information which the states will need to make centralized coordinated water quality management decisions. Another purpose is to encourage adoption of water quality objectives which take into account overall state policies and programs, including those for land use and other related natural resources. The regulations describe the preparation of plans and the procedures governing plan adoption, submission, revision, and approval. The relationship of plans with agency grants and the national permit system is also described. Water quality will be classified according to the severity of the pollution. Federal properties, facilities, and activities are subject to federal, state, interstate, and local standards and effluent limitations for control and abatement of pollution. (Sperling-Florida)
W75-03718

BEAUNIT V. ALABAMA POWER CO. (ACTION AGAINST CORPORATION FOR LOWERING RIVER LEVEL BY DAM).
370 F. Supp. 1044 (D.C. N.D. Ala. 1974).

Descriptors: *Alabama, *Judicial decisions, *Relative rights, *Natural flow doctrine, *Reasonable use, Land tenure, Federal jurisdiction, Discharge(Water), Water consumption, Water management(Applied), Water rights, Water law, Legal aspects, Riparian rights, Regulated flow, Water allocation(Policy), Water utilization, Rivers, Water quality control, Alteration of flow, Competing uses, Hydroelectric power, Adjudication procedure.
Identifiers: Nuisance(Legal aspects), Statute of limitations, Dam effects.

Plaintiff lower riparian landowner sued defendant public utility for certain alleged property damage suffered by the plaintiff due to the defendant's operation of an upstream dam as a peaking power plant. The defendant's operation of the dam resulted in a decreased flow of water past the plaintiff's property. The plaintiff contended that Alabama recognized his riparian right in the continuous and uninterrupted flow of the river, and that the defendant was therefore liable for certain damages incurred by the plaintiff as a result of the decreased flow. The United States District Court disagreed, stating that the plaintiff would have a cause of action only if the defendant had been negligent in the operation of its dam or if such operation was not a 'reasonable use' of the river. The court found that the defendant's use of the river incident to its operation of the dam and generating facilities was a reasonable exercise of its riparian rights, and ruled that the plaintiff's cause of action for nuisance accrued more than one year before commencement of this action, and therefore was barred by the statute of limitations. (Deckert-Florida)
W75-03719

GULF OIL CORPORATION, ET AL. V. MORTON (ACTION FOR WRIT OF MANDAMUS).
1 Pollution Control Guide, Vol 3, paragraph 15026, p 15232-15238, 1974.

Descriptors: *Leases, *Judicial decisions, *Legal review, *Water pollution sources, Decision making, Oil industry, Legislation, Drilling, Exploration, United States, Administrative agencies, Administration, Environmental effects, Continental shelf, Adoption of practices, Standards, Water pollution, Legal aspects, Administrative decisions, Water quality standards, Federal government, Exploitation.
Identifiers: *Administrative regulations.

A suit asked the court to declare invalid the Secretary of the Interior's order which suspended exploration and drilling operations on leaseswhich permit the recovery of mineral resources from the Outer Continental Shelf. The Secretary has the power to suspend operations under existing leases whenever he determines that the risk to the marine environment outweighs the immediate national interest in exploring and drilling for oil and gas. The scope of review requires an inquiry which identifies the range of choices available to an administrative official and which determines whether on the facts the official's decision falls within that

range. In this case drilling had not yet begun so the Secretary asked Congress to terminate certain leases and require their abandonment. A United States Geological Survey report indicated that the environmental risks involved in continued operation were unacceptable since the operations were subject to abandonment in the near future. The court held the Secretary's actions valid and in accordance with law. (Sperling-Florida)
W75-03721

GROUNDWATER USE ACT OF 1972.
Code of Georgia Annotated, Title 17, Ch 17-11, secs 17-510 thru 17-521.2, p 21-31 (Supp 1972).

Descriptors: *Georgia, *Legislation, *Water resources, *Regulation, *Planning, Water supply, Water resources development, Waterutilization, Water requirements, Conservation, Groundwater, Sea water, Water demand, Administrative agencies, Adoption of practices, Pumping, Wells, Aquifers, Permit, Aquifer management, Water supply development, Water conservation, Environmental control.
Identifiers: *Environmental policy, *Administrative regulations.

The water resources of the state of Georgia should be put to beneficial use to fullest extent possible, subject to reasonable regulation. This regulation will be aimed at conserving these resources and to provide and maintain conditions which are conducive to the development and use of water resources. The Environmental Protection Division of the Department of Natural Resources will prepare proposed regulations concerning the use of groundwaters. Water users will submit reports concerning the quality of water used, the sources of water, and the nature of the use. Provisions will be made to protect against or abate saltwater encroachment, as well as adverse effects on other water users. Regulations concerning well depth, pumping levels, and pumping rates in wells or aquifers will be promulgated. Permits will be required for the use of groundwater in excess of 100,000 gallons per day. Procedures for obtaining the permit from the division, and the criteria the division should consider are described. (Sperling-Florida)
W75-03722

U.S. V. CAPPAERT (ACTION BY U.S. TO HAVE ITS RIGHTS TO USE OF APPURTENANT WATERS DECLARED).
375 F Supp 456 (D Nev 1974).

Descriptors: *Nevada, *Fish, *Wildlife, *Fish conservation, *Fish populations, Judicial decisions, Wildlife conservation, Fish management, Water loss, Water management(Applied), Legal aspects, Landowners, Jurisdiction, Public rights, Water law, Water resources development, Parks, National parks, Recreation facilities, Conservation, Natural resources, Federal government, Adjudication procedure, Appropriation, Groundwater mining, Groundwater potential, Preservation.
Identifiers: Environmental policy, Water rights(Non-riparians).

Action was brought by the United States to have its rights declared to use the waters appurtenant to land known as Devil's Hole, Death Valley National Monument, to the extent that it is necessary to maintain a pool and the desert pupfish therein. The government also seeks an injunction restraining landowners from pumping water except for domestic purposes. The plaintiff alleges that this excess pumping is detrimental to the water rights of the public and the survival of the pupfish. The defendants own lands and claim the water rights within the area near Devil's Hole, which claimed rights conflict with the claimed rights of the United States. The Federal District Court held that the patents to which the defendants trace their ownership to the lands surrounding the hole passed title to the land, but U.S. title is superior in time and right. It further held that the defendants' pumping underground water had drawn water from underground sources which supplied Devil's Hole. This action threatened the survival of the pupfish. Since the public had an interest in protecting this endangered species, an injunction was granted. (Sperling-Florida)
W75-03723

TAXATION--EXEMPTION--PROPERTY USED FOR POLLUTION CONTROL OR WATER IMPOUNDMENT.
Iowa Legislative Service, Senate File 321, Vol 3, p 660-662, approved June 3, 1974 (1974).

Descriptors: *Iowa, *Legislation, *Impoundments, *Taxes, *Tax rates, *Assessments, *Water pollution, Treatment facilities, Water storage, Water pollution control, Permits, Adoption of practices, Administration, Regulation, Economic aspects, Water pollution control, Water treatment, Abatement, Water quality, Water quality control, Pollution abatement, Economics, Legal aspects.
Identifiers: State policy, Administrative regulations.

A limited exemption from property taxation for property used to control air or water pollution and an exemption for certain property used for water impoundments are provided. The exemptions apply to new installations of pollution control property for a period of ten years beginning on January first after the construction of installation of the property is completed. The exemption will apply with respect to each of the ten annual assessments within the ten year exemption period and the property taxes payable on the basis of each of such ten annual assessments. This exemption is limited to the market value of the pollution control property. If the pollution control property is assessed with other property as a unit, this exemption is limited to the net market value added by the pollution control property. Exemptions for impoundment structures and underlying land are available on application which will include a copy of the water storage permit approved by the water commissioner of the Iowa natural resources council. (Sperling-Florida)
W75-03724

ILLINOIS AND MICHIGAN CANAL.
Smith-Hurd Annotated (Illinois), Ch 19, secs 8-47e, p 5-14, Supp 1972.

Descriptors: *Illinois, *Canals, *Legislation, *Administrative agencies, *Michigan, Basins, Dams, Navigation, Adoption of practices, Regulation, Decision making, State governments, Legal aspects, Water power, Leases, Construction, Water rights, Cost-benefit analysis, Governmental interrelations, Water law, Water management(Applied), Water resources development, Economic aspects, Interstate.
Identifiers: Administrative regulations, State policy.

The Illinois Department of Conservation has control and management of the Illinois and Michigan canal including feeders, basins, appurtenances, and locks, dams, and other improvements for navigation. The Department can prescribe reasonable rules and regulations in respect to all matters connected with the navigation and use of the canal, locks and dams, as well as traffic through them. The Department will establish reasonable toll rates for passage. The Department can lease to the highest bidder any water power and lands connected with the canal. No lease shall be for more than twenty years. All leases of water power are subject to the right of the Department to resume, without compensation to the lesee, the use of any such water power for the purpose of the canal. Also, the work by the construction of which created the water privilege may be abandoned or destroyed, whenever such work in the opinion of the legislature is no longer advantageous to the State. (Sperling-Florida)
W75-03725

WATER RECREATION ACT OF 1973.
Code of Georgia Annotated, Title 17, Ch 17-21, secs 17-1201 thru 17-1205, p 31-32 (Supp 1973).

Descriptors: *Recreation, *Water resources, *Georgia, *Legislation, Regulation, Natural resources, Water demand, Adoption of practices, Decision making, Administration, Economic aspects, Administrative agencies, Lakes, Watercourses, Legal aspects, Water resources development, Water management(Applied), Administrative decisions.
Identifiers: Administrative regulations, State policy, Liability(Legal aspects), Environmental policy.

Massive water-related recreational events may cause considerable damages to natural resources if improperly handled. The increasing popularity of water related recreation will cause in increase in the number and intensity of such events. A person sponsoring a water event in Georgia is to provide a bond. A water event is one that is advertised and likely to attract over five thousand people onto state waters other than lakes. The bond is to be provided to the Georgia Department of Natural Resources, not exceeding ten thousand dollars, issued by a surety company authorized to do business in the state. The Department is to be the sole judge as to the performance. All existing rights to bring a civil action for damages to person or property remain intact. (Sperling-Florida)
W75-03726

UNITED STATES V. REPUBLIC STEEL CORP. (REFUSE DISCHARGE INTO NAVIGABLE WATERS).
1 Pollution Control Guide (Vol 3) paragraph 15034, p 15280-15282, 1974.

Descriptors: *Legal aspects, *Federal Water Pollution Control Act, *Rivers and Harbors Act, *Oil wastes, *Judicial decisions, Ohio, United States, Navigable waters, Adoption of practices, Administrative agencies, Water pollution control, Waste water disposal, Water pollution sources, Rivers, Water quality control, Industrial waste, Adjudication procedure, Legislation, Pollution abatement, Water policy.
Identifiers: Notice, Environmental policy, Refuse Act of 1899, Evidence.

The U.S. Sixth Circuit Court of Appeals recently affirmed the U.S. District for the Northern District of Ohio, holding that a corporation giving immediate notice to an agency of the federal government of a discharge of oil into navigable waters cannot be prosecuted by the use of such information. This use of information was precluded by provision of the Federal Water Pollution Control Act. The purpose of the provision is to control water pollution by requiring immediate reporting of discharges of oil, and to provide an incentive for such reporting. The language of the Act was construed as protecting corporations as well as natural persons. A steel company had dumped coal tar into the Mahoning River. This was a violation of a provision of the Rivers and Harbors Act of 1899 which makes it unlawful to discharge any refuse matter of any kind into navigable waters of the United States. The Court granted the company's motion to suppress the notice it had sent to the Coast Guard informing the government of the discharge. The notice by the company was the only evidence of violation. (Sperling-Florida)
W75-03727

POLLUTANT SPILL PREVENTION AND CONTROL ACT (AS AMENDED).
Florida Sess Laws, Vol 4, Ch 74-336, p 812-822, approved June 27, 1974, effective July 1, 1974 (1974).

Descriptors: *Water pollution, *Water pollution sources, *Oil pollution, *Legislation, *Florida, Public health, Social aspects, Ships, Enforcement, Regulations, Legal aspects, Governments, Pollution abatement, Environmental effects, Pollution taxes(Charges), Water quality control, Water quality standards, State governments.
Identifiers: Coastal waters, Coastal zone management, State policy, Environmental policy, Liability(Legal aspects), Effluent charges.

The act provides for the prevention and control of the discharge of pollutants in Florida. The legislature finds that the transfer of pollutants between vessels, between onshore facilities and vessels, and between offshore facilities and vessels is hazardous. The policy is to preserve the public use of navigable waters and to promote the general health, safety, and welfare. Provisions require registration certificates for all terminal facilities. The Department of Natural Resources is empowered to adopt and enforce regulations relating to the discharge of pollution into state waters and onto state coasts. Any person discharging effluents shall remove the pollutant. In the alternative, provisions for a department cleanup exist. A fund is established to provide monies for cleanup and rehabilitation after a pollutant has been discharged. An excise tax upon terminal facilities shall be levied to help maintain the fund. Any vessel or its agents which permits or suffers a prohibited discharge within state jurisdiction shall be liable to the fund for cleanup costs up to a fixed limit. Enforcement and penalties for violators are set forth. (Proctor-Florida)
W75-03728

PORT AUTHORITIES--ESTABLISHMENT.
Missouri Leg Service, Vol 2, Act 88, HB No 1646, p 227-231, approved June 18, 1974 (1974).

Descriptors: *Missouri, *Legislation, *Port authorities, *Adoption of practices, *Administration, Legal aspects, Rivers, Economic aspects, Government finance, Kansas, Boundaries(Property), Navigable waters, State governments, Administrative agencies, Political aspects, Local governments, Governmental interrelations, Standards, Water law, Economic aspects, Regulation, Interstate waters.
Identifiers: State policy.

The state of Missouri has authorized each city or county which has within its boundaries a navigable waterway to form a port authority. Upon the approval of the Director of the Transportation Commission of Missouri, the port authority will become a political subdivision of the state government. The Director is authorized to accept applications, conduct hearings, and approve or disapprove applications for creating city or county port authorities. Various criteria to be considered in passing upon the application are set out. Included in the criteria are: the population of the city or county submitting the application; the desirability or economic feasibility of having more than one authority in the same area; technical and economic capability to carry out port development; and the actual and potential river traffic and economic impact. Any application will be granted if the subdivision has a 300,000 population and a common boundary with the state of Kansas. (Sperling-Florida)
W75-03729

INLAND LAKES PROTECTION AND REHABILITATION.
Wisconsin Legis Service, Vol 2, Ch 301, AB 766, p 344-355, effective June 19, 1974 (1973).

Descriptors: *Lakes, *Eutrophication, *Planning, *Wisconsin, *Economic aspects, Recreation, Aesthetics, Environmental sanitation, Wildlife conservation, Public health, Water pollution, Water quality control, State governments, Local governments, Government finance, Water resources, Water law, Administration, Legislation, Water resources development, Surface waters, Water pollution control, Abatement.
Identifiers: State policy.

Environmental values, wildlife, public rights in navigable waters, and the public welfare are threatened by the deterioration of natural lakes. The current state effort in Wisconsin to abate water pollution will not undo the eutrophic and other deteriorated conditions of many lakes. Lakes form an important basis for the state's recreation industry. The increasing recreational usage of the waters of this state justifies state action to enhance and restore the potential of the inland lakes. A state effort of research, analysis, planning, and financing, and a local effort undertaken by lake rehabilitation and protection districts of planning and plan implementation is necessary. The local districts will be formed by persons directly affected by the deteriorated condition of inland waters and willing to assist financially, or through other means, in remedying lake problems. (Sperling-Florida)
W75-03730

POLLUTION CONTROL AWARDS PROGRAM.
Florida Sess Laws, Vol 1, Ch 74-60, p 64-65, app May 22, 1974, effective-immediately (1974).

Descriptors: *Pollution abatement, *Air pollution, *Water pollution control, *State governments, Environmental sanitation, *Water law, Environmental quality, Legislation, *Florida, Administration, Social aspects, Aesthetics, Water resources development, Political aspects, Water policy.
Identifiers: Environmental policy, State policy.

A pollution control awards program is established to be administered by the Florida Department of Commerce. Awards may be granted to governmental or private entities for efforts in preventing or cleaning up of pollution as provided by the rules promulgated by the Department of Commerce. Special awards may be given for outstanding effort and achievements in these endeavors. Awards or special awards may be presented in the categories of water pollution, air pollution, noise pollution and communication media on pollution problems. (Proctor-Florida)
W75-03731

MERCURY,
Bureau of Mines, Washington, D.C. Div. of Nonferrous Metals.
For primary bibliographic entry see Field 6C.
W75-03797

CLIO NODS: ARIZONA V. CALIFORNIA AND THE BOULDER CANYON ACT - A REASSESSMENT,
California Univ., Los Angeles. Dept. of History.
N. Hundley, Jr.
The Western Historical Quarterly, Vol III, No 1, p 17-51, January 1972, (California Water Resources Center Project UCAL-WRC-W-145).

Descriptors: *Water rights, *Federal-State Water Rights Conflicts, *Legal aspects, Streamflow, *Arizona, *California, *Interstate rivers.
Identifiers: *Boulder Canyon(Ariz-Calif).

The Boulder Canyon Project Act of 1928 is reviewed in the light of implications of the decision in Arizona v. California, 373 U. S. 546 (1963). The decision increased the power of the federal government by declaring that Congress could divide the waters of interstate streams. The implications of this effect--and the possible misinterpretations that might have led to what may be a faulty conclusion--are reviewed. Whereas it has been generally believed that Arizona v. California has resolved and settled most of the conflict issues, it is suggested that possible misinterpretations of the original 1928 Act may lead to continued conflict and court actions. (Snyder-California,Davis)
W75-03801

ENFORCEMENT UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
Environmental Protection Agency, Denver, Colo. Region VIII.
For primary bibliographic entry see Field 5G.
W75-03824

COSTS - EXERCISING EQUITABLE POWERS TO AWARD ATTORNEY'S FEES TO LOSING PARTY SEEKING COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT. SIERRA CLUB V. LYNN, 364 F. SUPP. 834 (W.D. TEX. 1973),
G. Zunker.
Land and Water Law Review, Vol 9, No 2, p 553-563, 1974.

Descriptors: Legal aspects, *Texas, Legislation, *Costs, Environment.
Identifiers: *Environmental impact statements, *National Environmental Policy Act.

A recent federal district court case in Texas resulted in allowing a plaintiff who unsuccessfully challenged environmental impact statements prepared by the Department of Housing and Urban Development (HUD) for a housing development to recover his costs of litigation, including attorney fees. This holding is contrary to the general rule under which courts neither award attorneys' fees as a part of costs to the prevailing party, nor permit direct recovery of which fees as a part of damages. The allowance of such fees in Sierra Club v. Lynn was based upon recognized exceptions to the general rule due to the fact that the plaintiff in the case was acting as a 'private attorney general' in seeking compliance with the National Environmental Policy Act and that there were overriding circumstances in view of the fact that the suit, although unsuccessful, encouraged remedial action by HUD and served to educate the public to the environmental implications of the proposed project. The court's holding is criticized in that the costs are awarded against the private land developer rather than HUD which is charged with statutory responsibility for the preparation of environmental impact statements. The statute barring such recovery from HUD is viewed an an impediment to the internalization of social and economic costs generated by the inadequate studies originally made by HUD.
W75-03825

'PROJECT AQUA' IN POLAND, (IN POLISH),
Polskie Towarzystwo Przyrodnikow im. Kopernika, Warsaw.
For primary bibliographic entry see Field 2A.
W75-03843

6F. Nonstructural Alternatives

THE NECESSITY OF ZONING VARIANCE OR AMENDMENTS NOTICE TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES UNDER THE SHORELAND ZONING AND NAVIGABLE WATERS PROTECTION ACT,
McBurney, Musolf and Whipple, Madison, Wis.
For primary bibliographic entry see Field 6E.
W75-03364

RAPID CREEK FLOOD HAZARD ANALYSES-(INCLUDING INMAN CREEK AND WEST

FORK CREEK TRIBUTARIES) BANNOCK COUNTY, IDAHO.
Soil Conservation Service, Boise, Idaho.
For primary bibliographic entry see Field 4A.
W75-03438

ALTERING ALABAMA'S HISTORY,
Soil Conservation Service, Auburn, Ala.
For primary bibliographic entry see Field 4A.
W75-03688

6G. Ecologic Impact Of Water Development

CHANGES IN THE ECONOMY AND ECOLOGY AT PROPOSED LAKE SITES IN THE SALT RIVER BASIN, KENTUCKY, DURING EARLY CONSTRUCTION OF THE DAM FOR TAYLORSVILLE LAKE,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 5C.
W75-03309

AMES RESERVOIR ENVIRONMENTAL STUDY, APPENDIX 1. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE RESERVOIR SITE AND STREAM SYSTEM.
Iowa State Water Resources Research Inst., Ames; and Iowa State Univ., Ames. Engineering Research Inst.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 623, $10.00 in paper copy, $2.25 in microfiche. Vol 1, 343 p, 1973. OWRT A-999-IA(8a). DACW25-72-C-0033.

Descriptors: *Land management, *Recreation, *Iowa, Planning, *Land use, Environmental effects, Aesthetics, *Landscaping.
Identifiers: *Ames Reservoir(Ia), Resource design.

A landscape overview of Iowa's Ames Reservoir site is presented in this report, one of several evaluating the social, economic and environmental impacts of the proposed reservoir. The first phase of the landscape overview was a visual analysis. The reservoir study was interpreted photographically and by artists' sketches to show potential changes brought about by alternative reservoir configurations. In the second phase a computer bank of resource information pertinent to the project area was created. The data was programmed in computer graphics or tabular form to enable researchers to quantify and qualify patterns of resource changes resulting from the proposed project. The third phase utilizes the accumulated resource information to illustrate patterns of land types for various reservoir associated uses. The fourth phase was to quantify changes in timber resources associated with alternative reservoir designs. Results of the study indicate that the 34 section study area contains 25% of the county's natural woodland. The proposed reservoir pool will inundate 15% of the county's natural woodland and 1.2% of the county's land area. The proposed landscapes would afford greater opportunity to recreate through more physical activities then are afforded now; but would yield a less diverse range of activities. (See also W74-11579, W74-11586, W74-11597, W74-11605, W74-11614, and W74-11623) (Schroeder-Wisconsin)
W75-03318

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-03331

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS: A STAFF STUDY,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W75-03347

THE NASA ROLE IN MAJOR AREAS OF HUMAN CONCERN.
Denver Research Institute, Colo.
For primary bibliographic entry see Field 5A.
W75-03349

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS,
Delaware Univ., Newark. Academy of Natural Sciences; and Rutgers - the State Univ., New Brunswick, N.J. Work Group on Economic and Social Problems of the Delaware Estuary Region.
P. G. Gosselink.
Report to NSF RANN Program, September 1973. 42 p, 2 fig, 24 tab, 13 ref.

Descriptors: *Rivers, *Delaware River, Water resources development, Planning, Recreation, Basins, *Water quality, *Estuaries, Delaware, New Jersey, Pennsylvania, New York.

Several social, economic, and environmental relationships are explored for the Delaware River basin. Secondary data is utilized to identify existing conditions and trends and future research needs. The basin extends from Capes May and Henlopen to the Trenton, N.J., tidewaters. A review of natural characteristics and land use indicate basin landscapes are primarily composed of rolling hills and undulated lands. Nearly 50% of the total land area was in forest, 22% in cropland, and 10% in urban uses. Economic projections forecast that the basin's population and employment will double over the 1955-2010 period, with personal income quadrupling. The basin's ports also handled over 116,000,000 short tons of sea commerce in 1968. River quality varies with industrial effluents and oil releases from vessels and the surrounding seven refineries that contribute to the degradation. The basin provides over 137,000 acres of recreational land and water to service over 25 million recreationalists. Growing demand and already overtaxed facilities suggest the need for expansion. Design and cost configurations are projected to meet this demand under three alternative developmental goals. Social, economic, and environmental impacts of port development and electric plants addition are also noted. (Schroeder-Wisconsin)
W75-03352

ENVIRONMENTAL POLLUTION IN A RAPIDLY GROWING ECONOMY,
Y. Iwata.
The Developing Economies, Vol 10, No 4, December 1972. p 479-495, 3 fig, 4 tab, 9 ref.

Descriptors: *Economic impact, *Environmental effects, *Pollution abatement, Industrial wastes, Industrial production.
Identifiers: *Japan.

Environmental pollution in Japan has undergone radical changes since 1955. Pollution has come to affect increasingly greater areas and is causing damage not only to property, but to humans as well. Damage is no longer confined to direct injuries; secondary and tertiary damage in ecological terms have become increasingly important. Finally, pollution is viewed as a serious economic problem because of the rapidly rising social costs of environmental degradation. A number of factors have been associated with the rapid spread and rising complexity of environmental deterioration and resultant economic burdens in Japan since 1965: (1) increasing congestion in the Japanese economy; (2) shifts in Japan's industrial structures to often more pollution prone industries; (3) greater sophistication of consumption resulting in greater refuse and (4) inadequate investments in social overhead capital. Projections for 1985 estimate that if trends continue, sulfate oxides, BOD and refuse levels will grow from 400,000 to 16,811,000 (1955-85) 543,000 to 16,977,000 (1955-85) and 24.9 to 78.9 million (1965-85) tons respectively. Greater pollution standards may lead to shifts in the industrial structure with machinery manufacturing increasing and oil refining and pulp industries declining. (Schroeder-Wisconsin)
W75-03353

ENVIRONMENTAL DEFENSE FUND, INC. V. CORPS OF ENGINEERS OF THE UNITED STATES ARMY (ACTION TO RESTRAIN CORPS FROM FURTHER CONSTRUCTION OF NAVIGATION PROJECT).
For primary bibliographic entry see Field 6E.
W75-03361

ENVIRONMENTAL DEFENSE FUND V. TENNESSEE VALLEY AUTHORITY (ACTION TO ENJOIN TVA FROM COMPLETING CONSTRUCTION OF TELLICO DAM).
For primary bibliographic entry see Field 6E.
W75-03362

ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6D.
W75-03399

TACNA MARSH. NATURAL AREA REPORT NO. 35,
Arizona Academy of Science, Tempe.
For primary bibliographic entry see Field 6B.
W75-03400

EVACUATION RISKS - AN EVALUATION,
National Environmental Research Center, Las Vegas, Nev.
J. M. Hans, Jr., and T. C. Sell.
Report No EPA-520/6-74-002, June 1974. 166 p, 1 fig, 16 tab, 52 ref, 1 biblio, 8 append.

Descriptors: *Accidents, *Damages, *Hazards, *Civil defense, *Radiation, Radioactivity, *Radioactivity effects, Lethal limit, Public health, Safety, Risks, Disasters, Evaluation, Population, Costs, Air pollution, Water pollution, Water pollution sources, Nuclear energy, Benefit-cost theory.

A study was conducted to assess the risk of death, injury, and cost associated with an evacuation of population groups affected by an incident at a fixed nuclear facility. Data and information were obtained by contacting persons and organizations involved with previous evacuations precipitated by natural or man-made causes and from available literature. Frequencies of 8.9 times 10 to the minus 8th power deaths per person-mile and 4.4 times 10 to the minus 8th power injuries per person-mile were derived from data representing vehicle evacuations involving approximately 5.5 times 100,000 persons. National Safety Council (NSC) data for motor vehicle accidents indicate frequencies of 2.4 times 10 to the minus 8th power deaths per person-mile and 9.0 times 10 to the minus 7th power injuries per person-mile. Because of the small number of deaths and injuries derived from the study of evacuations, no statistical comparison with NSC information could be made; however, strong subjective information suggests that NSC data can be used for estimating the risk of injury or death. (Houser-ORNL)
W75-03424

RAPID CREEK FLOOD HAZARD ANALYSES-(INCLUDING INMAN CREEK AND WEST

FORK CREEK TRIBUTARIES) BANNOCK COUNTY, IDAHO.
Soil Conservation Service, Boise, Idaho.
For primary bibliographic entry see Field 4A.
W75-03438

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POLLUTION AND TRANSFER RELATIONSHIPS,
Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships.
For primary bibliographic entry see Field 5B.
W75-03440

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. DELAWARE RIVER ESTUARINE MARSH SURVEY,
Academy of Natural Sciences of Philadelphia, Pa.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-229 781, $7.00 in paper copy, $2.25 in microfiche. Final Report (partial) to National Science Foundation, RANN Program, T. E. Walton III and R. Patrick, ed., Academy of Natural Sciences, Phildelphia, Pa. December, 1973. 174 p, 42 fig. GI-33369.

Descriptors: *Estuaries, *Estuarine environment, Marshes, *Marsh management, Management, *Water pollution, Wetlands, *Coastal marshes, *Aquatic habitats, Aquatic environment, Delaware, Marsh plants, Thermal pollution, Water pollution sources, Pollutants, Pollutants identification, Water quality, Water pollution effects, Pollution abatement, Environmental control, *Environmental effects, Ecology, Pennsylvania.
Identifiers: *Delaware Estuary, *Philadelphia(Pa), Trenton(Del), Wilmington(Del).

Important marshlands in the Delaware Estuary are described in terms of their common emergent vegetation. Human activities that might disturb these marshes are also identified. Aquatic life in each marsh area was examined to determine the kinds of aquatic communities supported and disturbed. Throughout the upper part of the estuary, extending from Trenton to Wilmington, the emerging vegetation is characteristic of freshwater marshland. Examination of aquatic life in the upper estuary produced evidence of organic enrichment, and there were also indications of toxic pollution and/or periods of low dissolved oxygen concentration, evidenced by reduction in numbers of fish in upper estuarine waters. Effects of thermal pollution have not been identified yet. On the seaward side, aquatic flora and fauna approached more natural conditions, but there were sites showing pollution effects from sewage treatment plants, landfills, or industry. However, these impacts are local, not widespread. The upper part of the estuary is the severely impacted zone, with degradation greatest near Philadelphia. While natural marshland has been eliminated in the upper reaches, large natural marshes still support flora and fauna in the lower estuary. (See also W75-03440) (Grden-North Carolina)
W75-03441

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. CONSTRUCTION SITE SELECTION,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 8A.
W75-03443

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT),
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 4A.
W75-03452

UNNATURAL SHORELINE,
California State Univ., San Francisco. Dept. of Geology.
For primary bibliographic entry see Field 5G.
W75-03459

FEDERAL ACTION FOR ENVIRONMENTAL PROTECTION AND ITS POTENTIAL SIGNIFICANCE FOR HOUSING.
Rivkin/Carson, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W75-03485

TRANSLATIONS ON ENVIRONMENTAL QUALITY, NO. 7.
Joint Publications Research Service, Arlington, Va.
For primary bibliographic entry see Field 6E.
W75-03486

LEGAL AND ECOLOGICAL ASPECTS OF THE INTERNATIONAL ENERGY SITUATION,
Department of State, Washington, D.C.
J. D. Muir.
International Lawyer, Vol 8, No 1, p 1-10, January 1974. 16 ref.

Descriptors: *Pollution sources, *Energy production, *Energy consumption, *Oil resources, *Environmental effects, *Natural resources, Environment, Technical problems, Radiation, Thermal energy, Environmental impact, Oil pollution, Federal Quality Control Act, Legislation, Jurisdiction, Adoption of practices, Nuclear energy, Breeder reactors, Social benefits, Natural resources, Legal aspects, Oceans, Water resources development, Water law, Water policy, International law.
Identifiers: *International agreements, *Territorial waters.

The current energy situation is to a considerable degree the result of increases in consumption and inclusion of ecological considerations in policy making. Production and consumption of energy are major sources of pollution. The increased consumption now projected for the immediate future will increase the incidence and magnitude of these environmental problems. Conflicts between environmentalists and industrialists over increased energy needs and environmental restrictions have spawned tension. The United States is increasing its dependence on foreign oil and this creates problems requiring international solutions. As oil prices rise, demands for increased use of coal, which is a major source of pollution, are heard. The development of nuclear energy for commercial use has also encountered environmental and technical problems relating to radiation release. It is hoped that the development of fusion technology will permit the use of seawater as an energy source. Considerable law has developed with respect to ecological considerations affecting neighboring countries, including liability for oil pollution damage. These developments are in addition to actions taken by state and federal jurisdictions in the United States through the Federal Water Quality Improvement Act. (Sperling-Florida)
W75-03490

ECOLOGY AND THE PROBLEM OF REHABILITATING WASTES FROM MINERAL EXTRACTION,
London Univ. (England). Dept. of Applied Biology.
For primary bibliographic entry see Field 5G.
W75-03626

A LOOK AT LEGISLATION DEFINING USES OF NATIONAL FOREST LANDS, PART TWO,
For primary bibliographic entry see Field 6E.
W75-03685

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE,
Maine State Planning Office, Augusta. Coastal Planning Group.
For primary bibliographic entry see Field 6E.
W75-03689

HUMBOLDT HARBOR AND BAY JETTIES AND DREDGING, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 4A.
W75-03706

COSTS - EXERCISING EQUITABLE POWERS TO AWARD ATTORNEY'S FEES TO LOSING PARTY SEEKING COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT. SIERRA CLUB V. LYNN, 364 F. SUPP. 834 (W.D. TEX. 1973),
For primary bibliographic entry see Field 6E.
W75-03825

MICROCLIMATE AND THERMAL STRESS OF MAN IN AN ALEPPO PINE PLANTATION AND AN OAK SCRUB,
Volcani Inst. of Agricultural Research, Ilanot (Israel). Forestry Div.
For primary bibliographic entry see Field 2I.
W75-03834

7. RESOURCES DATA

7A. Network Design

REMOTE SENSING OF ALGAL BLOOMS BY AIRCRAFT AND SATELLITE IN LAKE ERIE AND UTAH LAKE,
National Environmental Satellite Service, Hillcrest Heights, Md.
For primary bibliographic entry see Field 5A.
W75-03760

7B. Data Acquition

GAS CHROMATOGRAPHY OF VOLATILE METAL CHELATES: APPLICATION OF A NEW TECHNIQUE TO METAL ANALYSIS IN NATURAL WATERS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5A.
W75-03305

A DEVICE FOR MAINTAINING CONSTANT OXYGEN CONCENTRATION IN FLOWING WATER,
Colorado Div. of Wildlife, Fort Collins.
For primary bibliographic entry see Field 5G.
W75-03522

ESTIMATION OF GROUNDWATER ACCESSION TO AND EVAPORATION FROM A SOUTH AUSTRALIAN LAKE USING ENVIRONMENTAL TRITIUM,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
For primary bibliographic entry see Field 2H.
W75-03528

DETERMINATION OF LIQUID CONDUCTIVITY OF CAPILLARY POROUS SOLIDS,
Waterloo Univ. (Ontario).
For primary bibliographic entry see Field 2G.
W75-03532

MONITORING OF EARTH-ROCK DAMS,
Snowy Mountains Engineering Corp., Cooma (Australia). Materials Branch.
For primary bibliographic entry see Field 8D.
W75-03533

AUTOMATIC DOSAGE OF SULFATES BY AN IMPROVED NEPHELOMETRIC METHOD (DOSAGE AUTOMATIQUE DES SULFATES PAR UNE METHODE NEPHELOMETRIQUE AMELIOREE),
Institut d'Hygiene et d'Epidemiologie, Brussels (Belgium).
For primary bibliographic entry see Field 5A.
W75-03536

ON THE CHOICE OF METHODS FOR THE PREDICTION OF THE WATER-ACTIVITY AND ACTIVITY COEFFICIENT FOR MULTICOMPONENT AQUEOUS SOLUTIONS,
Ecole Polytechnique, Montreal (Quebec). Department de Genie Chimique.
For primary bibliographic entry see Field 2K.
W75-03540

USING AERIAL MEASUREMENTS OF FOREST OVERSTORY AND TOPOGRAPHY TO ESTIMATE PEAK SNOWPACK,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W75-03570

MEASUREMENT OF ATMOSPHERIC PRECIPITABLE WATER USING A SOLAR RADIOMETER,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 2B.
W75-03638

DIFFERENTIAL SEA-ICE DRIFT. II. COMPARISON OF MESOSCALE STRAIN MEASUREMENTS TO LINEAR DRIFT THEORY PREDICTIONS,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 2C.
W75-03650

CALCULATION OF TEMPERATURE VARIATIONS OF SMALL MOUNTAIN STREAMS,
Vrije Universiteit, Amsterdam (Netherlands). Dept. of Meteorology.
For primary bibliographic entry see Field 2E.
W75-03655

SUBGLACIAL GEOMORPHOLOGY SURROUNDING THE ICE-FREE VALLEYS OF SOUTHERN VICTORIA LAND, ANTARCTICA,
State Univ., of New York, Buffalo. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2C.
W75-03667

IN SITU MEASUREMENTS OF LEAF WATER POTENTIAL AND RESISTANCE TO WATER FLOW IN CORN, SOYBEAN, AND SUNFLOWER AT SEVERAL TRANSPIRATION RATES,
Atmospheric Environment Service, Downsview (Ontario).
For primary bibliographic entry see Field 3F.
W75-03668

CHEMICAL ANALYSES FOR WATER QUALITY - TRAINING MANUAL.
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
For primary bibliographic entry see Field 5A.
W75-03785

NEW MULTI-PROBE TEMPERATURE-PROFILE MEASUREMENT SYSTEM--THE 'THERMISTOR COMB',
California Univ., Berkeley. Sea Water Conversion Lab.
For primary bibliographic entry see Field 3A.
W75-03811

A SIMPLE DEVICE FOR ANALYZING THE ENERGY LOAD AND INTENSITY OF RAINSTORMS,
Institute for Agricultural Research, Zaria (Negeria).
For primary bibliographic entry see Field 2B.
W75-03838

LEAF WATER CONTENT AND POTENTIAL IN CORN, SORGHUM, SOYBEAN, AND SUNFLOWER,
Atmospheric Environment Service, Downsview (Ontario).
For primary bibliographic entry see Field 3F.
W75-03839

7C. Evaluation, Processing and Publication

USE OF INTERACTIVE COMPUTER GRAPHICS IN WATER RESOURCES PLANNING AND MANAGEMENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 6A.
W75-03301

WATER QUALITY MODELS FOR URBAN AND SUBURBAN AREAS.
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 5B.
W75-03311

HYDROLOGIC INFORMATION STORAGE AND RETRIEVAL SYSTEM,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
E. H. Wiser.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 565, $3.25 in paper copy, $2.25 in microfiche. Annual Progress Report, June 30, 1974, 5 p. OWRT A-067-NC(1). 14-01-0001-3833.

Descriptors: *Data collections, *Data storage and retrieval, *Hydrologic data, Streamflow, Rainfall, Dams, Safety, Computer programs, Data processing, *North Carolina, Information retrieval.

HISARS, an acronym for Hydrologic Information Storage and Retrieval System, is an electronic digital computer system that stores, retrieves and analyzes streamflow, rainfall, temperature, snow fall, and evaporation data as recorded at numerous stations in North Carolina. Also included is the Register of Dams and Damsites of North Carolina. Meteorological data are being updated to include calendar year 1971 and the streamflow data is updated to September 1972. Operations in HISARS are divided into three main divisions: Access, Processing, and Management. The Management function enables the user to add new records and correct or modify stored records. The Access function provides for various listing of stored data and the Processing function provides a statistical analysis of the stored data. Included in the Processing function are standard statistical calculations for daily values, monthly values, correlation analyses, frequency analyses, mass flow analyses and flow duration analyses. Data are stored on magnetic disc packs. Updating of the data base continues as the information becomes available. The HISARS program is written in PL-1. The system is operational on the IBM 370-165 computer at Triangle Universities Computation Center. A remote terminal to the computer is available at the North Carolina Office of Water and Air Resources. (McJunkin-North Carolina State)
W75-03316

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART I,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5D.
W75-03387

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART II,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5D.
W75-03388

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. STRUCTURAL SIZING OF FLOTATION MODULES AND CONSTRUCTION BARGE,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 8A.
W75-03442

THE APPLICATION OF REPRO-MODELING TO THE ANALYSIS OF A PHOTOCHEMICAL AIR POLLUTION MODEL,
Technology Service Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 5B.
W75-03633

SOME PREDICTED CLIMATIC EFFECTS OF A SIMULATED SAHARA LAKE,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 2B.
W75-03635

TWELVE BASIN INVESTIGATION: ANALYSIS OF POTENTIAL INCREASES IN PRECIPITATION AND STREAMFLOW RESULTING FROM MODIFICATION OF COLD OROGRAPHIC CLOUDS IN SELECTED RIVER BASINS OF THE WESTERN UNITED STATES. VOLUME 2,
North American Weather Consultants, Goleta, Calif.
For primary bibliographic entry see Field 3B.
W75-03639

FITTING A THREE-PARAMETER LOG-NORMAL DISTRIBUTION BY LEAST SQUARES,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 2E.
W75-03651

ON THE VARIABILITY OF SEASONAL PARAMETERS IN HYDROLOGIC TIME SERIES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-03658

MULTIVARIATE STATISTICAL ANALYSIS OF GLACIER ANNUAL BALANCES,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie.
For primary bibliographic entry see Field 2C.
W75-03664

OPTIMAL IDENTIFICATION OF PARAMETERS IN AN INHOMOGENEOUS MEDIUM WITH QUADRATIC PROGRAMMING,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 2F.
W75-03804

ON THE OPTIMAL IDENTIFICATION OF PARAMETERS IN A PARABOLIC SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 2F.
W75-03805

8. ENGINEERING WORKS

8A. Structures

ECONOMIC EVALUATION AND DETERMINATION OF PLANT CAPACITY AND DAM HEIGHT,
Public Power Corp., Athens (Greece).
For primary bibliographic entry see Field 6B.
W75-03328

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. STRUCTURAL SIZING OF FLOTATION MODULES AND CONSTRUCTION BARGE,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
I. R. Yumori.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-11047, $5.25 in paper copy, $2.25 in microfiche. Technical Report No 5, UNIHI-SEAGRANT-CR-74-03. March, 1974. 105 p, 32 fig, 2 tab, 3 append, 8 ref. SG-2-35243.

Descriptors: *Computer programs, *Structural models, *Offshore platforms, Structural engineering, *Structural design, *Hawaii, Structural analysis, *Hydraulic structures, Programs, Data processing, Structures, Coastal structures, Shores, Architecture, Civil engineering, Construction, Design, Stress analysis, Structural behavior, Bodies of water, Harbors, Engineering structures, Planning.
Identifiers: *Honolulu(Hawaii), *Floating City, Floating platforms, Flotation modules, Construction barges.

The preliminary structural sizing of modules for a proposed Floating City in Hawaii is presented. The City would be constructed aboard a large deep-sea floating platform and would house domestic, commercial, recreational, industrial, and public activities, linked to Honolulu by transportation and communication. Effects of draft, waterplane area, material strength, and weight distribution on stability characteristics and structural design are discussed. Also considered are structural integrity, seakeeping, cost, and feasibility of the modules. Design and sizing of a construction barge is also required; it serves as a working surface, a transportation barge, and a loading platform. A computer program is developed to size the structure of the flotation chambers and module and to calculate stability characteristics of the individual modules and completed ring platform. Required inputs are standard flotation chamber dimensions, structural material, and weight distribution. The program varies the upper cylinder diameter, which determines waterplane area. The final design configuration of the floating chamber uses 8,000 psi concrete, 240-feet draft, 62-foot upper cylinder diameter, and a 2:1 bottom aspect ratio. All results are shown in graphic form, and the program listing is provided. (See also W75-03443) (Grden-North Carolina)
W75-03442

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. CONSTRUCTION SITE SELECTION,
Hawaii Univ., Honolulu.
R. M. Kontingsberger, and S. B. Ribakoff.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-11046, $4.25 in paper copy, $2.25 in microfiche. Technical Report No 6, UNIHI-SEAGRANT-CR-74-04, 1974. SG-2-35243.

Descriptors: *Offshore platforms, *Structural engineering, *Structural design, *Environmental effects, *Hawaii, Land use, Structures, Coastal structures, Shores, Construction, Civil engineering, Design, Bodies of water, Harbors, Planning, Comprehensive planning, Sites, Locating, Urbanization, Environment, Oceans, Islands, Water resources, Cities, Floating.
Identifiers: Barber's Point(Hawaii), Oahu(Hawaii), *Floating City, Floating platforms, Floating modules, Honolulu(Hawaii).

Criteria for selecting a construction site for a Floating City in Hawaii are presented. The city would be constructed aboard a large, deep-sea floating platform and would house domestic, commercial, recreational, industrial, and public activities, linked to Honolulu by transportation and communication. Criteria include: adequate area of sheltered water; channel negotiable by the constuction barge; access to skilled labor force, transportation and capital resources; and minimum environmental consequences. Three adequate sites were located - Kawaihae on Hawaii, Port Allen on Kauai, and Barber's Point on Oahu. Barber's Point is preferred since a deep draft harbor is needed and is being planned, the district is zoned for heavy industry, no incompatible land uses exist, and the site is on Oahu, where most of the State's capital and human resources are located. Arguing for another site, however, is the non-existence of the harbor and the continued lopsided trend toward high density and overdevelopment on Oahu. If financing for a deep harbor cannot be obtained independently of the project, other sites will be less expensive since they possess suitable harbors. (See also W75-03442) (Grden-North Carolina)
W75-03443

PVC SEWER PIPE MEETS TIGHT SPECIFICATIONS.
Public Works, Vol 105, No 7, p 84, July, 1974.

Descriptors: *Plastic pipes, *Sewers, Construction materials, Delaware, Water pollution control, Treatment facilities, Design.
Identifiers: *PVC sewer pipes, New Castle County(Del).

Twenty-five sewer construction projects are underway in New Castle County, Delaware, in anticipation of a rise in population. Johns-Manville Ring-Tite PVC sewer pipes in 8-inch to 12-inch sizes are being selected due to their availability and reliance in meeting the strict infiltration/exfiltration limitations. Also the pipe's light weight and 20-foot lengths allow trenches to be opened and closed quickly. (Sandoski-FIRL)
W75-03547

EVALUATING WELL CONSTRUCTION, (PART II),
Agricultural Research Service, Beltsville, Md.
For primary bibliographic entry see Field 5B.
W75-03813

NEW RUBBER EXPANSION JOINTS FOR PIPELINES.
For primary bibliographic entry see Field 8G.
W75-03819

8B. Hydraulics

PREDICTING THE FLOW OF WATER WITHIN A CHANNEL BOUNDARY OF GRAVEL,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
Y. K. Tang.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 636, $4.25 in paper copy, $2.25 in microfiche. Ms Thesis, May 1973. 50 p, 10 fig, 5 tab, 12 ref, append. OWRT A-057-MISS(2).

Descriptors: *Open channel flow, *Boundaries(Surfaces), *Porous media, Free surfaces, Gravels, Flow, Channel erosion, Flumes, Velocity, Shear, Slopes, Gradients(Streams), Protection, Darcys law, Chezy equation, Mannings equation, Regression analysis, Roughness(Hydraulic), Reynolds number, Porosity, Particle size, Laboratory tests.
Identifiers: Flow depth, Average discharge velocity, Seepage velocity.

An empirical relationship was developed describing the discharge velocity of water flowing within a channel boundary of gravel as a function of the gravel size, channel slope, and flow depth above a gravel layer of uniform thickness of 4.5 inches. The nature of the function was determined from the analysis of laboratory observations. The laboratory tests were conducted in a 50 ft long, 1 ft wide, and 1 ft deep rectangular channel. Observations were made by varying one independent variable and holding the other independent variables constant. Three sizes of gravel ranging between 0.25 and 1.5 inches in diameter, six channel slopes between 0.00125 and 0.00750, and six flow depths between 0.5 and 5.5 inches were used. The discharge velocities within the gravel layer were measured with a hot-film anemometer. Multiple regression techniques were utilized to obtain the prediction equation. The analysis of variance and the coefficient of determination showed that the prediction is a good predictor. (Visocky-ISWS)
W75-03320

SEWER PIPE: INFILTRATION IS THE ISSUE,
For primary bibliographic entry see Field 5D.
W75-03548

MIXING AND TRANSPORT, (LITERATURE REVIEW),
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-03554

HYDRODYNAMIC EFFECTS ON FLOW THROUGH SCREENS AT INTAKES,
Bechtel, Inc., Gaithersburg, Md.
A. M. Alsaffar.
Water Research, Vol 8, No 9, p 617-622, September 1974. 7 fig, 10 ref.

Descriptors: *Screens, *Fish barriers, *Head loss, *Intakes, Hydraulics, Drag, *Hydrodynamics, Continuity equation, Velocity, Momentum equation, Flow resistance, Fish conservation.
Identifiers: Grids.

Screens placed at intakes to protect fish were investigated. The effects of approach velocity, wire area, and screen angles less than 90 degrees to the flow were considered. Equations were developed for the pressure drop coefficient and for the flow angle downstream from the screen. These parameters were found to depend on the drag coefficient and the three conditions initially considered. Results were presented in a form useful for design of fish protective screens at intakes. (Adams-ISWS)
W75-03659

ANTI-HEAVE PROTECTIVE SYSTEM,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France). (assignee)
J. E. Lamy.
US Patent No 3,849,990, 4 p, 17 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1447, November 26, 1974.

Descriptors: *Patents, *Shore protection, *Breakwaters, *Pollution abatement, Waves(Water), Offshore platforms, Oil industry, Heaving.
Identifiers: Wave effects, *Heave effects, Port facilities, Offshore facilities, Submarine deposits, Underwater mining.

A wall is provided with projecting studs arranged in staggered relation. The studs are adapted to slow ascending and descending water flows against the wall exposed to wave and heave action. Circulation-generating fluid deviations and end eddies are introduced. The studs can consist of pipes draining water through the apertures of a perforated wall of a breakwater of a perforated caisson type. (Sinha-OEIS)
W75-03732

MECHANICAL REEF,
For primary bibliographic entry see Field 2J.
W75-03738

ANTI-EROSION DEVICE,
For primary bibliographic entry see Field 2J.
W75-03742

BOUNDARY EFFECTS ON DILUTION OF BUOYANT JETS,
Memorial Univ. of Newfoundland, St. John's. Faculty of Engineering and Applied Science.
J. J. Sharp, and G. Wang.
In: Water Pollution Research in Canada 1973, Vol 8, p 168-177, 6 fig, 8 ref.

Descriptors: *Jets, *Waste dilution, *Outfall sewers, Coasts, Mixing.
Identifiers: Buoyant jets.

Large marine outfalls are laid on the ocean bed with jets discharging horizontally at right angles to the pipe axis. When first installed the jet discharges at a distance above the bed equal to half the pipe diameter but subsequent current scour may bring the jet into much closer proximity with the floor, or in soft sediments, with time, the jets will discharge at or below the sea bed level. The dilution achieved in a single jet under such conditions was investigated with resultant conclusions that the dilution of a buoyant jet discharged in close proximity to a horizontal floor, is considerably greater than that obtained in a free jet. The magnitude of the increase in dilution varies depending on the values of relevant parameters but comparisons indicate that an increase in the order of 200% to 500% would not be uncommon. As the jet leaves the discharge nozzle it tends to cling to the floor before rising, thus changing the shape of the trajectory and increasing dilution. The implications are that, for the type of ocean outfall described, settlement of the discharge pipe due to scour will have a beneficial effect on the dilution achieved between outfall and surface. (See also W75-03770) (Auen-Wisconsin)
W75-03780

OIL-IN-WATER EMULSIONS AND THEIR FLOW PROPERTIES IN POROUS MEDIA,
Chevron Research Co., Richmond, Calif.
C. D. McAuliffe.
Journal of Petroleum Technology, Vol 25, p 727-733, June, 1973. 10 fig, 3 tab, 16 ref.

Descriptors: Porosity, *Emulsions, *Groundwater, Oil reservoirs, Drilling fluids, Injection wells, Sandstones, Penetration, Heterogeneity, Displacement, Capillary action, Asphalt, Viscosity, Drops(Fluids), Equipment, Flow, Permeability, Cores, Saturated flow.
Identifiers: *Oil-in-water emulsions, Porous media, Emulsion flow, Waterfloods, Oil recovery, Producing wells, Fingering, Jamin effect, Crude oil, Droplets, Pseudo non-Newtonian flow.

In waterfloods, the rapid channeling of water from injection to producing wells through the more permeable portions of the reservoir gives low oil recovery. Laboratory investigations were undertaken to determine the properties of oil-in-water emulsions and to study the flow of emulsions through porous media. Samples of core material can be considered as miniature reservoirs and the cores are heterogeneous. The following conclusions were drawn: (1) Crude oil-in-water emulsions can be easily prepared from some asphaltic crude oils and dilute solutions of sodium hydroxide. (2) Emulsions containing up to 50% oil have viscosities in bulk that are less than 20 times that of water, even though the oil viscosities may range up to 1 million cp at room temperature. (3) Emulsions prepared from various asphaltic crude oils have droplets of different sizes. (4) Oil-in-water emulsions can effectively reduce the water permeabilities of sandstone cores if the initial water permeabilities are less than 2 darcies. (5) The permeability reduction caused by injecting emulsion is retained even when the emulsion is followed by many pore volumes of water. (6) Flow of oil-in-water emulsions through porous media is pseudo non-Newtonian, regardless of how much oil the emulsion contains. (7) In these experiments, with cores of different permeabilities mounted in parallel, oil-in-water emulsion proportionally reduced the permeability in high-permeability cores more than in cores of lower permeability. (Campbell-NWWA)
W75-03812

8C. Hydraulic Machinery

HOW DO YOU EXPLAIN THE COST,
LFE Control System Industries, Santa Clara, Calif.
For primary bibliographic entry see Field 6C.
W75-03333

PACKAGED PUMPING STATIONS FOR SUBURBAN WATER DISTRIBUTION,
For primary bibliographic entry see Field 5F.
W75-03451

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT),
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 4A.
W75-03452

TALKING TANKERS.
For primary bibliographic entry see Field 5E.
W75-03560

OIL-IN-WATER EMULSIONS AND THEIR FLOW PROPERTIES IN POROUS MEDIA,
Chevron Research Co., Richmond, Calif.
For primary bibliographic entry see Field 8B.
W75-03812

8D. Soil Mechanics

MONITORING OF EARTH-ROCK DAMS,
Snowy Mountains Engineering Corp., Cooma (Australia). Materials Branch.
A. D. Hosking.
Australian Geomechanics Journal, Vol G4, No 1, p 1-12, 1974. 14 fig, 15 ref.

Descriptors: *Design data, *Instrumentation, *Monitoring, *Rockfill dams, Dam design, Design criteria, Dams, Dam construction, Earth dams, Reservoir operation, Pressure measuring instruments, Strain measurement, Seismic properties, Structures, *Australia.
Identifiers: Snowy Mountains Hydroelectric Scheme(Aust).

Dams are monitored during construction to check on the predictions of design factors and allow for modification of designs where necessary, and during their operational life to ensure their safety, and determine the effects of operational practices and external influences. Data are also derived for the design of future dams. The data required are principally related to neutral and total stresses, and to movements and strains; the response of the dam to seismic shock may also be required. The types of instruments employed, both embedded and surface-installed, are reviewed and discussed. An outline of methods of presenting the data obtained is provided, with illustrative examples covering several of the earth-rock dams of the Snowy Mountains Scheme. The frequency of observations is discussed. (Levick-CSIRO)
W75-03533

STRUCTURAL BEHAVIOR OF A FLEXIBLE METAL CULVERT UNDER A DEEP EARTH EMBANKMENT USING METHOD A BACKFILL,
California State Div. of Highways, Sacramento. Bridge Dept.
D. W. Spannagel, R. E. Davis, and A. E. Bacher.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 589, $7.00 in paper copy, $2.25 in microfiche. Report No CA-Hy-BD-624111-73-6, June 1973. 220 p, 120 fig, 13 tab, 17 ref, 1 append. D-4-24.

Descriptors: *Culverts, *Embankments, *On-site data collections, *Design, *Backfill, Structural design, Engineering structures, Roads, Highways, Instrumentation, Structural behavior, Investigations, Analytical techniques, Evaluation, Prototype tests, Earth pressure, Stress, Stress analysis, Hydraulic structures, Soil mechanics, Soil pressure, Steel pipe.
Identifiers: Flexible culverts, Structural-steel plate pipe.

A culvert consisting of twin 108-inch-nominal-diameter structural steel plate pipes was buried under 160 feet of highway embankment at Apple Canyon using Method A (soil) backfill. Two cross-sections were extensively instrumented to determine soil pressures, displacements, strains, and settlements at various fill heights and following construction completion. Results indicated that the soil pressures were linear functions of fill height and produced fairly uniform peripheral distributions. Displacements were small. Stresses exceeding the specified minimum yield were observed without apparent structural damage. Theoretical analysis procedures were applied to the installation to determine their relative merit. The finite element procedure proved the best, although sufficient soil property data were not available to predict accurately pipe displacements and stresses. Comparisons were made between this installation and a similar structural plate pipe at Chadd Creek using Method B (baled straw) backfill. The Method A backfill technique was found to be superior to Method B due to the uniformity of pressures, stresses, and moments obtained. (Humphreys-ISWS)
W75-03641

8E. Rock Mechanics and Geology

EFFECT OF FLUID CONTENT ON THE MECHANICAL PROPERTIES OF WESTERLY GRANITE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W75-03428

A GEOLOGICAL AND SEISMOLOGICAL INVESTIGATION OF THE LAWRENCE LIVERMORE LABORATORY SITE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W75-03429

8F. Concrete

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. STRUCTURAL SIZING OF FLOTATION MODULES AND CONSTRUCTION BARGE,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 8A.
W75-03442

TESTING AND EVALUATION OF PROTOTYPE TUNNEL SUPPORT SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
H. W. Parker, D. U. Deere, R. B. Peck, P. C. Birkemoe, and R. M. Semple.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 912, $9.50 in paper copy, $2.25 in microfiche. Report No UILU-ENG 73 2013, August 1973. 320 p, 109 fig, 23 tab, 48 ref, 4 append. DOT FR-20020.

Descriptors: *Tunnels, *Laboratory tests, *Tunnel linings, *Concrete technology, Testing, Evaluation, Concrete additives, Concrete testing, Concrete mixes, Prototypes.
Identifiers: *Tunnel supports, *Large scale tests, Steel fiber, Regulated-set concrete, Precast polymer concrete segments.

Presented were the results of engineering studies related to the development of new and improved tunnel support systems. Steel fiber reinforced regulated-set concrete was proposed for use as a slipformed concrete lining which can be placed immediately behind a tunnel boring machine. Mix design studies and field pumping tests for this new concrete were described. The results of a cooperative research effort carried out with the U.S. Bureau of Reclamation on precast polymer concrete segmented tunnel support systems included an evaluation of the structural aspects of the system, an analysis of potential heat and fire hazards, and an evaluation of the cost of the promising new support system. The design, construction, and operation of a large-scale test facility to test both circular and horseshoe-shaped tunnel supports with a span of 10 feet were described. These tests are expected to result in the adoption of more effective and economical liners and supports. Large-scale tests which will evaluate the structural behavior of steel fiber regulated-set concrete were described. These tests are being conducted in connection with the development of an extruded liner tunneling system. (Humphreys-ISWS)
W75-03644

8G. Materials

BENEFICIATION OF LIGNIN SOLUTIONS AND PULP MILL WASTES,
Betz Labs., Inc., Trevose, Pa. (assignee)
For primary bibliographic entry see Field 5D.
W75-03593

STRUCTURAL BEHAVIOR OF A FLEXIBLE METAL CULVERT UNDER A DEEP EARTH EMBANKMENT USING METHOD A BACKFILL,
California State Div. of Highways, Sacramento. Bridge Dept.
For primary bibliographic entry see Field 8D.
W75-03641

TESTING AND EVALUATION OF PROTOTYPE TUNNEL SUPPORT SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8F.
W75-03644

HYDROGEN EVOLUTION ON BETA III TITANIUM ALLOY,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 2K.
W75-03809

OIL-IN-WATER EMULSIONS AND THEIR FLOW PROPERTIES IN POROUS MEDIA,
Chevron Research Co., Richmond, Calif.
For primary bibliographic entry see Field 8B.
W75-03812

NEW RUBBER EXPANSION JOINTS FOR PIPELINES.
Water Services, Vol 18, No 935, p 21, January, 1974.

Descriptors: *Expansion joints, *Rubber, *Pipelines, Design data, Flexibility.
Identifiers: United Kingdom.

Rubber expansion joints for pipelines are being marketed in the United Kingdom by United Flexible Metallic Tubing Company, Limited. The joints are available in a variety of qualities of rubber and can be fitted for aggressive chemicals. They have a strong multi-ply nylon fabric carcass with wire reinforced collars and a weather proof external cover. Sizes range from 32-300 mm bore. The over length is 130 mm. Total axial movement possible is plus or minus 30 mm from the normal free length. Maximum lateral offset is from 20-30 mm depending on diameter. The joints provide a versatile and economic means of achieving flexibility in pipelines conveying fluids under pressure or vacuum. All forms of movement can be compensated for, and they also serve to dampen vibrations and prevent the transmission of noise. (Merritt-FIRL)
W75-03819

8H. Rapid Excavation

SELECTED PHYSICOCHEMICAL PROPERTIES OF BASALTIC ROCKS, LIQUIDS, AND GLASSES,
Los Alamos Scientific Lab., N. Mex.
M. C. Krupka.
Available from the National Technical Information Service, Springfield, Va. 22161, as Rept. No LA-5540-MS;, $4.00 in paper copy, $2.25 in microfiche. Report No LA-5540-MS, March 1974. 11 p, 18 fig, 9 tab, 27 ref.

Descriptors: *Basalts, *Physicochemical properties, *Physical properties, *Chemical properties, *Thermodynamic behavior, *Rock properties, *Liquids, *Melting, Radioactivity, Research and development, Viscosity, Density, Thermal capacity, Thermal conductivity, Geothermal studies, Thermal expansion, Mechanical properties, Specific heat, Waste disposal, Systems analysis.
Identifiers: *Glasses.

Rock-melting systems are under development. Based on the concept of progressive localized melting of the rock encountered in forward motion and subsequent chilling of the melt to a glass, these systems, when fully developed, have the potential of contributing significant improvements to the general field of excavation technology. Selected physicochemical properties of basaltic rocks, liquids, and glasses are presented including viscosity, thermal diffusivity, thermal conductivity, specific heat, density, thermal expansion coefficient, and average chemical composition. (Houser-ORNL)
W75-03419

8I. Fisheries Engineering

FINANCING RESOURCES FOR FISHERY DEVELOPMENT,
Inter-American Development Bank, Washington, D.C.
For primary bibliographic entry see Field 6C.
W75-03339

EXPANSION AND EVALUATION OF AN ARTIFICIAL REEF OFF MURRELL'S INLET, SOUTH CAROLINA,
National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center.
For primary bibliographic entry see Field 6C.
W75-03348

COMMERCIAL OYSTER FISHERY DEVELOPMENT INVESTIGATION,
Hawaii State Dept. of Land and Natural Resources, Honolulu.
For primary bibliographic entry see Field 6C.
W75-03350

THE TRANSITION FROM SMALL-SCALE TO LARGE-SCALE INDUSTRY,
United Nations Development Program, Lagos (Nigeria).
For primary bibliographic entry see Field 6C.
W75-03351

THE ROLE OF AQUACULTURE IN FISHERY DEVELOPMENT AND MANAGEMENT,
Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries.
For primary bibliographic entry see Field 6C.
W75-03355

ALTERNATIVES IN AQUACULTURAL DEVELOPMENT: CONSIDERATION OF EXTENSIVE VERSUS INTENSIVE METHODS,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
For primary bibliographic entry see Field 6B.
W75-03398

FOOD SELECTION BY LABEOROHITA (HAM.) AND ITS FEEDING RELATIONSHIP WITH OTHER MAJOR CARPS,
Aligarh Muslim Univ. (India). Dept. of Zoology.
Rashid A. Khan, and A. Qayyum Siddiqui.
Hydrobiologia, Vol 43, No 3/4, p 429-442, 1973, Illus.
Identifiers: Algae, *Carps, Catla-catla, Cirrhina-mrigala, Crustacea, Growth, *Labeo-rohita, Phytoplankton, Ponds, Protozoa, Rivers, Rotifers, Vegetation, Zooplankton, Fish ponds, *Fish food organisms.

Selectivity of food by L. rohita was studied in a stocking pond (Moat), by calculating an electivity index (E) for each food organism as described by Ivlev. L. rohita was definitely selective in its feeding. In case of fingerlings, there was a strong selection for zooplanktonic organisms (Arcella and Dif-

flugia among protozoans, Keratella and Brachionus among rotifer and Daphnia and Cyclops among crustaceans) and smaller algae (Cosmarium and Closterium among desmids, Euglena and Volvox among phytoflagellates and algal spores and zygotes) while most of the phytoplanktonic organisms, belonging to green algae, diatoms and blue green algae, were avoided. In case of adults, a strong negative selection was observed for all zooplanktonic organisms and a strong positive selection for most of the green algae and diatoms (Ankistrodesmus, Zygnema, Spirogyra, Selenastrum, Pediastrum, Scenedesmus, Tetraspora, Stephanodiscus, Naviculla, Diatoma, Synedra and Nitzchia). However, all blue green algae were avoided. The feeding relationship of L. rohita with other major carps, Cirrhina mrigala and Catla catla was studied in 2 different habitats, pond and river. The adults of L. rohita fed mainly on phytoplankton and macrovegetation, the main food of adult C. mrigala was decayed organic matter, sand and mud supplemented by plankton, while the food of adult C. catla was chiefly composed of zooplankton, and some phytoplankton.--Copyright 1974, Biological Abstracts, Inc.
W75-03496

OBSERVATIONS ON A BREEDING PAIR OF TILAPIA RENDALLI RENDALLI BOULENGER 1896 IN AN EXPERIMENTAL TANK AT LAKE KARIBA FISHERIES RESEARCH INSTITUTE,
D. H. S. Kenmuir.
Hydrobiologia, Vol 43, No 3/4, p 365-370, 1973, Illus.
Identifiers: *Breeding, Climates, Fisheries, Lakes, *Rhodesia(Lake Kariba), Temperature, *Tilapia-rendalli-rendalli, Weeds, *Fish ponds, Fish management.

A pair of breeding T. r. randalli were installed in a tank at the Lake Kariba Fisheries Research Institute (Rhodesia) in order to determine the number of times they would breed in a yr under Kariba climatic conditions. The pair bred almost monthly from Jan. until May, when temperatures in the tank dropped below 20C, the minimum temperature at which this species will breed. Breeding commenced again in Sept., when temperatures were above 20C and continued monthly to the end of the yr. A total of 8 breedings in the calendar yr of 1971 were recorded. T. rendalli could breed at least 8 times a yr in the Lake. This represents a considerable capacity for increase and in view of the destructive weed-eating habits of T. r. rendalli effort should be made to find a way to crop this species, which is not effectively caught by gill nets.--Copyright 1974, Biological Abstracts, Inc.
W75-03501

THE PLANKTON OF NEW TRANSFER-PONDS AT THE GOLYSZ FARM,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
L. Krzeczkowska-Woloszyn.
Acta Hydrobiol, Vol 15, No 4, p 427-436, 1973, Illus.
Identifiers: Algae, *Carp production, *Fertilization, *Phytoplankton, *Poland(Golysz Farm), Ponds, *Zooplankton, Fish ponds, *Fish transfer ponds, Fish foods, Fish management.

Earlier investigations are continued on the plankton of the 1st and 2nd transfer-ponds in the 1st yr after their construction (for carp production). It discusses the development of plankton with the application of another type of fertilization. The observed changes in the phyto- and zooplankton indicate a structure more consistent with that occurring in water bodies utilized for a longer time. The analyses of the fertilization did not reveal any influence on the numbers of plankton. Among other factors, some role was probably played by its composition, chiefly among the algae.--Copyright 1974, Biological Abstracts, Inc.
W75-03502

HYDRODYNAMIC EFFECTS ON FLOW THROUGH SCREENS AT INTAKES,
Bechtel, Inc., Gaithersburg, Md.
For primary bibliographic entry see Field 8B.
W75-03659

FLOATING WATER SCREEN,
FMC Corp., San Jose, Calif. (assignee)
R. G. Bottorf.
U.S. Patent No. 3,843,520, 5 p, 7 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1637, October 22, 1974.

Descriptors: *Patents, Water treatment, *Screens, *Fish barriers, *Fish conservation, Equipment, Conservation, Water level fluctuations.
Identifiers: *Ice formation, *Fish screens, Floating water screens.

A floating water screen installation for use in bodies of water in which the water level varies comprises an anchoring structure on the bed of such a water body. It includes a fixed vertical hollow central column and an outlet pipe in communication with the column. A buoyantly supported generally cylindrical screen structure, having an enclosed bottom, is mounted in a surrounding relationship to the column for vertical sliding motion on the column in response to changes in water level, and for rotation about the column. Long vertical slots are provided in the central column to admit only screened water to the outlet pipe. Rotary drive and screen backwash systems are also described. One object of this device is intended to be the protection and conservation of fish. This is accomplished by the provision of a screening structure with a low velocity water flow through the screen areas to permit fish to swim away and the elimination of pockets and areas in which the fish may be trapped. Additional objects include the provision of rotating drives which reduce ice formation around the floating screen structure and multiple removable screen panels for simplified maintenance and repair. (Sinha-OEIS)
W75-03745

MARINE FISH CULTURE IN BRITAIN: IX. GROWTH OF CULTURED PLAICE TO MARKETABLE SIZE IN THE LABORATORY,
Marine Biological Station, Port Erin, Isle of Man (England).
A. B. Bowers.
J Cons Cons Int Explor Mer. Vol 35, No 2, p 149-157, Illus 1974.

Descriptors: Europe, Sea water, Fish, *Fish management, Fish populations, Fish reproduction, *Fish growth.
Identifiers: Great Britain, *Plaice, Pleuronectes-Platessa.

Plaice (Pleuronectes platessa) were reared in unheated sea water in the laboratory through 2 generations. Selected 2nd generation plaice were measured and weighed every 2 mo. One group of fish cultured at a density of 13 fish/m2 of tank area gave a yield of 11.6 kg of marketable plaice 21 mo. from hatching for a food consumption of 56 kg. Plaice cultured in laboratory tanks grew faster than wild plaice in the sea and were heavier for their length. Seasonal variations in growth of cultured plaice were similar to those shown by wild plaice in the sea.--Copyright 1974, Biological Abstracts, Inc.
W75-03759

AN ELECTRICAL BARRIER FOR PREVENTING MIGRATION OF FRESHWATER CRAYFISH IN RUNNING WATER: A METHOD TO STOP THE SPREAD OF THE CRAYFISH PLAGUE,
Uppsala Univ. (Sweden). Inst. for Physiologic Botany.
T. Unestam, C. Nestell, and S. Abrahamsson.
Rep Inst Freshwater Res Drottningholm 52, 199-203, Illus. 1972.

Descriptors: *Water pollution control, Fish control agents, *Crayfish, Aquatic animals, Aquatic life, Crustaceaus, Electronic equipment, Europe, Freshwater, Rivers, Running waters, Streams, *Fish barriers, Barriers, Fish migration.
Identifiers: Astacus-astacus, Sweden.

The electronic device described was tested in a stream of the River Tidan, Vastergotland, Sweden. Crayfish up to 1 m from the device were paralyzed; since the plague fungus survives only several weeks after all crayfish have succumbed, the time necessary to maintain the barrier is short.--Copyright 1974, Biological Abstracts, Inc.
W75-03833

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

PUBLICATIONS LIST OF THE IDAHO WATER RESOURCES RESEARCH INSTITUTE.
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 10C.
W75-03321

SEA GRANT PROGRAM 1973, STATE UNIVERSITY SYSTEM OF FLORIDA.
Florida Univ., Gainesville. Marine Advisory Program.
(1973). 24 p, 12 photo, 2 tab, 26 ref.

Descriptors: *Florida, *Government finance, *Estuaries, *Research and development, Comprehensive planning, Economics, Decision-making, Grants, Projects, Water resources development, Federal government, State governments, Local governments, Fisheries, Fishing, Fish management, Environmental effects, Coasts, Resources development, Economic aspects, Wetlands, Coastal marshes, Conservation.
Identifiers: Coastal waters, Coastal zone management, State policy.

Research has contributed information to decisions such as the Florida state purchase of coastal lands, siting of a sewage outfall and an oil well, cutting an inlet, and redesigning a commercial fishing trawl. Increasing the number of participating universities to five, developing closer ties with other marine-oriented organizations, and establishment of a quality publications series, all strengthened Sea Grant in Florida. Research concerning estuarine management, fisheries resources, ocean engineering, and aquaculture is reported. Research was done on some Gulf coast estuaries to develop information to decide how to balance the many uses of these areas. Florid's fisheries resources make possible a far-flung economic enterprise with local, state, national and international interests. Three projects were designed to provide information for the harvesting, handling, and utilization of renewable fisheries resources. (Sperling-Florida)
W75-03720

9B. Education (In-House)

CHEMICAL ANALYSES FOR WATER QUALITY - TRAINING MANUAL.
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
For primary bibliographic entry see Field 5A.
W75-03785

9C. Research Facilities

TWENTY YEARS OF WORK ON SOLAR DISTILLATION AT THE UNIVERSITY OF CALIFORNIA,
California Univ., Berkeley. Sea Water Conversion Lab.
For primary bibliographic entry see Field 3A.
W75-03810

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

PUBLICATIONS LIST OF THE IDAHO WATER RESOURCES RESEARCH INSTITUTE.
Idaho Univ., Moscow. Water Resources Research Inst.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 633, $4.25 in paper copy, $2.25 in microfiche. Research Report, April 1974. 44 p, 1 append. OWRT A-999-IDA(5).

Descriptors: *Publications, *Water Resources Institute, *Bibliographies, Information retrieval, *Research and development, Indexing, Documentation, *Idaho.

The various publications, thesis and papers prepared in conjunction with the Idaho Water Resources Research Institute activities were listed. All entries listed are either contained in the Institute's Reading Room or in the project file. Some of the publications are available free of charge, but photo copies of all publications are available at five cents per page. To assist in referring to any particular report or group of reports, the listing was subdivided into four basic categories: OWRR allotment projects, OWRR matching grants, Title II grants, and Miscellaneous publications. Each entry was referenced in both an author index and a research category index. A detailed description of the FCST research category descriptions was provided as an appendix to explain the use of the research cateogry index. It was hoped that these publications will increase the exchange of ideas, that interest in water related research and training will be encouraged, and that academic cooperation and communication with all interested parties will be enhanced as a result of the added knowledge on water and its management. (Scott-ISWS)
W75-03321

MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. PROTOZOA: CILIOPHORA,
New Hampshire Univ., Durham. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W75-03787

10F. Preparation Of Reviews

DISINFECTION,
Texas Univ., Houston.
For primary bibliographic entry see Field 05D.
W75-03369

ANAEROBIC DIGESTION OF ORGANIC MATTER,
Rowett Research Inst., Bucksburn (Scotland).
For primary bibliographic entry see Field 05D.
W75-03371

STATE OF THE ART-ACTIVATED CARBON TREATMENT OF WASTEWATER,
CH2M-Hill, Reston, Va.
For primary bibliographic entry see Field 05D.
W75-03545

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW),
National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div.
For primary bibliographic entry see Field 05D.
W75-03553

MIXING AND TRANSPORT, (LITERATURE REVIEW),
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W75-03554

THE USE OF AEROBIC PROCESSES FOR THE STABILIZATION OF ANIMAL WASTES,
North of Scotland Coll. of Agriculture, Aberdeen.
For primary bibliographic entry see Field 05D.
W75-03555

SUBJECT INDEX

2-4-D
Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

ABATE INSECTICIDE
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

ABSCISIC ACID
Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

ABSORPTION
Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

Investigations on the Incorporation of Different Algae by Some Zooplankton-Species, (In German),
W75-03643 5C

Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

ACCIDENTS
Evacuation Risks - An Evaluation,
W75-03424 6G

ACCRETION
Bonelli Cattle Co. v. Arizona (Quiet Title Action).
W75-03493 6E

ACCRETION (LEGAL ASPECTS)
Oliver v. Milliken and Farwell, Inc. (Action Involving Division Among Riparian Owners of Alluvial Deposits).
W75-03481 6E

ACID MINE WATER
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

ACTINIDES
Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

ACTIVATED CARBON
Adsorption Processes,
W75-03386 5D

State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

ACTIVATED SLUDGE
Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

Comparison of Completely Mixed and Plug Flow Biological Systems,
W75-03381 5D

High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

Operating Experience and Design Criteria for 'UNOX' Wastewater Treatment Systems, Design Seminar for Wastewater Treatment Facilities.
W75-03565 5D

A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

Unique New Secondary Oxygen Treatment System for Effluent,
W75-03587 5D

Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

Disposal of Alum Sludge to the Existing Activated Sludge Wastewater Treatment Plant,
W75-03774 5D

ADAPTATION
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

ADDITIVES
The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

ADIABATIC FLASHING
Wastewater Degassing by Adiabatic Flashing,
W75-03446 5D

ADJACENT LAND OWNERS
Miller Land Co., Inc. v. Liberty Township (Action for Injunction to Remove Drain Tile and Restore Condition of Land).
W75-03713 6E

ADJUDICATION PROCEDURE
Environmental Defense Fund v. Tennessee Valley Authority (Action to Enjoin TVA From Completing Construction of Tellico Dam).
W75-03362 6E

Commonwealth v. Washington Township (Action to Order Compliance with Clean Streams Law).
W75-03468 6E

Jewett v. Redwater Irrigating Association (Action for Adjudication of Water Rights).
W75-03471 6E

State Ex Rel. Indianapolis Water Co. v. Boone Cir. Ct. (Action by Water Company for Writ of Prohibition).
W75-03473 6E

Commonwealth of Kentucky, Department of Highways v. Fitzpatrick (Eminent Domain Action for Taking of River Bottom Lands).
W75-03477 6E

ADMINISTRATION
Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

Water Strategy Paper Highlights EPA Policies.
W75-03691 5G

Offshore Terminal Authority.
W75-03716 6E

Port Authorities--Establishment.
W75-03729 6E

ADMINISTRATIVE AGENCIES
Study and Survey of Lake Michigan Shore Line,
W75-03357 6E

People Ex Rel Gazlay v. Murray (Action to Enjoin Filling Parcel of Submerged Land).
W75-03460 6E

Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

Estuaries of Oregon-Ecosystems in Crisis, Problems and Legal Solutions,
W75-03678 5G

Winnipesaukee River Basin Control.
W75-03690 6E

Water Program Policy Issues, (EPA Policy Directives).
W75-03692 5G

Explanatory Statement: Implementation of NPDES, (EPA).
W75-03693 5G

Water Resources (As Amended).
W75-03699 6E

Department of Pollution Control and Ecology.
W75-03700 6E

Water Management Districts in North Dakota,
W75-03701 6E

ADMINISTRATIVE AGENCIES

State of Minnesota V. Environmental Protection Agency (Action of Impoundment of FWPCA Funds),
W75-03705 6E

Report of Proceedings at Public Hearing Concerning the Reclassification of Various Streams in the Cape Fear (Lower Section), Lumber, Neuse and White Oak River Basins.
W75-03717 4A

Illinois and Michigan Canal.
W75-03725 6E

ADMINISTRATIVE DECISIONS

State Ex Rel. Indianapolis Water Co. v. Boone Cir. Ct. (Action by Water Company for Writ of Prohibition).
W75-03473 6E

Environmentalists Attack Administration, Industry Plans to Weaken NEPA and Set Back Recent Clean Air Gains.
W75-03687 5G

ADMINISTRATIVE REGULATIONS

Robert E. Nilles, Inc. v. Illinois Pollution Control Bd. (Action Against Pollution Control Board for Denial of Sewerage Permits).
W75-03474 6E

Compensatory Storage,
W75-03676 6E

Explanatory Statement: Implementation of NPDES, (EPA).
W75-03693 5G

Water Resources (As Amended).
W75-03699 6E

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

Gulf Oil Corporation, et al. v. Morton (Action for Writ of Mandamus).
W75-03721 6E

Groundwater Use Act of 1972.
W75-03722 6E

ADOPTION OF PRACTICES

Watershed Protection and Flood Prevention Program and Resource Conservation and Development Program--Proposed Water Quality Management Guidelines.
W75-03491 5G

Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

Water Program Policy Issues, (EPA Policy Directives).
W75-03692 5G

Explanatory Statement: Implementation of NPDES, (EPA).
W75-03693 5G

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

Port Authorities--Establishment.
W75-03729 6E

ADSORPTION

Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

Adsorption Processes,
W75-03386 5D

Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

AERATED LAGOONS

A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

AERATION

Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

Process of and Installation for Purifying Sewage,
W75-03752 5D

AERIAL PHOTOGRAPHY

Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

AEROBIC BACTERIA

Investigations on Aerobic Pectolytic Bacteria in an Eutrophic Lake, (In German),
W75-03538 5C

AEROBIC TREATMENT

Practical Treatment of Feedlot Runoff,
W75-03313 5D

Temperature-Substrate Interactions in Biological Treatment,
W75-03445 5D

The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

Apparatus for Biologically Purifying Effluent,
W75-03734 5D

Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

A Performance Study of Aerobic Sludge Digestion,
W75-03773 5D

AGRICULTURAL RUNOFF

Pollutional Aspects and Crop Yields Resulting from High Manure Applications on Soil,
W75-03310 5B

Agriculture's Pollution Solution for Lake Apopka,
W75-03686 5C

AIR POLLUTION

Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

On the Spring Maximum of the Concentration of Trace Constituents in Atmospheric Precipitation,
W75-03621 5B

Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

Removing Three Air Pollutants at Once.
W75-03631 5D

The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

Pollution Control Awards Program.
W75-03731 6E

AIR POLLUTION CONTROL

A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

AIR TEMPERATURE

Lucerne in Wet Soils: The Effect of Stage of Regrowth, Cultivar, Air Temperature and Root Temperature,
W75-03847 2I

ALABAMA

Altering Alabama's History,
W75-03688 4A

Beaunit v. Alabama Power Co. (Action Against Corporation for Lowering River Level by Dam).
W75-03719 6E

ALASKA

Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

ALGAE

Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

Investigations on the Incorporation of Different Algae by Some Zooplankton-Species, (In German),
W75-03643 5C

Algal Nutrient Limitation in Lake Ontario and Tributary Waters,
W75-03757 5C

Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

Observations on the Nutrition of Larvae of Chironomus f.l. Plumosus in the Waters of the Danube Flood Area, (In Romanian),
W75-03827 2I

ALGAL TOXINS
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

ALGORITHMS
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

ALKALI METALS
The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

ALLOTMENTS
City of New York V. Train (Action Brought to Compel Release of Funds Authorized Under FWPCA),
W75-03703 6E

ALSEA RIVER (ORE)
1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

ALTERATION OF FLOW
Conservation--Alteration of Streams.
W75-03675 6E

ALTERNATIVE COSTS
Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

ALTERNATIVE WATER USE
Opportunities for Watershed Management in Wyoming,
W75-03326 4D

ALUM
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

ALUM RECOVERY
Alum Recovery from Water and Wastewater Treatment Plant Sludges,
W75-03542 5D

ALUM SLUDGE
Disposal of Alum Sludge to the Existing Activated Sludge Wastewater Treatment Plant,
W75-03774 5D

ALUMINUM
Removing Three Air Pollutants at Once.
W75-03631 5D

AMBERLITE RESINS
Decolorizing Dye Wastes,
W75-03608 5D

AMES RESERVOIR (IA)
Ames Reservoir Environmental Study, Appendix 1. Natural and Archaeological Resources of the Reservoir Site and Stream System.
W75-03318 6G

AMINO ACIDS
Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

AMMONIA
Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

ANAEROBIC DIGESTION
Anaerobic Digestion of Organic Matter,
W75-03371 5D

Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

ANAEROBIC TREATMENT
Temperature-Substrate Interactions in Biological Treatment,
W75-03445 5D

ANALYSIS
Determination of the Size Distribution of Dissoved Organics in Effluents,
W75-03771 5D

ANALYTICAL TECHNIQUES
Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

Determination of Total Water Hardness by Conductometric Titration with Complexing Agents (Determinarea duritatii toale a apei prin titrari conductometrice cu complexoni),
W75-03604 5A

The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

The Opening Up of Insoluble Oxides (Tantalum, Niobium, Chromium, Aluminium, and Others), With Liquid Selenium Dioxide,
W75-03614 5A

Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

Selective Determination of Iron in Alloys by Reaction with 2,3-Pyridinediol and Ring Colorimetry,
W75-03623 2K

Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

Chemical Analyses for Water Quality - Training Manual.
W75-03785 5A

Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

ANIMAL METABOLISM
Selenium Biochemistry,
W75-03620 5C

ANIMAL PHYSIOLOGY
Renal Concentration of Citrate as a Negative Modulator of Diuretic Response to Mercurials,
W75-03616 5C

ANIMAL POPULATIONS
Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Snail Population in Running Water,
W75-03803 2I

ANTARCTIC
Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

ANTHROPOLOGICAL ANALYSIS
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

ANTIMONY
Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

APHANIZOMENON FLOS-AQUAE
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

AQUARIA
Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

AQUATIC ANIMALS
Specific Production of Aquatic Invertebrates,
W75-03327 5C

Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

AQUATIC HABITATS
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

AQUATIC POPULATIONS
Population Dynamics of Hoplolaimus Sp. at Various Levels of Soil Moisture,
W75-03832 5C

AQUATIC WEED CONTROL
Aquatic Weed Harvesting Costs and Equipment--1972,
W75-03391 4A

AQUATIC WEEDS
Static Pressure Fractionation Characteristics of Water Hyacinth,
W75-03302 4A

AQUEOUS SOLUTIONS
On the Choice of Methods for the Prediction of the Water-Activity and Activity Coefficient for Multicomponent Aqueous Solutions,
W75-03540 2K

The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

AQUICULTURE
The Role of Aquaculture in Fishery Development and Management,
W75-03355 6C

Alternatives in Aquacultural Development: Consideration of Extensive Versus Intensive Methods,
W75-03398 6B

The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

Recent Developments in the New Zealand Rock Oyster Farming Industry (1970-72) and Problems Regarding Aquatic Pollution,
W75-03516 5C

Sewage and Aquacultural Production,
W75-03524 5D

AQUIFER CHARACTERISTICS
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

AQUIFERS
Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

(ARCH. HYDROBIOL. 66:1-36
A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

ARIZONA
Proposed Natural Areas, Salt River Salt Banks, Report No 2,
W75-03396 6B

Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

Bonelli Cattle Co. v. Arizona (Quiet Title Action).
W75-03493 6E

Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

ARKANSAS
Department of Pollution Control and Ecology.
W75-03700 6E

Jones v. Scott (Action Claiming Prescriptive Right in Public over Navigable Water).
W75-03712 6E

ARSENIC COMPOUNDS
Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

ARTIFICIAL PRECIPITATION
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

ARTIFICIAL RECHARGE
Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

ARTIFICIAL REEF
Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

ASPEN
Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

ASPEN TREES
Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

ASPERGILLUS FUMIGATUS
Effect of Potassium and Zinc Ions of Growth and Tryptophan Synthetase in Alkaloid Producing Culture of Aspergillus fumigatus,
W75-03791 5C

ASSESSMENTS
Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6E

ATOMIC ABSORPTION
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

ATTITUDES
Willingness to Pay for Pollution Abatement: A Case Study,
W75-03389 5G

Category Versus Successive-Intervals Scales,
W75-03802 6B

AUSTRALIA
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

Monitoring of Earth-Rock Dams,
W75-03533 8D

Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

AUSTRALIA (LAKE MODEWARRE)
The Biology of a Landlocked Form of the Normally Catadromous Salmoniform Fish Galaxias Maculatus (Jonyns): V. Composition of the Diet,
W75-03597 2H

AUTOMATIC CONTROL
How Do You Explain the Cost,
W75-03333 6C

BACKFILL
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

BACTERIA
Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

Effect of Water on Bacterial Multiplication in Plant Tissue,
W75-03831 5C

BACTERIOLOGICAL SURVEILLANCE STANDARDS
Evaluation of the Georgia Water Supply Program.
W75-03435 5F

BACTERIOPHAGE
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

BAJRA
Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

BALTIMORE (MD)
Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

BASAL SLIDING
Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

BASALTS
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

BASS
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

BAYS
Unnatural Shoreline,
W75-03459 5G

BEACH EROSION
Mechanical Reef,
W75-03738 2J

Anti-Erosion Device,
W75-03742 2J

Beach-Protectors,
W75-03748 2J

Reinforced Mattress for Protecting Shorelines and the Like,
W75-03749 2J

BEACHES
State University System of Florida Sea Grant Program 1972.
W75-03714 6E

Reinforced Mattress for Protecting Shorelines and the Like,
W75-03749 2J

BEAUFORT SEA
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

BELGIUM
Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

BENEFITS
A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

BERYLLIUM
Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

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W75-03321 10C

Disinfection,
W75-03369 5D

Anaerobic Digestion of Organic Matter,
W75-03371 5D

Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

Mixing and Transport, (Literature Review),
W75-03554 5B

The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

Marine Flora and Fauna of the Northeastern United States. Protozoa: Ciliophora,
W75-03787 5C

BIOACCUMULATION
Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Lindan in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

BIOASSAY
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

BIOCHEMICAL OXYGEN DEMAND
Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

BIOCHEMISTRY
Selenium Biochemistry,
W75-03620 5C

BIOCONCENTRATION
Chronic Cadmium Toxicity to the Bluegill (Lepomis Macrochirus Rafinesque),
W75-03511 5C

BIODEGRADATION
Nonbiodegradable and Other Recalcitrant Molecules,
W75-03497 5B

The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

Sewage and Aquacultural Production,
W75-03524 5D

A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

BIOINDICATORS
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

Phytoplankton Which are Pollution Indicators in Lakes, (In Swedish),
W75-03828 5B

BIOLOGICAL COMMUNITIES
Limnological Studies on the River Yamuna at Delhi, India. Part II. The Dynamics of Potamoplankton Populations in the River Yamuna,
W75-03784 5C

BIOLOGICAL TREATMENT
Practical Treatment of Feedlot Runoff,
W75-03313 5D

Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

Comparison of Completely Mixed and Plug Flow Biological Systems,
W75-03381 5D

High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Combined Chemical-Biological Treatment Studies,
W75-03383 5D

Temperature-Substrate Interactions in Biological Treatment,
W75-03445 5D

The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

A Basic Study of Biological Nitrification and Denitrification, (In Japanese),
W75-03550 5D

Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

Apparatus for Biologically Purifying Effluent,
W75-03734 5D

Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

Waste Treatment Process,
W75-03751 5D

Process of and Installation for Purifying Sewage,
W75-03752 5D

Waste Water Purification System,
W75-03755 5D

BIOMASS
Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

BIOTA
A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

BIRCH TREES
Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

BLACK LIQUOR OXIDATION
Unique New Secondary Oxygen Treatment System for Effluent.
W75-03372 5D

BLEACHING WASTES
Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

BOILER FEED WATER
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

BOULDER CANYON (ARIZ-CALIF)
Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

BOUNDARIES (SURFACES)
Predicting the Flow of Water Within a Channel Boundary of Gravel,
W75-03320 8B

BOUNDARY DISPUTES
Smith v. Hadad (Petition to Register and Confirm Title to Land).
W75-03470 6E

BREAKWATERS
Anti-Heave Protective System,
W75-03732 8B

BREEDING
Observations on a Breeding Pair of Tilapia Rendalli Rendalli Boulenger 1896 in an Experimental Tank at Lake Kariba Fisheries Research Institute,
W75-03501 8I

Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

BUBBLES
Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

BUDAPEST (HUNGARY)
The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

BUDGETING
Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

BURMA (RANGOON)
The Sewage System of the City of Rangoon,
W75-03544 5D

BUTYPHOS
Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters, (In Russian),
W75-03505 5C

BYPRODUCTS
Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

CADDISFLIES
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

CADMIUM
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

Chronic Cadmium Toxicity to the Bluegill (Lepomis Macrochirus Rafinesque),
W75-03511 5C

Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

CALCIUM CARBONATE
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

CALIFORNIA
Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

Unnatural Shoreline,
W75-03459 5G

Distribution of Potential Mosquito Vectors in the Imperial Valley, California, 1971-1972,
W75-03498 5G

Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

Category Versus Successive-Intervals Scales,
W75-03802 6B

Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

CALIFORNIA KILLIFISH
Influence of Salinity on the Eggs and Larvae of the California Killifish Fundulus Parvipinnis,
W75-03334 5C

CANADA
Willingness to Pay for Pollution Abatement: A Case Study,
W75-03389 5G

Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

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W75-03770 5D

CANADA (HUDSON BAY)
Snow-Vegetation Relationships in the Forest Tundra of Nouveau-Quebec, Hudson Bay, (In French),
W75-03849 2I

CANADA (MATAMEK RIVER)
Observations on the Ecology of Lacrustrine Populations of the Threespine Stickleback (Gasterosteus Aculeatus L., 1758) in the Matamek River System, Quebec,
W75-03625 5C

CANADA (ONTARIO)
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

CANADA (ROCKY MOUNTAIN REGION)
Effects of Experimental Soil Moisture Fluctuations on Turnover Rates of Testacea,
W75-03681 2G

CANAL CONSTRUCTION
Canal Authority of State of Florida v. Callaway (Injunction to Stop Construction).
W75-03360 6E

Environmental Defense Fund, Inc. v. Corps of Engineers of the United States Army (Action to Restrain Corps from Further Construction of Navigation Project).
W75-03361 6E

CANALS
Illinois and Michigan Canal.
W75-03725 6E

CANOPY
Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

CAPILLARY CONDUCTIVITY
Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532 2G

CARBOHYDRATES
Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

CARBON
High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

CARBON-14 TRACERS
Investigations on the Incorporation of Different Algae by Some Zooplankton-Species, (In German),
W75-03643 5C

CARP
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

CARP PRODUCTION
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

CARPS
Food Selection by Labeorohita (Ham.) and Its Feeding Relationship with Other Major Carps,
W75-03496 8I

CATCHMENTS
Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

CATION EXCHANGE
An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

CATIONIC POLYMERS
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

CATS
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

CATTAILS
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

CATTLE
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

CELLULOSE
Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

CENSUS
Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

CENTRIFUGES
Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

CESIUM
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

CHAPARRAL
Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

CHELATION
Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

CHEMICAL ANALYSIS
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and

CHEMICAL ANALYSIS

Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

Chemical Analyses for Water Quality - Training Manual.
W75-03785 5A

Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

CHEMICAL-BIOLOGICAL TREATMENT
Combined Chemical-Biological Treatment Studies,
W75-03383 5D

CHEMICAL DEGRADATION
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

CHEMICAL OXYGEN DEMAND
Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

CHEMICAL PRECIPITATION
Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

CHEMICAL PROPERTIES
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

CHEMICAL REACTIONS
Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

CHEMICAL RECOVERY
Pulping Process Prevents Pollution,
W75-03588 5D

CHEMICAL STUDIES
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

CHEMICAL TREATMENT
Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

Treatment of Sewage,
W75-03746 5D

Liquid Waste Treatment,
W75-03754 5D

CHEMICAL WASTES
Nonbiodegradable and Other Recalcitrant Molecules,
W75-03497 5B

Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

Decolorizing Dye Wastes,
W75-03608 5D

CHEMICALS
The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

CHEMISTRY
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

CHESAPEAKE BAY
A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

CHICAGO (ILL)
Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

CHINOOK SALMON
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

CHIRONOMUS-PLUMOSUS
Observations on the Nutrition of Larvae of Chironomus f.l. Plumosus in the Waters of the Danube Flood Area, (In Romanian),
W75-03827 2I

CHLORIDES
An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

CHLORINATION
Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

Disinfection,
W75-03369 5D

CHROMATOGRAPHY
Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

CHROMIUM
A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

CILIOPHORA
Marine Flora and Fauna of the Northeastern United States. Protozoa: Ciliophora,
W75-03787 5C

CIRCULATION
Remote Sensing of Algal Blooms by Aircraft and Satellite in Lake Erie and Utah Lake,
W75-03760 5A

CISTERNS
Moss Rose Manufacturing Co. v. Foster (Action for Recovery of Water Damage Caused by Seepage).
W75-03455 6E

CIVIL DEFENSE
Evacuation Risks - An Evaluation,
W75-03424 6G

CLAIMS (CONTRACTS)
Schine Enterprises, Inc. v. Askew (Declaratory Judgment Action Concerning Florida Inland Navigation District).
W75-03359 6E

CLASSIFICATIONS
Report of Proceedings at Public Hearing Concerning the Reclassification of Various Streams in the Cape Fear (Lower Section), Lumber, Neuse and White Oak River Basins.
W75-03717 4A

CLIMATES
Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

CLIMATIC DATA
A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

CLOUD SEEDING MODEL
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

COAGULATION
Treatment for Oily Waste Water Using Magnetic Powder, (In Japanese).
W75-03551 5D

Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

Liquid Waste Treatment,
W75-03754 5D

COASTAL MARSHES
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects Delaware River Estuarine Marsh Survey,
W75-03441 6C

State Ex Rel. McLeod V. Murrell's Inlet Camp and Marina, Inc. (Quiet Title Action Involving Riparian Land),
W75-03704 6E

COASTAL STRUCTURES
Mechanical Reef,
W75-03738 2J

COASTAL WATERS
Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

COASTAL ZONE MANAGEMENT
Schine Enterprises, Inc. v. Askew (Declaratory Judgment Action Concerning Florida Inland Navigation District).
W75-03359 6E

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

Unnatural Shoreline,
W75-03459 5G

Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

COASTS
Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

The Coastal Upwelling Cycle on a Beta-Plane: Hydrodynamics and Thermodynamics,
W75-03642 2L

COHO SALMON
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

COLD REGIONS
Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

COLLOIDS
A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

COLOR
Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

COLORADO
Ground-Water Quality Study,
W75-03534 5B

Compensatory Storage,
W75-03676 6E

COLORADO RIVER BASIN
Compensatory Storage,
W75-03676 6E

COLORIMETRY
Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

Selective Determination of Iron in Alloys by Reaction with 2,3-Pyridinediol and Ring Colorimetry,
W75-03623 2K

Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

COMBINATION LIMESTONE-LIME TREATMENT
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

COMMERCIAL FISH
Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

COMMERCIAL FISHING
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

COMMERCIAL SHELLFISH
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

Recent Developments in the New Zealand Rock Oyster Farming Industry (1970-72) and Problems Regarding Aquatic Pollution,
W75-03516 5C

COMPENSATION
Compensatory Storage,
W75-03676 6E

COMPETING USES
Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

COMPLEXES (MERCURY)
Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

COMPOSTING
The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

COMPREHENSIVE PLANNING
National Environmental Research Center - Las Vegas: A Staff Study,
W75-03347 5A

The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

COMPUTER MODELS
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

COMPUTER PROGRAMS
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

CONCRETE TECHNOLOGY
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

CONDENSATION
Distillation Apparatus,
W75-03735 3A

CONDENSERS
Multistage Flash Distillation,
W75-03739 3A

CONFERS
Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

CONSERVATION
Proposed Natural Areas, Salt River Salt Banks, Report No 2,
W75-03396 6B

Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

Scenery Preservation Council.
W75-03673 6E

Interagency Committee.
W75-03674 6E

CONSTRUCTION
McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

Watershed Protection and Flood Prevention Program and Resource Conservation and Development Program--Proposed Water Quality Management Guidelines.
W75-03491 5G

Kentucky Pollution Abatement Authority,
W75-03707 6E

CONTRACT ADMINISTRATION

CONTRACT ADMINISTRATION
Schine Enterprises, Inc. v. Askew (Declaratory Judgment Action Concerning Florida Inland Navigation District).
W75-03359 6E

CONTROL SYSTEMS
How Do You Explain the Cost,
W75-03333 6C

CONVERGENCE
Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

COOLING WATER
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

COOMBABAH LAKES (AUST)
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

COORDINATION
Study and Survey of Lake Michigan Shore Line,
W75-03357 6E

COPPER
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

CORN (FIELD)
Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

CORROSION
Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

CORROSION CONTROL
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

COST ANALYSIS
Future of Desalting is Bright but Costs Must Drop,
W75-03356 3A

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

COST-BENEFIT RATIO
Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

COST-BENEFIT THEORY
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

COST COMPARISONS
Aquatic Weed Harvesting Costs and Equipment--1972,
W75-03391 4A

COSTS
How Do You Explain the Cost,
W75-03333 6C

Houston Suburbs Profits from Building the State's Wastewater Treatment Plant.
W75-03340 5D

A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

Aquatic Weed Harvesting Costs and Equipment--1972,
W75-03391 4A

Determining an Equitable Surcharge for Industrial Wastes,
W75-03397 5G

Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

Costs - Exercising Equitable Powers to Award Attorney's Fees to Losing Party Seeking Compliance with the National Environmental Policy Act. Sierra Club v. Lynn, 364 F. Supp. 834 (W.D. Tex. 1973),
W75-03825 6E

CRAYFISH
An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

CRESOL
Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

CROP PRODUCTION
Pollutional Aspects and Crop Yields Resulting from High Manure Applications on Soil,
W75-03310 5B

CROPS
Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

CRYSTAL GROWTH
Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

CULTIVATION
Physiological Analysis of the Response of Sorghum Hybrids 'CSH-1' and 'CSH-2' to Rain-Fed Cultivation,
W75-03368 3F

CULTURED FISH
Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

CULVERTS
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

CYANOPHYTA
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

CYTOPHAGA
Investigations on Aerobic Pectolytic Bacteria in an Eutrophic Lake, (In German),
W75-03538 5C

DAIRY INDUSTRY
Dairy Manure Management Methods,
W75-03636 5D

Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

DAM DESIGN
Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

DAMAGES
The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

Evacuation Risks - An Evaluation,
W75-03424 6G

Beane v. Prince George's County (Action for Damages for Unnatural Water Flow).
W75-03478 6E

DAMS
Dams.
W75-03672 6E

Dams and Reservoirs.
W75-03694 6E

DATA COLLECTIONS
Hydrologic Information Storage and Retrieval System,
W75-03316 7C

Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

An Outline of the Physical Limnology of Lake Malawi (Lake Nyasa),
W75-03660 2H

Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

DATA STORAGE AND RETRIEVAL
Hydrologic Information Storage and Retrieval System,
W75-03316 7C

DDT
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

DDT-CARBON-14
Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

DEBRIS
A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

DECISION MAKING
Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

Di Vosta Rentals Inc. v. Lee (Review of Denial of Fill Permit).
W75-03492 6E

Water Program Policy Issues, (EPA Policy Directives).
W75-03692 5G

DEFOLIATION
Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

DEFORMATION
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

DEGASIFICATION
Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

DEGRADATION (DECOMPOSITION)
Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

DEHYDRATION
Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

DELAWARE ESTUARY
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

DELAWARE RIVER
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects,
W75-03352 6G

DELAWARE RIVER ESTUARY
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

DENDROCHRONOLOGY
Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

DENDROMETERS
Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

DENITRIFICATION
High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

A Basic Study of Biological Nitrification and Denitrification, (In Japanese),
W75-03550 5D

Waste Treatment Process,
W75-03751 5D

DENMARK (ZEALAND LAKE SYSTEM)
Phytoplankton Which are Pollution Indicators in Lakes, (In Swedish),
W75-03828 5B

DENSITOMETRY
Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

DESALINATION
Future of Desalting is Bright but Costs Must Drop,
W75-03356 3A

Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

Desalination - New Water for Old (Entsalzung-Frischwasserversorgung und Abwasseraufbereitung),
W75-03385 5D

Distillation Apparatus,
W75-03735 3A

Multistage Flash Distillation,
W75-03739 3A

Method of Preparing Water Purification Membranes,
W75-03756 3A

New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

DESALINATION PLANTS
Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

DESALINATION PROCESSES
Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

DESIGN
Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

A Device for Maintaining Constant Oxygen Concentration in Flowing Water,
W75-03522 5G

Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

DESIGN CRITERIA
A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

Operating Experience and Design Criteria for 'UNOX' Wastewater Treatment Systems, Design Seminar for Wastewater Treatment Facilities.
W75-03565 5D

DESIGN DATA
Monitoring of Earth-Rock Dams,
W75-03533 8D

DEVELOPING COUNTRIES
The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

DEWATERING
Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

DIABLO CANYON (CALIF)
Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

DIELDRIN
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

DIET (FISH)
The Biology of a Landlocked Form of the Normally Catadromous Salmoniform Fish Galaxias Maculatus (Jonyns): V. Composition of the Diet,
W75-03597 2H

DIFFUSION
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

DIGESTER SYSTEMS
Anaerobic Digestion of Organic Matter,
W75-03371 5D

DIGESTION TANKS
Anaerobic Digestion of Organic Matter,
W75-03371 5D

DISCHARGE (WATER)
Beane v. Prince George's County (Action for Damages for Unnatural Water Flow).
W75-03478 6E

DISINFECTION
Disinfection,
W75-03369 5D

Treatment of Sewage,
W75-03746 5D

DISPERSION
Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

DISSOLVED OXYGEN
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

A Device for Maintaining Constant Oxygen Concentration in Flowing Water,
W75-03522 5G

DISTILLATION
Distillation Apparatus,
W75-03735 3A

Multistage Flash Distillation,
W75-03739 3A

DISTRIBUTION
Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

DISTRIBUTION PATTERNS
The Nature of Water Potential Gradients in Trees, (In German),
W75-03336 2I

Distribution of Potential Mosquito Vectors in the Imperial Valley, California, 1971-1972,
W75-03498 5G

Mercury in Tunas: A Review,
W75-03622 5C

Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

DOLANIA AMERICANA
Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

DOMESTIC WASTES
The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

DOVER SOLE
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

DRAINAGE BASINS
Unnatural Shoreline,
W75-03459 5G

DRAINAGE EFFECTS
Miller Land Co., Inc. v. Liberty Township (Action for Injunction to Remove Drain Tile and Restore Condition of Land).
W75-03713 6E

DRAINAGE ENGINEERING
Agriculture's Pollution Solution for Lake Apopka,
W75-03686 5C

DRAINAGE PATTERNS (GEOLOGIC)
Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

DRAINAGE SYSTEMS
Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

DREDGE SPOIL DISPOSAL
Guidelines for Development of Criteria for Control of Ocean Waste Disposal.
W75-03632 5E

DREDGING
Rivers, Streams and Brooks--Alteration.
W75-03698 6E

Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

Yonge V. Askew (Certiorari to Review Denial of Application to Dredge Navigable Waters),
W75-03711 6E

DRIFT (SEA ICE)
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

Differential Sea-Ice Drift. II. Comparison of Mesoscale Strain Measurements to Linear Drift Theory Predictions,
W75-03650 2C

DRY MATTER PRODUCTION
Response of Mycorrhizal and Nonmycorrhizal Rooted Cuttings of Heather (Calluna Vulgaris(L.) Hull) to Variations in Nutrient and Water Regimes,
W75-03842 3F

DRYING
Static Pressure Fractionation Characteristics of Water Hyacinth,
W75-03302 4A

DUNALIELLA
Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

DWARF WHEATS
Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

DYES
Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

Decolorizing Dye Wastes,
W75-03608 5D

E COLI
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

EARTHQUAKES
A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

EAST BRIMFIELD DAM (MASS)
East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

ECOLOGICAL DISTRIBUTION
Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

ECOLOGY
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Flora of the Enterprise Radiation Forest,
W75-03406 5C

Translations on Environmental Quality, No. 7.
W75-03486 6E

Observations on the Ecology of Lacrustrine Populations of the Threespine Stickleback (Gasterosteus Aculeatus L., 1758) in the Matamek River System, Quebec,
W75-03625 5C

Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

Translations on Environmental Quality No. 8.
W75-03696 5G

Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

ECONOMIC ASPECTS
Inland Lakes Protection and Rehabilitation.
W75-03730 6E

ECONOMIC EFFICIENCY
On Taxation as a Pollution Control Policy,
W75-03329 5G

A Performance Study of Aerobic Sludge Digestion,
W75-03773 5D

ECONOMIC FEASIBILITY
The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

ECONOMIC IMPACT
Economic Development and Water Resources Investments,
W75-03343 6B

Environmental Pollution in a Rapidly Growing Economy,
W75-03353 6G

The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

Alternatives in Aquacultural Development: Consideration of Extensive Versus Intensive Methods,
W75-03398 6B

Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

CONOMIC IMPACTS
Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

CONOMIC JUSTIFICATION
Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

COSYSTEMS
Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

Snail Population in Running Water,
W75-03803 2I

COTYPES
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

FFLUENT LIMITATIONS
Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

FFLUENTS
Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

LECTRIC POWER DEMAND
Electric Energy Requirements for Environmental Protection,
W75-03399 6D

LECTRICAL CONDUCTANCE
An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

LECTRICAL EQUIPMENT
A simple Device for Analyzing the Energy Load and Intensity of Rainstorms,
W75-03838 2B

ELECTROLYTES
On the Choice of Methods for the Prediction of the Water-Activity and Activity Coefficient for Multicomponent Aqueous Solutions,
W75-03540 2K

EMBANKMENTS
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

EMULSIONS
Oil-In-Water Emulsions and Their Flow Properties in Porous Media,
W75-03812 8B

ENDRIN
Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

ENERGY
Electric Energy Requirements for Environmental Protection,
W75-03399 6D

Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

ENERGY BUDGET
Calculation of Temperature Variations of Small Mountain Streams,
W75-03655 2E

ENERGY CONSUMPTION
Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

ENERGY PRODUCTION
Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

ENFORCEMENT
People v. Oceana Terminal Corp. (Prosecution for an Oil Spill).
W75-03456 6E

The New Federal Water Pollution Control Law,
W75-03715 5G

ENGINEERING STRUCTURES
Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

ENTERIC BACTERIA
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

ENTERPRISE RADIATION FOREST
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

ENTOBACTERIN
Effect of Biotic and Abiotic Factors on the Toxicity of Entobacterin for Larvae of Blood-Sucking Mosquitoes and Biting Midges, (In Russian),
W75-03845 5C

ENVIRONMENTAL CONTROL
A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

Translations on Environmental Quality, No. 7.
W75-03486 6E

Department of Environmental Protection.
W75-03683 6E

Translations on Environmental Quality No. 8.
W75-03696 5G

Department of Pollution Control and Ecology.
W75-03700 6E

ENVIRONMENTAL EFFECTS
Population Growth, Resource Availability and Environmental Quality,
W75-03331 6B

Environmental Pollution in a Rapidly Growing Economy,
W75-03353 6G

Canal Authority of State of Florida v. Callaway (Injunction to Stop Construction).
W75-03360 6E

Environmental Defense Fund, Inc. v. Corps of Engineers of the United States Army (Action to Restrain Corps from Further Construction of Navigation Project).
W75-03361 6E

Environmental Defense Fund v. Tennessee Valley Authority (Action to Enjoin TVA From Completing Construction of Tellico Dam).
W75-03362 6E

Electric Energy Requirements for Environmental Protection,
W75-03399 6D

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

In Re Barker Sargent Corp (Appeal from Environmental Board Decision).
W75-03466 6E

Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

Environmental Protection Act (As Amended),
W75-03709 6E

The New Federal Water Pollution Control Law,
W75-03715 5G

ENVIRONMENTAL EFFECTS

Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

ENVIRONMENTAL IMPACT STATEMENT

Environmental Defense Fund, Inc. v. Corps of Engineers of the United States Army (Action to Restrain Corps from Further Construction of Navigation Project).
W75-03361 6E

Environmental Defense Fund v. Tennessee Valley Authority (Action to Enjoin TVA From Completing Construction of Tellico Dam).
W75-03362 6E

ENVIRONMENTAL IMPACT STATEMENTS

Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

Costs - Exercising Equitable Powers to Award Attorney's Fees to Losing Party Seeking Compliance with the National Environmental Policy Act. Sierra Club v. Lynn, 364 F. Supp. 834 (W.D. Tex. 1973),
W75-03825 6E

ENVIRONMENTAL POLICY

Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

Translations on Environmental Quality, No. 7.
W75-03486 6E

Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

Translations on Environmental Quality No. 8.
W75-03696 5G

City of New York V. Train (Action Brought to Compel Release of Funds Authorized Under FWPCA),
W75-03703 6E

Groundwater Use Act of 1972.
W75-03722 6E

ENVIRONMENTAL PROTECTION

Department of Environmental Protection.
W75-03683 6E

ENVIRONMENTAL SANITATION

Environmental Protection Act (As Amended),
W75-03709 6E

ENZYMES

Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

Slime Control in Industrial Waters,
W75-03594 5D

Selenium Biochemistry,
W75-03620 5C

EPIDEMIOLOGIC STUDIES

Epidemiologic Relationships Between Human and Animal Salmonella Carriers and Their Environment in the Swiss Region of the Lake of Constance, (In German),
W75-03330 5C

EQUITY

Pierce v. Riley (Action by Lake Owners for Injunctive Relief).
W75-03476 6E

EROSIAN CONTROL

Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

EROSION

Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

EROSION CONTROL

Study and Survey of Lake Michigan Shore Line,
W75-03357 6E

Anti-Erosion Device,
W75-03742 2J

Beach-Protectors,
W75-03748 2J

Reinforced Mattress for Protecting Shorelines and the Like,
W75-03749 2J

Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

ESTIMATING

Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part I,
W75-03387 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

ESTUARIES

1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects,
W75-03352 6G

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

Estuaries of Oregon-Ecosystems in Crisis, Problems and Legal Solutions,
W75-03678 5G

State University System of Florida Sea Grant Program 1972.
W75-03714 6E

Sea Grant Program 1973, State University System of Florida.
W75-03720 9A

A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

ESTUARINE ENVIRONMENT

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

ETHYLENE (ENDOGENOUS)

Effect of Water Stress Upon Endogenous Ethylene Levels in Vicia Faba,
W75-03841 2I

EUTROPHICATION

Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

Investigations on Aerobic Pectolytic Bacteria in an Eutrophic Lake, (In German),
W75-03538 5C

Agriculture's Pollution Solution for Lake Apopka,
W75-03686 5C

Inland Lakes Protection and Rehabilitation.
W75-03730 6E

Remote Sensing of Algal Blooms by Aircraft and Satellite in Lake Erie and Utah Lake,
W75-03760 5A

EVALUATION

A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

Evaluation of the Georgia Water Supply Program.
W75-03435 5F

Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

Advisory Report on Health Effects of Nitrates in Water.
W75-03484 5C

The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

EVAPORATION
Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

EVAPORATORS
Distillation Apparatus,
W75-03735 3A

Multistage Flash Distillation,
W75-03739 3A

EVAPOTRANSPIRATION
Actual Evapotranspiration in Relation to Leaf Area,
W75-03653 2D

Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

EXPANSION JOINTS
New Rubber Expansion Joints for Pipelines.
W75-03819 8G

EXPANSIVE CLAYS
Moisture Profiles in Swelling Soils,
W75-03527 2G

EXPLORATIONS
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

FARM WASTES
Pollutional Aspects and Crop Yields Resulting from High Manure Applications on Soil,
W75-03310 5B

Practical Treatment of Feedlot Runoff,
W75-03313 5D

The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

Dairy Manure Management Methods,
W75-03636 5D

The Effect of Incorporating Hen Manure into the Diet of Young Chicks,
W75-03814 5D

Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

FAULTS (GEOLOGIC)
A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

FEASIBILITY STUDIES
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

FEDERAL GOVERNMENT
Environmental Law--Oil Pollution Control--in the Absence of Federal Preemption and Any Fatal Conflict Between Statutory Schemes, a State May Constitutionally Exercise its Police Power to Provide for Cleanup of Oil Spillage and for Recoupement of Costs Concurrently With the Federal Government,
W75-03365 5G

U.S. Checking Up on Firms' Spill-Prevention, Cleanup Plans.
W75-03373 5G

People Ex Rel Gazlay v. Murray (Action to Enjoin Filling Parcel of Submerged Land).
W75-03460 6E

Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

Ocean Disposal Practices and Effects (Report of Meeting Held in New York on September 26-29, 1972).
W75-03697 5G

FEDERAL JURISDICTION
Environmental Defense Fund, Inc. v. Corps of Engineers of the United States Army (Action to Restrain Corps from Further Construction of Navigation Project).
W75-03361 6E

FEDERAL-STATE WATER RIGHTS CONFLICTS
Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

FEDERAL WATER POLLUTION CONTROL ACT
Water Strategy Paper Highlights EPA Policies.
W75-03691 5G

City of New York V. Train (Action Brought to Compel Release of Funds Authorized Under FWPCA),
W75-03703 6E

The New Federal Water Pollution Control Law,
W75-03715 5G

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

United States v. Republic Steel Corp. (Refuse Discharge into Navigable Waters).
W75-03727 6E

Enforcement Under the Federal Water Pollution Control Act Amendments of 1972,
W75-03824 5G

FEED LOTS
Guidelines for Land Disposal of Feedlot Lagoon Water.
W75-03306 5G

Practical Treatment of Feedlot Runoff,
W75-03313 5D

FERMENTATION
Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

FERTILIZATION
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

Sewage and Aquacultural Production,
W75-03524 5D

Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

FERTILIZERS
Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

FIBERS (PLANT)
System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

FIJI ISLANDS
Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

FILL PERMIT
Askew v. Taylor (Action for Equitable Relief Against State Following Denial of Application for Dredge and Fill Permits for Bottomlands).
W75-03482 6E

FILTERS
Anaerobic Digestion of Organic Matter,
W75-03371 5D

Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part I,
W75-03387 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

FILTRATION
Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part I,
W75-03387 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

Waste Water Purification System,
W75-03755 5D

FIN EROSION
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

FINANCING
City of New York V. Train (Action Brought to Compel Release of Funds Authorized Under FWPCA),
W75-03703 6E

FINITE-DIFFERENCE MODEL
Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

FINITE ELEMENT ANALYSIS
Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

FISH
U.S. v. Cappaert (Action by U.S. to Have its Rights to Use of Appurtenant Waters Declared).
W75-03723 6E

Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

FISH BARRIERS
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659 8B

Floating Water Screen,
W75-03745 8I

An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

FISH BEHAVIOR
Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

FISH CONSERVATION
U.S. v. Cappaert (Action by U.S. to Have its Rights to Use of Appurtenant Waters Declared).
W75-03723 6E

Floating Water Screen,
W75-03745 8I

FISH CONTROL AGENTS
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

FISH DISEASES
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

FISH FARMING
Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

FISH FOOD ORGANISMS
Food Selection by Labeorohita (Ham.) and Its Feeding Relationship with Other Major Carps,
W75-03496 8I

FISH GROWTH
Marine Fish Culture in Britain: IX. Growth of Cultured Plaice to Marketable Size in the Laboratory,
W75-03759 8I

FISH MANAGEMENT
Financing Resources for Fishery Development,
W75-03339 6C

Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

The Role of Aquaculture in Fishery Development and Management,
W75-03355 6C

Reconciling Conflicts Among Different Economic Interest Groups in the Management of Fisheries,
W75-03392 6B

Alternatives in Aquacultural Development: Consideration of Extensive Versus Intensive Methods,
W75-03398 6B

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

Marine Fish Culture in Britain: IX. Growth of Cultured Plaice to Marketable Size in the Laboratory,
W75-03759 8I

FISH PHYSIOLOGY
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

FISH PONDS
Observations on a Breeding Pair of Tilapia Rendalli Rendalli Boulenger 1896 in an Experimental Tank at Lake Kariba Fisheries Research Institute,
W75-03501 8I

FISH POPULATIONS
U.S. v. Cappaert (Action by U.S. to Have its Rights to Use of Appurtenant Waters Declared).
W75-03723 6E

FISH SCREENS
Floating Water Screen,
W75-03745 8I

FISH TISSUE
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

FISH TRANSFER PONDS
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

FISHERIES
1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

Reconciling Conflicts Among Different Economic Interest Groups in the Management of Fisheries,
W75-03392 6B

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

FISHERIES FINANCING
Financing Resources for Fishery Development,
W75-03339 6C

FISHERY DEVELOPMENT
Financing Resources for Fishery Development,
W75-03339 6C

FISHING
Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

State University System of Florida Sea Grant Program 1972.
W75-03714 6

FISHING INDUSTRY
The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

FLASH DISTILLATION
Wastewater Degassing by Adiabatic Flashing,
W75-03446 5

Multistage Flash Distillation,
W75-03739 3

New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 7

FLIES
Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

FLOATING
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

FLOATING CITY
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

FLOCCULANT
Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

FLOCCULATION
Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

Liquid Waste Treatment,
W75-03754 5D

Waste Water Purification System,
W75-03755 5D

FLOOD CONTROL
Rapid Creek Flood Hazard Analyses-(Including Inman Creek and West Fork Creek Tributaries) Bannock County, Idaho.
W75-03438 4A

Flood Hazard Analyses - City of Lisbon, Ransom County, North Dakota.
W75-03439 4A

A. H. Smith Sand and Gravel Co. v. Dept. of Water Resources (Action Dealing With Filling Operations in Floodplain).
W75-03464 6E

Cappture Realty Corp. v. Board of Adjustment (Suit Challenging Denial of Special Exception Use--Construction in Flood Plains).
W75-03467 6E

FLOOD DATA
Rapid Creek Flood Hazard Analyses-(Including Inman Creek and West Fork Creek Tributaries) Bannock County, Idaho.
W75-03438 4A

FLOOD PLAIN
A. H. Smith Sand and Gravel Co. v. Dept. of Water Resources (Action Dealing With Filling Operations in Floodplain).
W75-03464 6E

FLOOD PLAIN MANAGEMENT
Flood Hazard Analyses - City of Lisbon, Ransom County, North Dakota.
W75-03439 4A

FLOOD PLAIN ZONING
Rapid Creek Flood Hazard Analyses-(Including Inman Creek and West Fork Creek Tributaries) Bannock County, Idaho.
W75-03438 4A

A. H. Smith Sand and Gravel Co. v. Dept. of Water Resources (Action Dealing With Filling Operations in Floodplain).
W75-03464 6E

Cappture Realty Corp. v. Board of Adjustment (Suit Challenging Denial of Special Exception Use--Construction in Flood Plains).
W75-03467 6E

FLOOD PLAINS
Cappture Realty Corp. v. Board of Adjustment (Suit Challenging Denial of Special Exception Use--Construction in Flood Plains).
W75-03467 6E

FLOOD PROFILES
Rapid Creek Flood Hazard Analyses-(Including Inman Creek and West Fork Creek Tributaries) Bannock County, Idaho.
W75-03438 4A

FLOOD PROTECTION
Flood Hazard Analyses - City of Lisbon, Ransom County, North Dakota.
W75-03439 4A

FLOODS
Musumeci v. State (Action by Downstream Landowners to Recover Flooding Damages Caused by Relocation of Highway).
W75-03469 6E

FLORIDA
Schine Enterprises, Inc. v. Askew (Declaratory Judgment Action Concerning Florida Inland Navigation District).
W75-03359 6E

Canal Authority of State of Florida v. Callaway (Injunction to Stop Construction).
W75-03360 6E

Environmental Law--Oil Pollution Control--in the Absence of Federal Preemption and Any Fatal Conflict Between Statutory Schemes, a State May Constitutionally Exercise its Police Power to Provide for Cleanup of Oil Spillage and for Recoupement of Costs Concurrently With the Federal Government,
W75-03365 5G

The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

United States v. Raven (Appeal from Conviction for Failing to Remove Sunken Vessel and Obstructing Navigable Waterway).
W75-03462 6E

Askew v. Taylor (Action for Equitable Relief Against State Following Denial of Application for Dredge and Fill Permits for Bottomlands).
W75-03482 6E

Di Vosta Rentals Inc. v. Lee (Review of Denial of Fill Permit).
W75-03492 6E

Yonge V. Askew (Certiorari to Review Denial of Application to Dredge Navigable Waters),
W75-03711 6E

State University System of Florida Sea Grant Program 1972.
W75-03714 6E

Sea Grant Program 1973, State University System of Florida.
W75-03720 9A

Pollutant Spill Prevention and Control Act (As Amended).
W75-03728 6E

Pollution Control Awards Program.
W75-03731 6E

FLORIDA (LOXAHATCHEE NATIONAL WILDLIFE REFUGE)
Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

FLOTATION
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

FLOTSAM
Rotary Skimmer,
W75-03736 5G

FLOW AUGMENTATION
Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

FLUID MECHANICS
Talking Tankers.
W75-03560 5E

FLUORESCENCE
The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

FLUORSPAR
Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

FLUTES
Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

FOAMING
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

FOOD CHAINS
Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

FORAGE GRASSES
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

FORAGE SORGHUM
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

FORECASTING
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

The Problem of Determining the Maximum Storm Runoff Yield in Small Rivers (In problema determinarii debitelor maxime din ploi pe riuri mici),
W75-03535 2A

FOREST FIRES
Watershed Behavior After Forest Fire in Washington,
W75-03820 4C

Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

FOREST MANAGEMENT
The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Lichens of the Enterprise Radiation Forest,
W75-03405 5C

Flora of the Enterprise Radiation Forest,
W75-03406 5C

Water: Its Quality Often Depends on the Forester,
W75-03589 5B

Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

FOREST TUNDRA
Snow-Vegetation Relationships in the Forest Tundra of Nouveau-Quebec, Hudson Bay, (In French),
W75-03849 2I

FOREST WATERSHEDS
Watershed Behavior After Forest Fire in Washington,
W75-03820 4C

FORESTS
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

FRESHWATER MARSHES
Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

FROTH FLOTATION
Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

FRY
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

FUEL REPROCESSING
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

FUEL REPROCESSING WASTES
Storage of Tritium and Noble Gases,
W75-03418 5D

FUELS
Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

FUNCTIONAL TRANSFORM
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

FUNGI
Lichens of the Enterprise Radiation Forest,
W75-03405 5C

Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

FUNGICIDES
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

FWPCA AMENDMENTS OF 1972
Explanatory Statement: Implementation of NPDES, (EPA).
W75-03693 5G

GALAXIAS-MACULATUS
The Biology of a Landlocked Form of the Normally Catadromous Salmoniform Fish Galaxias Maculatus (Jonyns): V. Composition of the Diet,
W75-03597 2H

GAMMA RADIATION
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

GAS BUBBLE DISEASE
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

GAS CHROMATOGRAPHY
Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

GENETICS
Lichens of the Enterprise Radiation Forest,
W75-03405 5C

Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

GEOGRIA
Evaluation of the Georgia Water Supply Program.
W75-03435 5F

GEOLOGIC INVESTIGATIONS
A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

GEOLOGY
A Study: Effects of Geology and Nutrients on Water Quality Development,
W75-03539 5G

GEOMORPHOLOGY
Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

GEORGIA
Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

Groundwater Use Act of 1972.
W75-03722 6E

Water Recreation Act of 1973.
W75-03726 6E

GEOTHERMAL HEAT
Power Generation From Hot Brines,
W75-03737 4B

GEOTHERMAL WELLS
Power Generation From Hot Brines,
W75-03737 4B

GLACIAL SEDIMENTS
Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

GLACIATION
Advance of the Greenland Ice Sheet on to North-Eastern Ellesmere Island,
W75-03645 2C

Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

GLACIERS
A Study of Glacier Flow for an Open-Pit Mine: An Exercise in Applied Glaciology,
W75-03663 2C

Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

GLACIOLOGY
Advance of the Greenland Ice Sheet on to North-Eastern Ellesmere Island,
W75-03645 2C

A Study of Glacier Flow for an Open-Pit Mine: An Exercise in Applied Glaciology,
W75-03663 2C

Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

GLASSES
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

GOLDFISH
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

GOLDSTREAM VALLEY (ALAS)
Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

GOLF GREENS DRAINAGE
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

GOVERNMENT FINANCE
Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

State of Minnesota V. Environmental Protection Agency (Action of Impoundment of FWPCA Funds),
W75-03705 6E

Kentucky Pollution Abatement Authority,
W75-03707 6E

State University System of Florida Sea Grant Program 1972.
W75-03714 6E

Sea Grant Program 1973, State University System of Florida.
W75-03720 9A

GOVERNMENTAL INTERRELATIONS
Winnipesaukee River Basin Control.
W75-03690 6E

GRAIN CROPS
Water Conservation in Three Grain Crops in the Zambezi Valley,
W75-03332 3F

GRAIN SORGHUM
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

GRANITES
Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

GRANTS
Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

GRAPHICAL ANALYSIS
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

GRAPHICAL TECHNIQUES
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

GREAT LAKES
Great Lakes-St. Lawrence Seaway System and the Mid-Continent Economy,
W75-03394 6B

Great Lakes Water Quality, 1973 Annual Report to the International Joint Commission.
W75-03640 5G

Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

GREAT LAKES REGION
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

GREAT PLAINS
Nitrogen Budgets of Great Plains Impoundments,
W75-03758 5C

GREENLAND (ISUA)
A Study of Glacier Flow for an Open-Pit Mine: An Exercise in Applied Glaciology,
W75-03663 2C

GROUNDWATER
Influence of Fertilizer Practices on Water and the Quality of the Environment (Phase II),
W75-03315 5B

Mehling v. Deines (Action to Compel Defendant to Reopen Ditch to Provide Proper Drainage).
W75-03475 6E

Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

Ground-Water Quality Study,
W75-03534 5B

Ground-Water Quality Modeling,
W75-03661 5B

Power Generation From Hot Brines,
W75-03737 4B

Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

Oil-In-Water Emulsions and Their Flow Properties in Porous Media,
W75-03812 8B

Evaluating Well Construction, (Part II),
W75-03813 5B

GROUNDWATER MOVEMENT
Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

GROUNDWATER RESOURCES
A Program for the Future--Water and Sewer in Rural America.
W75-03488 5D

GROWTH RATES
Population Growth, Resource Availability and Environmental Quality,
W75-03331 6B

Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

Effect of Water on Bacterial Multiplication in Plant Tissue,
W75-03831 5C

Population Dynamics of Hoplolaimus Sp. at Various Levels of Soil Moisture,
W75-03832 5C

Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

GYMNODINIUM
The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

HABITATS
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

HARBORS
Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

HARDNESS (WATER)
Determination of Total Water Hardness by Conductometric Titration with Complexing Agents (Determinarea duritatii toale a apei prin titrari conductometrice cu complexoni),
W75-03604 5A

HARMONIC ANALYSIS
On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

HARVESTING
Aquatic Weed Harvesting Costs and Equipment--1972,
W75-03391 4A

HATCHET BROOK WATERSHED (MASS)
East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

HAWAII
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

HAZARDOUS SUBSTANCES (POLLUTION)
People v. Oceana Terminal Corp. (Prosecution for an Oil Spill).
W75-03456 6E

Advisory Report on Health Effects of Nitrates in Water.
W75-03484 5C

HAZARDS
Evacuation Risks - An Evaluation,
W75-03424 6G

HEAD LOSS
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659 8B

HEAT EXCHANGERS
Power Generation From Hot Brines,
W75-03737 4B

HEAT FLOW
Power Generation From Hot Brines,
W75-03737 4B

HEAT TRANSFER
Power Generation From Hot Brines,
W75-03737 4B

HEATHER
Response of Mycorrhizal and Nonmycorrhizal Rooted Cuttings of Heather (Calluna Vulgaris(L.) Hull) to Variations in Nutrient and Water Regimes,
W75-03842 3F

HEAVE EFFECTS
Anti-Heave Protective System,
W75-03732 8B

HEAVY METALS
Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

Comparative Studies of the Toxicity of Heavy Metals to Phytoplankton and Their Synergistic Interactions,
W75-03775 5C

Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

Hydrometallurgy,
W75-03793 3E

Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

HEMLOCK
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500 2I

HERBACEOUS PLANTS
Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

HERBICIDES
Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

Water: Its Quality Often Depends on the Forester,
W75-03589 5B

HIERARCHICAL MODELING
Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

HIGHWAY RELOCATION
Musumeci v. State (Action by Downstream Landowners to Recover Flooding Damages Caused by Relocation of Highway).
W75-03469 6E

HISTOGRAMS
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

HONOLULU (HAWAII)
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

HUMAN HAIR
On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

HUMAN PATHOLOGY
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

HUMAN PHYSIOLOGY
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

HUMAN POPULATION
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6

HUMBOLDT BAY (CALIF)
Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4

HUNGARY
On the Spring Maximum of the Concentration of Trace Constituents in Atmospheric Precipitation,
W75-03621 5

HYDRATION
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500

HYDRAULIC CONDUCTIVITY
Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532

HYDRAULIC STRUCTURES
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442

HYDRODYNAMICS
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659

HYDROELECTRIC PLANTS
Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

HYDROGRAPH ANALYSIS
Water Quality Models for Urban and Suburban Areas.
W75-03311 5B

Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

HYDROGRAPHIC STUDIES
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

YDROLOGIC DATA
Hydrologic Information Storage and Retrieval System,
W75-03316 7C

Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

YDROMETALLURGY
Hydrometallurgy,
W75-03793 3E

YGROMETRY
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

E FORMATION
Floating Water Screen,
W75-03745 8I

E-WATER INTERFACES
Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

ELAND (HOT SPRINGS)
The Sphagnum Flora of Hot Springs in Iceland,
W75-03526 2I

AHO
Publications List of the Idaho Water Resources Research Institute.
W75-03321 10C

apid Creek Flood Hazard Analyses-(Including man Creek and West Fork Creek Tributaries) annock County, Idaho.
75-03438 4A

HO BATHOLITH
ediment in Streams and Its Effects on Aquatic ife,
75-03303 2J

INOIS
ources of Phosphorus Inputs from the Atosphere and Their Significance to ligotrophic Lakes,
75-03304 5B

udy and Survey of Lake Michigan Shore ne,
75-03357 6E

Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

Campbell v. Village of Oquawka (Action to Enjoin City From Maintaining a Levee Abutting its Property).
W75-03472 6E

Robert E. Nilles, Inc. v. Illinois Pollution Control Bd. (Action Against Pollution Control Board for Denial of Sewerage Permits).
W75-03474 6E

Advisory Report on Health Effects of Nitrates in Water.
W75-03484 5C

Illinois and Michigan Canal.
W75-03725 6E

IMMUNITY (LEGAL ASPECTS)
Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

IMPERIAL VALLEY (CALIF)
Distribution of Potential Mosquito Vectors in the Imperial Valley, California, 1971-1972,
W75-03498 5G

IMPOUNDMENTS
Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6E

Nitrogen Budgets of Great Plains Impoundments,
W75-03758 5C

INADVERTENT CLIMATE CHANGES
Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

INCINERATION
A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

INCOME
Great Lakes-St. Lawrence Seaway System and the Mid-Continent Economy,
W75-03394 6B

INDIA
Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

INDIA (MAHANADI CATCHMENT)
Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

INDIA (RIVER NARMADA)
Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

INDIANA
State Ex Rel. Indianapolis Water Co. v. Boone Cir. Ct. (Action by Water Company for Writ of Prohibition).
W75-03473 6E

Interstate Mining Compact (As Amended),
W75-03708 6E

INDONESIA
Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

INDUSTRIAL WASTES
Determining an Equitable Surcharge for Industrial Wastes,
W75-03397 5G

The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

Method of Bleaching Wood Pulp,
W75-03562 5D

Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

Removing Three Air Pollutants at Once.
W75-03631 5D

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

INDUSTRIAL WATER
Slime Control Compositions and Their Use,
W75-03575 5D

Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

INDUSTRIAL WATER

Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

Slime Control in Industrial Waters,
W75-03594 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

INFILTRATION
Sewer Pipe: Infiltration is the Issue,
W75-03548 5D

Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

INFLOW
Sewer Pipe: Infiltration is the Issue,
W75-03548 5D

INJECTION WELLS
Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

INJUNCTION
Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

INJUNCTIVE RELIEF
McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

Rivers, Streams and Brooks--Alteration.
W75-03698 6E

Miller Land Co., Inc. v. Liberty Township (Action for Injunction to Remove Drain Tile and Restore Condition of Land).
W75-03713 6E

INLAND WATERWAYS
Canal Authority of State of Florida v. Callaway (Injunction to Stop Construction).
W75-03360 6E

Environmental Defense Fund, Inc. v. Corps of Engineers of the United States Army (Action to Restrain Corps from Further Construction of Navigation Project).
W75-03361 6E

INORGANIC COMPOUNDS
Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

INSECTICIDES
Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

INSTRUMENTATION
Monitoring of Earth-Rock Dams,
W75-03533 8D

Measurements of Sludge Level and Sludge Density in Clarifier Installations (Messungen von Schlamminiveau und Schlammdichte in Klaeranlagen),
W75-03586 5D

INTAKES
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659 8B

INTERCEPTION
Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

INTERNATIONAL AGREEMENTS
The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Translations on Environmental Quality, No. 7.
W75-03486 6E

Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

INTERNATIONAL BOUNDARY AND WATER COMM.
Agreement Between the United States of America and Canada on Great Lakes Water Quality.
W75-03480 5G

INTERNATIONAL COMMISSIONS
Agreement Between the United States of America and Canada on Great Lakes Water Quality.
W75-03480 5G

INTERNATIONAL JOINT COMMISSION
Agreement Between the United States of America and Canada on Great Lakes Water Quality.
W75-03480 5G

Great Lakes Water Quality, 1973 Annual Report to the International Joint Commission.
W75-03640 5G

Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

INTERNATIONAL LAW
A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Effluent Neighbors: The Mexico-United States Water Quality Dilemma.
W75-03677 5G

INTERNATIONAL WATERS
A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Agreement Between the United States of America and Canada on Great Lakes Water Quality.
W75-03480 5G

Effluent Neighbors: The Mexico-United States Water Quality Dilemma.
W75-03677 5G

INTERSTATE COMMISSIONS
The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

INTERSTATE COMPACTS
Interstate Mining Compact (As Amended),
W75-03708 6E

INTERSTATE RIVERS
Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

INVERTEBRATES
Specific Production of Aquatic Invertebrates,
W75-03327 5C

INVESTMENT
Economic Development and Water Resources Investments,
W75-03343 6B

Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

IONS
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5I

IOWA
Factors Influencing Participation in Recreation Activities in Southeast Iowa, and Camper Attendance at Macbride State Park,
W75-03317 6I

Ames Reservoir Environmental Study, Appendix 1. Natural and Archaeological Resources of the Reservoir Site and Stream System.
W75-03318 6

Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6

IRAQ
Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2

IRON
Solution, Diffusion and Sorption in Upper Layer of Lake Sediments: III. Chemical and Physical Conditions in Sediment-Water Transition Zone of Meromictic BOG Late (Ursee) and its Relation to Accumulation of Vivianite, (German),
W75-03571

Selective Determination of Iron in Alloys by Reaction with 2,3-Pyridinediol and Ring Colorimetry,
W75-03623 2K

Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

IRON PHOSPHATE
Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

IRRIGATION
Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

The Effect of Shelter Belts and Irrigation on Water Use in a Dry Region,
W75-03652 3F

IRRIGATION SYSTEMS
Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

ISLANDS
Mississippi and Missouri River Islands Are Property of State.
W75-03684 6E

ISRAEL (JUDEAN HILLS)
Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

JAPAN
Environmental Pollution in a Rapidly Growing Economy,
W75-03353 6G

JETS
Boundary Effects on Dilution of Buoyant Jets,
W75-03780 8B

JETTIES
Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

JUDICIAL DECISIONS
United States v. Chesapeake and Delaware Shipyard, Inc. (Suit by Government to Recover Under the 'Wreck Act').
W75-03358 6E

Schine Enterprises, Inc. v. Askew (Declaratory Judgment Action Concerning Florida Inland Navigation District).
W75-03359 6E

Canal Authority of State of Florida v. Callaway (Injunction to Stop Construction).
W75-03360 6E

Environmental Defense Fund, Inc. v. Corps of Engineers of the United States Army (Action to Restrain Corps from Further Construction of Navigation Project).
W75-03361 6E

Environmental Defense Fund v. Tennessee Valley Authority (Action to Enjoin TVA From Completing Construction of Tellico Dam).
W75-03362 6E

The Necessity of Zoning Variance or Amendments Notice to the Wisconsin Department of Natural Resources Under the Shoreland Zoning and Navigable Waters Protection Act,
W75-03364 6E

Environmental Law--Oil Pollution Control--in the Absence of Federal Preemption and Any Fatal Conflict Between Statutory Schemes, a State May Constitutionally Exercise its Police Power to Provide for Cleanup of Oil Spillage and for Recoupement of Costs Concurrently With the Federal Government,
W75-03365 5G

Moss Rose Manufacturing Co. v. Foster (Action for Recovery of Water Damage Caused by Seepage).
W75-03455 6E

People v. Oceana Terminal Corp. (Prosecution for an Oil Spill).
W75-03456 6E

McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

Pacific Northwest Bell Telephone Co. v. U.S. (Action Seeking Damages for Damage to Submarine Telephone Cable).
W75-03461 6E

United States v. Raven (Appeal from Conviction for Failing to Remove Sunken Vessel and Obstructing Navigable Waterway).
W75-03462 6E

Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

A. H. Smith Sand and Gravel Co. v. Dept. of Water Resources (Action Dealing With Filling Operations in Floodplain).
W75-03464 6E

Commonwealth v. Borough of Galeton (Petition to Enforce Clean Streams Law).
W75-03465 6E

In Re Barker Sargent Corp (Appeal from Environmental Board Decision).
W75-03466 6E

Cappture Realty Corp. v. Board of Adjustment (Suit Challenging Denial of Special Exception Use--Construction in Flood Plains).
W75-03467 6E

Commonwealth v. Washington Township (Action to Order Compliance with Clean Streams Law).
W75-03468 6E

Musumeci v. State (Action by Downstream Landowners to Recover Flooding Damages Caused by Relocation of Highway).
W75-03469 6E

Smith v. Hadad (Petition to Register and Confirm Title to Land).
W75-03470 6E

Jewett v. Redwater Irrigating Association (Action for Adjudication of Water Rights).
W75-03471 6E

Campbell v. Village of Oquawka (Action to Enjoin City From Maintaining a Levee Abutting its Property).
W75-03472 6E

Robert E. Nilles, Inc. v. Illinois Pollution Control Bd. (Action Against Pollution Control Board for Denial of Sewerage Permits).
W75-03474 6E

Mehling v. Deines (Action to Compel Defendant to Reopen Ditch to Provide Proper Drainage).
W75-03475 6E

Commonwealth of Kentucky, Department of Highways v. Fitzpatrick (Eminent Domain Action for Taking of River Bottom Lands).
W75-03477 6E

Beane v. Prince George's County (Action for Damages for Unnatural Water Flow).
W75-03478 6E

Oliver v. Milliken and Farwell, Inc. (Action Involving Division Among Riparian Owners of Alluvial Deposits).
W75-03481 6E

Askew v. Taylor (Action for Equitable Relief Against State Following Denial of Application for Dredge and Fill Permits for Bottomlands).
W75-03482 6E

Di Vosta Rentals Inc. v. Lee (Review of Denial of Fill Permit).
W75-03492 6E

Bonelli Cattle Co. v. Arizona (Quiet Title Action).
W75-03493 6E

Ohio v. Wyandotte Chemicals Corp., Restatement of the Original Jurisdiction of the Supreme Court of the United States,
W75-03680 6E

U.S. V. Colgate-Palmolive Co. (Action Charging Unlawful Discharge of Refuse Matter Into Navigable Waters),
W75-03702 6E

State Ex Rel. McLeod V. Murrell's Inlet Camp and Marina, Inc. (Quiet Title Action Involving Riparian Land),
W75-03704 6E

State of Minnesota V. Environmental Protection Agency (Action of Impoundment of FWPCA Funds),
W75-03705 6E

Yonge V. Askew (Certiorari to Review Denial of Application to Dredge Navigable Waters),
W75-03711 6E

Jones v. Scott (Action Claiming Prescriptive Right in Public over Navigable Water).
W75-03712 6E

Miller Land Co., Inc. v. Liberty Township (Action for Injunction to Remove Drain Tile and Restore Condition of Land).
W75-03713 6E

Beaunit v. Alabama Power Co. (Action Against Corporation for Lowering River Level by Dam).
W75-03719 6E

Gulf Oil Corporation, et al. v. Morton (Action for Writ of Mandamus).
W75-03721 6E

United States v. Republic Steel Corp. (Refuse Discharge into Navigable Waters).
W75-03727 6E

JURISDICTION
State of Minnesota V. Environmental Protection Agency (Action of Impoundment of FWPCA Funds),
W75-03705 6E

KANSAS
Guidelines for Land Disposal of Feedlot Lagoon Water.
W75-03306 5G

Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

KEEPIT DAM (NSW)
Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

KENTUCKY
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

Commonwealth of Kentucky, Department of Highways v. Fitzpatrick (Eminent Domain Action for Taking of River Bottom Lands).
W75-03477 6E

A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

Water Resources (As Amended).
W75-03699 6E

Kentucky Pollution Abatement Authority,
W75-03707 6E

Environmental Protection Act (As Amended),
W75-03709 6E

KEZAR LAKE (NH)
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

KINETICS
Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

KRAFT MILLS
Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

LABEO-ROHITA
Food Selection by Labeorohita (Ham.) and Its Feeding Relationship with Other Major Carps,
W75-03496 8I

LABORATORY TESTS
Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

Effects of Oil Under Sea Ice,
W75-03646 2C

Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

LACUSTRINE POPULATIONS
Observations on the Ecology of Lacrustrine Populations of the Threespine Stickleback (Gasterosteus Aculeatus L., 1758) in the Matamek River System, Quebec,
W75-03625 5C

LAKE GEORGE (NY)
Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

LAKE MICHIGAN
Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

Study and Survey of Lake Michigan Shore Line,
W75-03357 6E

LAKE ONTARIO
Algal Nutrient Limitation in Lake Ontario and Tributary Waters,
W75-03757 5C

Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

LAKE SEDIMENTS
Solution, Diffusion and Sorption in Upper Layer of Lake Sediments: III. Chemical and Physical Conditions in Sediment-Water Transition Zone of Meromictic BOG Late (Ursee) and its Relation to Accumulation of Vivianite, (In German),
W75-03571 5B

LAKES
Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

An Outline of the Physical Limnology of Lake Malawi (Lake Nyasa),
W75-03660 2H

Lands Lying Under Public Waters.
W75-03671 6E

Inland Lakes Protection and Rehabilitation.
W75-03730 6E

Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

LAND FILLS
State Ex Rel. McLeod V. Murrell's Inlet Camp and Marina, Inc. (Quiet Title Action Involving Riparian Land),
W75-03704 6E

LAND FORMING
Mississippi and Missouri River Islands Are Property of State.
W75-03684 6E

LAND MANAGEMENT
Ames Reservoir Environmental Study, Appendix 1. Natural and Archaeological Resources of the Reservoir Site and Stream System.
W75-03318 6G

The Hydrology of a Small Catchment Basin at Samaru, Nigeria: III. Assessment of Surface Run-Off Under Varied Land Management and Vegetation Cover,
W75-03765 4A

LAND TENURE
People Ex Rel Gazlay v. Murray (Action to Enjoin Filling Parcel of Submerged Land).
W75-03460 6E

Smith v. Hadad (Petition to Register and Confirm Title to Land).
W75-03470 6E

Askew v. Taylor (Action for Equitable Relief Against State Following Denial of Application for Dredge and Fill Permits for Bottomlands).
W75-03482 6E

LAND USE
Ames Reservoir Environmental Study, Appendix 1. Natural and Archaeological Resources of the Reservoir Site and Stream System.
W75-03318 6G

In Re Barker Sargent Corp (Appeal from Environmental Board Decision).
W75-03466 6E

A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

LANDFILLS
In Re Barker Sargent Corp (Appeal from Environmental Board Decision).
W75-03466 6E

Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

LANDSCAPING
Ames Reservoir Environmental Study, Appendix 1. Natural and Archaeological Resources of the Reservoir Site and Stream System.
W75-03318 6G

LARGE SCALE TESTS
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

LARVAE FOODS
Investigations About Population Dynamics and Nutritional Aspects on the Simulid-Larvae of a Mountain Stream Polluted by Organic Waste Water, (In German),
W75-03479 5B

LAS VEGAS (NEV)
National Environmental Research Center - Las Vegas: A Staff Study,
W75-03347 5A

LAW ENFORCEMENT
Commonwealth v. Borough of Galeton (Petition to Enforce Clean Streams Law).
W75-03465 6E

LEACHATE
Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

LEACHING
Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

LEAD
Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

LEAF-AREA INDEX
Actual Evapotranspiration in Relation to Leaf Area,
W75-03653 2D

Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

LEAF-LITTER
Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

LEAF WATER POTENTIAL
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

LEASES
Gulf Oil Corporation, et al. v. Morton (Action for Writ of Mandamus).
W75-03721 6E

LEAST SQUARES METHOD
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

LEAVES
Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

LEGAL ASPECTS
A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

People Ex Rel Gazlay v. Murray (Action to Enjoin Filling Parcel of Submerged Land).
W75-03460 6E

Pacific Northwest Bell Telephone Co. v. U.S. (Action Seeking Damages for Damage to Submarine Telephone Cable).
W75-03461 6E

Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

Smith v. Hadad (Petition to Register and Confirm Title to Land).
W75-03470 6E

Askew v. Taylor (Action for Equitable Relief Against State Following Denial of Application for Dredge and Fill Permits for Bottomlands).
W75-03482 6E

Bonelli Cattle Co. v. Arizona (Quiet Title Action).
W75-03493 6E

Ohio v. Wyandotte Chemicals Corp., Restatement of the Original Jurisdiction of the Supreme Court of the United States,
W75-03680 6E

Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

United States v. Republic Steel Corp. (Refuse Discharge into Navigable Waters).
W75-03727 6E

Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

LEGAL REVIEW
State Ex Rel. Indianapolis Water Co. v. Boone Cir. Ct. (Action by Water Company for Writ of Prohibition).
W75-03473 6E

Robert E. Nilles, Inc. v. Illinois Pollution Control Bd. (Action Against Pollution Control Board for Denial of Sewerage Permits).
W75-03474 6E

Yonge V. Askew (Certiorari to Review Denial of Application to Dredge Navigable Waters),
W75-03711 6E

Gulf Oil Corporation, et al. v. Morton (Action for Writ of Mandamus).
W75-03721 6E

LEGISLATION
Schine Enterprises, Inc. v. Askew (Declaratory Judgment Action Concerning Florida Inland Navigation District).
W75-03359 6E

Environmental Law--Oil Pollution Control--in the Absence of Federal Preemption and Any Fatal Conflict Between Statutory Schemes, a State May Constitutionally Exercise its Police Power to Provide for Cleanup of Oil Spillage and for Recoupement of Costs Concurrently With the Federal Government,
W75-03365 5G

Pacific Northwest Bell Telephone Co. v. U.S. (Action Seeking Damages for Damage to Submarine Telephone Cable).
W75-03461 6E

Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

Di Vosta Rentals Inc. v. Lee (Review of Denial of Fill Permit).
W75-03492 6E

Sewer Pipe: Infiltration is the Issue,
W75-03548 5D

Lands Lying Under Public Waters.
W75-03671 6E

Dams.
W75-03672 6E

Scenery Preservation Council.
W75-03673 6E

Interagency Committee.
W75-03674 6E

Conservation--Alteration of Streams.
W75-03675 6E

Compensatory Storage,
W75-03676 6E

Estuaries of Oregon-Ecosystems in Crisis, Problems and Legal Solutions,
W75-03678 5G

New Legislation for Water Quality.
W75-03679 5G

Department of Environmental Protection.
W75-03683 6E

Mississippi and Missouri River Islands Are Property of State.
W75-03684 6E

Altering Alabama's History,
W75-03688 4A

Water Strategy Paper Highlights EPA Policies.
W75-03691 5G

Water Resources (As Amended).
W75-03699 6E

Department of Pollution Control and Ecology.
W75-03700 6E

Water Management Districts in North Dakota,
W75-03701 6E

Kentucky Pollution Abatement Authority,
W75-03707 6E

Interstate Mining Compact (As Amended),
W75-03708 6E

Environmental Protection Act (As Amended),
W75-03709 6E

Offshore Terminal Authority.
W75-03716 6E

Groundwater Use Act of 1972.
W75-03722 6E

Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6E

Illinois and Michigan Canal.
W75-03725 6E

Water Recreation Act of 1973.
W75-03726 6E

LEGISLATION

Pollutant Spill Prevention and Control Act (As Amended).
W75-03728 6E

Port Authorities--Establishment.
W75-03729 6E

Mercury,
W75-03797 6C

LEMNA PERPUSILLA
The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

LETHAL LIMIT
Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters, (In Russian),
W75-03505 5C

Chronic Cadmium Toxicity to the Bluegill (Lepomis Macrochirus Rafinesque),
W75-03511 5C

Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

LEVEES
Campbell v. Village of Oquawka (Action to Enjoin City From Maintaining a Levee Abutting its Property).
W75-03472 6E

LIABILITY (LEGAL ASPECTS)
U.S. V. Colgate-Palmolive Co. (Action Charging Unlawful Discharge of Refuse Matter Into Navigable Waters),
W75-03702 6E

LICENSES
Di Vosta Rentals Inc. v. Lee (Review of Denial of Fill Permit).
W75-03492 6E

LICHENS
Lichens of the Enterprise Radiation Forest,
W75-03405 5C

LIGHT
Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

LIGNINS
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

LIME
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

LIME SLUDGE
Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

LIMESTONES
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

LIMNOLOGY
An Outline of the Physical Limnology of Lake Malawi (Lake Nyasa),
W75-03660 2H

Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

LIMNOLOGY CLASSIFICATION
'Project Aqua' in Poland, (In Polish),
W75-03843 2A

LINDANE
Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

LINEAR RESERVOIRS
Ground-Water Quality Modeling,
W75-03661 5B

LIQUID WASTES
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

LIQUIDS
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

LITTER
Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

LITTER FALL
Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

LOCAL GOVERNMENTS
Commonwealth v. Washington Township (Action to Order Compliance with Clean Streams Law).
W75-03468 6E

Campbell v. Village of Oquawka (Action to Enjoin City From Maintaining a Levee Abutting its Property).
W75-03472 6E

LOG-NORMAL DISTRIBUTION
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

LONG-TERM PLANNING
National Environmental Research Center - Las Vegas: A Staff Study,
W75-03347 5A

LOS ANGELES BASIN (CALIF)
The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

LOUISIANA
Oliver v. Milliken and Farwell, Inc. (Action Involving Division Among Riparian Owners of Alluvial Deposits).
W75-03481 6E

Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

Offshore Terminal Authority.
W75-03716 6E

LUCERNE
Lucerne in Wet Soils: The Effect of Stage of Regrowth, Cultivar, Air Temperature and Root Temperature,
W75-03847 2I

LUMBERING
Water: Its Quality Often Depends on the Forester,
W75-03589 5B

MAGNESIUM CARBONATE
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

MAGNETIC POWDER
Treatment for Oily Waste Water Using Magnetic Powder, (In Japanese).
W75-03551 5D

MAINE
Department of Environmental Protection.
W75-03683 6E

Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

Dams and Reservoirs.
W75-03694 6E

Rivers, Streams and Brooks--Alteration.
W75-03698 6E

MALAWI (LAKE MALAWI)
An Outline of the Physical Limnology of Lake Malawi (Lake Nyasa),
W75-03660 2H

MAMMALS
Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

MANAGEMENT
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

Dairy Manure Management Methods,
W75-03636 5D

MANURE STOCK
Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

MAPLE TREES
Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

MAPPING
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

MARGINAL COSTS
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

Reconciling Conflicts Among Different Economic Interest Groups in the Management of Fisheries,
W75-03392 6B

MARINE ANIMALS
Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

Marine Flora and Fauna of the Northeastern United States. Protozoa: Ciliophora,
W75-03787 5C

MARINE GEOLOGY
Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

MARINE MICROORGANISMS
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

MARINE RESOURCE MAP
1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

MARSH MANAGEMENT
Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

MARSHES
Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

MARYLAND
United States v. Chesapeake and Delaware Shipyard, Inc. (Suit by Government to Recover Under the 'Wreck Act').
W75-03358 6E

A. H. Smith Sand and Gravel Co. v. Dept. of Water Resources (Action Dealing With Filling Operations in Floodplain).
W75-03464 6E

Beane v. Prince George's County (Action for Damages for Unnatural Water Flow).
W75-03478 6E

Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

MASSACHUSETTS
East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

Smith v. Hadad (Petition to Register and Confirm Title to Land).
W75-03470 6E

Ground-Water Quality Modeling,
W75-03661 5B

MATHEMATICAL MODELS
On Taxation as a Pollution Control Policy,
W75-03329 5G

Population Growth, Resource Availability and Environmental Quality,
W75-03331 6B

Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

The Problem of Determining the Maximum Storm Runoff Yield in Small Rivers (In problema determinarii debitelor maxime din ploi pe riuri mici),
W75-03535 2A

On the Choice of Methods for the Prediction of the Water-Activity and Activity Coefficient for Multicomponent Aqueous Solutions,
W75-03540 2K

The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

A Study of Glacier Flow for an Open-Pit Mine: An Exercise in Applied Glaciology,
W75-03663 2C

Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

MATHEMATICAL STUDIES
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

MAXIMUM ALLOWABLE CONCENTRATION
Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters, (In Russian),
W75-03505 5C

MAYFLIES
Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

MEASUREMENT
Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532 2G

Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

MECHANICAL PROPERTIES
Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

MELTING
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

MEMBRANE PROCESSES
Storage of Tritium and Noble Gases,
W75-03418 5D

MEMBRANES
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

Method of Preparing Water Purification Membranes,
W75-03756 3A

MERCURY
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

MERCURY

Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

Renal Concentration of Citrate as a Negative Modulator of Diuretic Response to Mercurials,
W75-03616 5C

Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

Mercury in Tunas: A Review,
W75-03622 5C

Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

Mercury,
W75-03797 6C

Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

METAL CHELATES

Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

METALLURGY

Hydrometallurgy,
W75-03793 3E

METALS

Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

The Opening Up of Insoluble Oxides (Tantalum, Niobium, Chromium, Aluminium, and Others), With Liquid Selenium Dioxide,
W75-03614 5A

Selective Determination of Iron in Alloys by Reaction with 2,3-Pyridinediol and Ring Colorimetry,
W75-03623 2K

Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

METEOROLOGY

Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

Translations on Environmental Quality No. 8.
W75-03696 5G

METHODOLOGY

The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

METHYLMERCURY

Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

Mercury in Tunas: A Review,
W75-03622 5C

MEXICO

Effluent Neighbors: The Mexico-United States Water Quality Dilemma.
W75-03677 5G

MICHIGAN

Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

People Ex Rel Gazlay v. Murray (Action to Enjoin Filling Parcel of Submerged Land).
W75-03460 6E

Pierce v. Riley (Action by Lake Owners for Injunctive Relief).
W75-03476 6E

Illinois and Michigan Canal.
W75-03725 6E

MICROANALYSIS

Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

MICROBIOLOGY

Effect of Potassium and Zinc Ions of Growth and Tryptophan Synthetase in Alkaloid Producing Culture of Aspergillus fumigatus,
W75-03791 5C

MICROCLIMATOLOGY

Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

MICROORGANISMS

Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

MIDGES

Effect of Biotic and Abiotic Factors on the Toxicity of Entobacterin for Larvae of Blood-Sucking Mosquitoes and Biting Midges, (In Russian),
W75-03845 5C

MIGRATION

Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

MINE DRAINAGE

Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

MINE WATER

Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

MINERAL BALANCE (ANIMALS)

Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

MINERAL INDUSTRY

Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

MINING

Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

Interstate Mining Compact (As Amended),
W75-03708 6E

Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

MINNESOTA

State of Minnesota V. Environmental Protection Agency (Action of Impoundment of FWPCA Funds),
W75-03705 6E

MISSISSIPPI RIVER

Mississippi and Missouri River Islands Are Property of State.
W75-03684 6E

MISSOURI

Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

Mississippi and Missouri River Islands Are Property of State.
W75-03684 6E

Miller Land Co., Inc. v. Liberty Township (Action for Injunction to Remove Drain Tile and Restore Condition of Land).
W75-03713 6E

Port Authorities--Establishment.
W75-03729 6E

MISSOURI RIVER
Mississippi and Missouri River Islands Are Property of State.
W75-03684 6E

MIXING
Mixing and Transport, (Literature Review),
W75-03554 5B

MOBILITY
Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

MODEL STUDIES
Water Quality Models for Urban and Suburban Areas.
W75-03311 5B

Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

The Coastal Upwelling Cycle on a Beta-Plane: Hydrodynamics and Thermodynamics,
W75-03642 2L

Ground-Water Quality Modeling,
W75-03661 5B

MOLECULES (NONBIODEGRADABLE)
Nonbiodegradable and Other Recalcitrant Molecules,
W75-03497 5B

MOLLUSKS
The Role of Aquaculture in Fishery Development and Management,
W75-03355 6C

MONITORING
National Environmental Research Center - Las Vegas: A Staff Study,
W75-03347 5A

The NASA Role in Major Areas of Human Concern.
W75-03349 5A

The NASA Role in Major Areas of Human Concern.
W75-03349 5A

Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

Monitoring of Earth-Rock Dams,
W75-03533 8D

Guidelines for Development of Criteria for Control of Ocean Waste Disposal.
W75-03632 5E

MONROE COUNTY (ILL)
Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

MORTALITY
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

MOSQUITOES
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

Effect of Biotic and Abiotic Factors on the Toxicity of Entobacterin for Larvae of Blood-Sucking Mosquitoes and Biting Midges, (In Russian),
W75-03845 5C

MOTIVATION
Factors Influencing Participation in Recreation Activities in Southeast Iowa, and Camper Attendance at Macbride State Park,
W75-03317 6B

MOUNTAIN FORESTS
Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

MULCHING
Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

MULTIPLE METAL TOLERANCE
Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

MUNICIPAL WASTES
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

MYCORRHIZAL ROOTED CUTTINGS
Response of Mycorrhizal and Nonmycorrhizal Rooted Cuttings of Heather (Calluna Vulgaris(L.) Hull) to Variations in Nutrient and Water Regimes,
W75-03842 3F

NAKED GOBIES
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

NATIONAL ENVIRONMENTAL POLICY ACT
Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

Costs - Exercising Equitable Powers to Award Attorney's Fees to Losing Party Seeking Compliance with the National Environmental Policy Act. Sierra Club v. Lynn, 364 F. Supp. 834 (W.D. Tex. 1973),
W75-03825 6E

NATIONAL FORESTS
A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

NATIONAL WILDLIFE REFUGES
Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

NATURAL FLOW DOCTRINE
Beaunit v. Alabama Power Co. (Action Against Corporation for Lowering River Level by Dam).
W75-03719 6E

NATURAL RESOURCES
Proposed Natural Areas, Salt River Salt Banks, Report No 2,
W75-03396 6B

Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

Scenery Preservation Council.
W75-03673 6E

Interagency Committee.
W75-03674 6E

NAVIGABLE WATERS
United States v. Chesapeake and Delaware Shipyard, Inc. (Suit by Government to Recover Under the 'Wreck Act').
W75-03358 6E

United States v. Raven (Appeal from Conviction for Failing to Remove Sunken Vessel and Obstructing Navigable Waterway).
W75-03462 6E

U.S. V. Colgate-Palmolive Co. (Action Charging Unlawful Discharge of Refuse Matter Into Navigable Waters),
W75-03702 6E

NEBRASKA
Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

Influence of Fertilizer Practices on Water and the Quality of the Environment (Phase II),
W75-03315 5B

Mehling v. Deines (Action to Compel Defendant to Reopen Ditch to Provide Proper Drainage).
W75-03475 6E

NEEDLE WATER POTENTIAL
Effects of Thinning on Needle Water Potential in Red Pine,
W75-03499 2I

NEGLIENCE
United States v. Chesapeake and Delaware Shipyard, Inc. (Suit by Government to Recover Under the 'Wreck Act').
W75-03358 6E

NEMATODES
Population Dynamics of Hoplolaimus Sp. at Various Levels of Soil Moisture,
W75-03832 5C

NEPHELOMETRIC METHODS
Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

NETWORKS
Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

NEUTRALIZATION
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

NEUTRON ACTIVATION ANALYSIS
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

NEVADA
National Environmental Research Center - Las Vegas: A Staff Study,
W75-03347 5A

U.S. v. Cappaert (Action by U.S. to Have its Rights to Use of Appurtenant Waters Declared).
W75-03723 6E

NEW ENGLAND
Marine Flora and Fauna of the Northeastern United States. Protozoa: Ciliophora,
W75-03787 5C

NEW HAMPSHIRE
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

Winnipesaukee River Basin Control.
W75-03690 6E

NEW JERSEY
Cappture Realty Corp. v. Board of Adjustment (Suit Challenging Denial of Special Exception Use--Construction in Flood Plains).
W75-03467 6E

NEW MEXICO
Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

NEW YORK
People v. Oceana Terminal Corp. (Prosecution for an Oil Spill).
W75-03456 6E

Musumeci v. State (Action by Downstream Landowners to Recover Flooding Damages Caused by Relocation of Highway).
W75-03469 6E

Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

NEW ZEALAND
Recent Developments in the New Zealand Rock Oyster Farming Industry (1970-72) and Problems Regarding Aquatic Pollution,
W75-03516 5C

NICHES
Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

NICKEL
The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

NIGERIA (SAMARU)
The Hydrology of a Small Catchment Basin at Samaru, Nigeria: III. Assessment of Surface Run-Off Under Varied Land Management and Vegetation Cover,
W75-03765 4A

NISQUALLY GLACIER
Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

NITRATES
Advisory Report on Health Effects of Nitrates in Water.
W75-03484 5C

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

NITRIFICATION
A Basic Study of Biological Nitrification and Denitrification, (In Japanese),
W75-03550 5D

NITRILOTRIACETIC ACID
A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

NITROGEN
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

Influence of Fertilizer Practices on Water and the Quality of the Environment (Phase II),
W75-03315 5B

High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

Nitrogen Budgets of Great Plains Impoundments,
W75-03758 5C

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

NITROGEN COMPOUNDS
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

NITROGEN SOURCES
Nitrogen Budgets of Great Plains Impoundments,
W75-03758 5C

NOBLE GASES
Storage of Tritium and Noble Gases,
W75-03418 5D

NON-STRUCTURAL ALTERNATIVES
Robert E. Nilles, Inc. v. Illinois Pollution Control Bd. (Action Against Pollution Control Board for Denial of Sewerage Permits).
W75-03474 6E

NORTH ATLANTIC REGION
Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

NORTH CAROLINA
Hydrologic Information Storage and Retrieval System,
W75-03316 7C

Report of Proceedings at Public Hearing Concerning the Reclassification of Various Streams in the Cape Fear (Lower Section), Lumber, Neuse and White Oak River Basins.
W75-03717 4A

NORTH DAKOTA
Flood Hazard Analyses - City of Lisbon, Ransom County, North Dakota.
W75-03439 4A

Water Management Districts in North Dakota,
W75-03701 6E

NORWAY
The Effect of Shelter Belts and Irrigation on Water Use in a Dry Region,
W75-03652 3F

NORWAY (OKSTINDAN)
Autumn, Winter and Spring Soil Temperatures in Okstindan, Norway,
W75-03665 2C

NOTICE
U.S. V. Colgate-Palmolive Co. (Action Charging Unlawful Discharge of Refuse Matter Into Navigable Waters),
W75-03702 6E

NUCLEAR WASTES
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

Storage of Tritium and Noble Gases,
W75-03418 5D

Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

NUCLEATION
Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

NUISANCE (LEGA ASPECTS)
Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

NUTRIENT BUDGET
A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

NUTRIENT REMOVAL
Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

NUTRIENT REQUIREMENTS
Effect of Potassium and Zinc Ions of Growth and Tryptophan Synthetase in Alkaloid Producing Culture of Aspergillus fumigatus,
W75-03791 5C

NUTRIENTS
A Study: Effects of Geology and Nutrients on Water Quality Development,
W75-03539 5G

Algal Nutrient Limitation in Lake Ontario and Tributary Waters,
W75-03757 5C

A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

NUTRITION
Observations on the Nutrition of Larvae of Chironomus f.l. Plumosus in the Waters of the Danube Flood Area, (In Romanian),
W75-03827 2I

OAK TREES
Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

OCEANIC FRONTS
The Coastal Upwelling Cycle on a Beta-Plane: Hydrodynamics and Thermodynamics,
W75-03642 2L

OCEANOGRAPHY
The Coastal Upwelling Cycle on a Beta-Plane: Hydrodynamics and Thermodynamics,
W75-03642 2L

OCEANS
Guidelines for Development of Criteria for Control of Ocean Waste Disposal.
W75-03632 5E

Ocean Disposal Practices and Effects (Report of Meeting Held in New York on September 26-29, 1972).
W75-03697 5G

Oil on the Sea.
W75-03762 5C

ODOR
Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

OFFSHORE PLATFORMS
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

Offshore Terminal Authority.
W75-03716 6E

OFFSHORE SPOIL DISPOSAL
Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

OHIO
Ohio v. Wyandotte Chemicals Corp., Restatement of the Original Jurisdiction of the Supreme Court of the United States,
W75-03680 6E

OIL
Protected Offshore Storage Facility,
W75-03744 5G

OIL-IN-WATER EMULSIONS
Oil-In-Water Emulsions and Their Flow Properties in Porous Media,
W75-03812 8B

OIL POLLUTION
Environmental Law--Oil Pollution Control--in the Absence of Federal Preemption and Any Fatal Conflict Between Statutory Schemes, a State May Constitutionally Exercise its Police Power to Provide for Cleanup of Oil Spillage and for Recoupement of Costs Concurrently With the Federal Government,
W75-03365 5G

Pollutant Spill Prevention and Control Act (As Amended).
W75-03728 6E

Pollution Suction Water Sweeper,
W75-03733 5G

Rotary Skimmer,
W75-03736 5G

Protected Offshore Storage Facility,
W75-03744 5G

Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

Oil on the Sea.
W75-03762 5C

OIL RESOURCES
Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

OIL SLICKS
Oil on the Sea.
W75-03762 5C

OIL SPILLS
U.S. Checking Up on Firms' Spill-Prevention, Cleanup Plans.
W75-03373 5G

People v. Oceana Terminal Corp. (Prosecution for an Oil Spill).
W75-03456 6E

Effects of Oil Under Sea Ice,
W75-03646 2C

Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

Pollution Suction Water Sweeper,
W75-03733 5G

Rotary Skimmer,
W75-03736 5G

OIL WASTES
United States v. Republic Steel Corp. (Refuse Discharge into Navigable Waters).
W75-03727 6E

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

OIL WELLS
Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

OILY WATER
Treatment for Oily Waste Water Using Magnetic Powder, (In Japanese).
W75-03551 5D

OKANAGAN BASIN (BRITISH COLUMBIA)
Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

ON-SITE DATA COLLECTIONS
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

ON-SITE INVESTIGATIONS
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

Autumn, Winter and Spring Soil Temperatures in Okstindan, Norway,
W75-03665 2C

Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

ONE-DIMENSIONAL FLOW
Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

OPEN CHANNEL FLOW
Predicting the Flow of Water Within a Channel Boundary of Gravel,
W75-03320 8B

OPTIMIZATION
Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

OREGON
1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

Estuaries of Oregon-Ecosystems in Crisis, Problems and Legal Solutions,
W75-03678 5G

ORGANIC COMPOUNDS
Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

ORGANIC LOADING
Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

ORGANIC MATTER
Anaerobic Digestion of Organic Matter,
W75-03371 5D

Determination of the Size Distribution of Dissoved Organics in Effluents,
W75-03771 5D

ORGANIC WASTES
Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

ORGANIZATIONS
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

OUTFALL SEWERS
Boundary Effects on Dilution of Buoyant Jets,
W75-03780 8B

OUTLETS
Beane v. Prince George's County (Action for Damages for Unnatural Water Flow).
W75-03478 6E

OVERFLOWS
Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

OWNERSHIP OF BEDS
Oliver v. Milliken and Farwell, Inc. (Action Involving Division Among Riparian Owners of Alluvial Deposits).
W75-03481 6E

OXIDATION
Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

OXIDATION DITCH
Ejector Aerated Oxidation Ditch for Waste Treatment,
W75-03753 5D

OXIDATION LAGOONS
Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

Ejector Aerated Oxidation Ditch for Waste Treatment,
W75-03753 5D

OXIDES
The Opening Up of Insoluble Oxides (Tantalum, Niobium, Chromium, Aluminium, and Others), With Liquid Selenium Dioxide,
W75-03614 5A

OXYGEN
The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

Unique New Secondary Oxygen Treatment System for Effluent,
W75-03587 5D

OXYGENATION
Unique New Secondary Oxygen Treatment System for Effluent.
W75-03372 5D

Operating Experience and Design Criteria for 'UNOX' Wastewater Treatment Systems, Design Seminar for Wastewater Treatment Facilities.
W75-03565 5D

The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

Unique New Secondary Oxygen Treatment System for Effluent,
W75-03587 5D

OYSTERS
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

Recent Developments in the New Zealand Rock Oyster Farming Industry (1970-72) and Problems Regarding Aquatic Pollution,
W75-03516 5C

PARAMETRIC HYDROLOGY
Ground-Water Quality Modeling,
W75-03661 5B

PATENTS
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

Method of Bleaching Wood Pulp,
W75-03562 5D

Sewage Treatment System,
W75-03563 5D

Anti-Heave Protective System,
W75-03732 8B

Pollution Suction Water Sweeper,
W75-03733 5G

Apparatus for Biologically Purifying Effluent,
W75-03734 5D

Distillation Apparatus,
W75-03735 3A

Rotary Skimmer,
W75-03736 5G

Power Generation From Hot Brines,
W75-03737 4B

Mechanical Reef,
W75-03738 2J

Multistage Flash Distillation,
W75-03739 3A

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

Anti-Erosion Device,
W75-03742 2J

Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

Protected Offshore Storage Facility,
W75-03744 5G

Floating Water Screen,
W75-03745 8I

Treatment of Sewage,
W75-03746 5D

Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

Beach-Protectors,
W75-03748 2J

Reinforced Mattress for Protecting Shorelines and the Like,
W75-03749 2J

Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

Waste Treatment Process,
W75-03751 5D

Process of and Installation for Purifying Sewage,
W75-03752 5D

Ejector Aerated Oxidation Ditch for Waste Treatment,
W75-03753 5D

Liquid Waste Treatment,
W75-03754 5D

Waste Water Purification System,
W75-03755 5D

Method of Preparing Water Purification Membranes,
W75-03756 3A

PATH OF POLLUTANT

Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

PATH OF POLLUTANTS

Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

PATHOGENIC BACTERIA

Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

PEARL HARBOR (HAWAII)

Commercial Oyster Fishery Development Investigation,
W75-03350 6C

PEAT

Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

PENALTIES (LEGAL)

Commonwealth v. Borough of Galeton (Petition to Enforce Clean Streams Law).
W75-03465 6E

PENMAN EQUATION

Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

PENMAN METHOD

Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

PENNSYLVANIA

Moss Rose Manufacturing Co. v. Foster (Action for Recovery of Water Damage Caused by Seepage).
W75-03455 6E

Commonwealth v. Borough of Galeton (Petition to Enforce Clean Streams Law).
W75-03465 6E

Commonwealth v. Washington Township (Action to Order Compliance with Clean Streams Law).
W75-03468 6E

Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

PEPTONE

Effect of Water on Bacterial Multiplication in Plant Tissue,
W75-03831 5C

PERMITS

Pacific Northwest Bell Telephone Co. v. U.S. (Action Seeking Damages for Damage to Submarine Telephone Cable).
W75-03461 6E

Water Program Policy Issues, (EPA Policy Directives).
W75-03692 5G

Explanatory Statement: Implementation of NPDES, (EPA).
W75-03693 5G

Rivers, Streams and Brooks--Alteration.
W75-03698 6E

Yonge V. Askew (Certiorari to Review Denial of Application to Dredge Navigable Waters),
W75-03711 6E

PESTICIDE RESIDUES

Pesticide Analysis from Urban Storm Runoff,
W75-03312 5A

Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

PESTICIDES

Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

Slime Control Compositions and Their Use,
W75-03575 5D

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

Water: Its Quality Often Depends on the Forester,
W75-03589 5B

Slime Control in Industrial Waters,
W75-03594 5D

PHENOLOGY

Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

PHENOLS

Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

Physiological Effects of a Sublethal Concentration of Phenol in the Pike (Esox Lucius L.) in Pure Brackish Water,
W75-03507 5C

Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

PHILADELPHIA (PA)

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

PHOSPHATES
Solution, Diffusion and Sorption in Upper Layer of Lake Sediments: III. Chemical and Physical Conditions in Sediment-Water Transition Zone of Meromictic BOG Late (Ursee) and its Relation to Accumulation of Vivianite, (In German),
W75-03571 5B

Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

PHOSPHORUS
Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

Phosphorus Removal Practice.
W75-03558 5D

Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

PHOSPHORUS COMPOUNDS
Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

PHOTOMETRY
Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

PHOTOOXIDATION
Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

PHYSICAL PROPERTIES
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

PHYSICOCHEMICAL PROPERTIES
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

PHYSICOCHEMICAL TREATMENT
Adsorption Processes,
W75-03386 5D

PHYSIOLOGICAL ANALYSIS
Physiological Analysis of the Response of Sorghum Hybrids 'CSH-1' and 'CSH-2' to Rain-Fed Cultivation,
W75-03368 3F

PHYTOPLANKTON
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

Comparative Studies of the Toxicity of Heavy Metals to Phytoplankton and Their Synergistic Interactions,
W75-03775 5C

Phytoplankton Which are Pollution Indicators in Lakes, (In Swedish),
W75-03828 5B

PHYTOTOXICITY
The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

PIKES
Physiological Effects of a Sublethal Concentration of Phenol in the Pike (Esox Lucius L.) in Pure Brackish Water,
W75-03507 5C

PINE TREES
Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

PINE TREES (RED)
Effects of Thinning on Needle Water Potential in Red Pine,
W75-03499 2I

PINUS-RESINOSA
Effects of Thinning on Needle Water Potential in Red Pine,
W75-03499 2I

PIPELINES
New Rubber Expansion Joints for Pipelines.
W75-03819 8G

PIPES
Sewer Pipe: Infiltration is the Issue,
W75-03548 5D

PLAICE
Marine Fish Culture in Britain: IX. Growth of Cultured Plaice to Marketable Size in the Laboratory,
W75-03759 8I

PLANKTON
Limnological Studies on the River Yamuna at Delhi, India. Part II. The Dynamics of Potamoplankton Populations in the River Yamuna,
W75-03784 5C

PLANNING
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

Unnatural Shoreline,
W75-03459 5G

The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

Interagency Committee.
W75-03674 6E

Ocean Disposal Practices and Effects (Report of Meeting Held in New York on September 26-29, 1972).
W75-03697 5G

Environmental Protection Act (As Amended),
W75-03709 6E

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

Groundwater Use Act of 1972.
W75-03722 6E

Inland Lakes Protection and Rehabilitation.
W75-03730 6E

PLANT GROUPINGS
Flora of the Enterprise Radiation Forest,
W75-03406 5C

PLANT GROWTH
Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

PLANT TISSUES
Effect of Water on Bacterial Multiplication in Plant Tissue,
W75-03831 5C

PLASTIC PIPES
PVC Sewer Pipe Meets Tight Specifications.
W75-03547 8A

PLUTONIUM
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

POLAND
'Project Aqua' in Poland, (In Polish),
W75-03843 2A

POLAND (GOLYSZ FARM)
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

POLARIZATION
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

POLLUTANT IDENTIFICATION
Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

Pesticide Analysis from Urban Storm Runoff,
W75-03312 5A

The NASA Role in Major Areas of Human Concern.
W75-03349 5A

Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

The Opening Up of Insoluble Oxides (Tantalum, Niobium, Chromium, Aluminium, and Others), With Liquid Selenium Dioxide,
W75-03614 5A

Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

Chemical Analyses for Water Quality - Training Manual.
W75-03785 5A

On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

POLLUTION

Translations on Environmental Quality, No. 7.
W75-03486 6E

Translations on Environmental Quality No. 8.
W75-03696 5G

POLLUTION ABATEMENT

On Taxation as a Pollution Control Policy,
W75-03329 5G

Houston Suburbs Profits from Building the State's Wastewater Treatment Plant.
W75-03340 5D

The NASA Role in Major Areas of Human Concern.
W75-03349 5A

Environmental Pollution in a Rapidly Growing Economy,
W75-03353 6G

U.S. Checking Up on Firms' Spill-Prevention, Cleanup Plans.
W75-03373 5G

Willingness to Pay for Pollution Abatement: A Case Study,
W75-03389 5G

The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

Electric Energy Requirements for Environmental Protection,
W75-03399 6D

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

Pulping Process Prevents Pollution,
W75-03588 5D

Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

Environmentalists Attack Administration, Industry Plans to Weaken NEPA and Set Back Recent Clean Air Gains.
W75-03687 5G

The New Federal Water Pollution Control Law,
W75-03715 5G

Pollution Control Awards Program.
W75-03731 6E

Anti-Heave Protective System,
W75-03732 8B

Protected Offshore Storage Facility,
W75-03744 5G

POLLUTION INDICES

Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

POLLUTION LOADING

A Study of Pollution Loadings from Urban Runoff,
W75-03772 5B

POLLUTION SOURCES

Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

POLLUTION TAXES (CHARGES)

On Taxation as a Pollution Control Policy,
W75-03329 5G

Determining an Equitable Surcharge for Industrial Wastes,
W75-03397 5G

POLYELECTROLYTES

New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

POLYMERIZATION

Method of Preparing Water Purification Membranes,
W75-03756 3A

POLYSACCHAROSE
Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

PONDS
Lands Lying Under Public Waters.
W75-03671 6E

POPULATION
Population Growth, Resource Availability and Environmental Quality,
W75-03331 6B

POPULATION DYNAMICS
Investigations About Population Dynamics and Nutritional Aspects on the Simulid-Larvae of a Mountain Stream Polluted by Organic Waste Water, (In German),
W75-03479 5B

POROUS MEDIA
Predicting the Flow of Water Within a Channel Boundary of Gravel,
W75-03320 8B

Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532 2G

On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

PORT AUTHORITIES
Offshore Terminal Authority.
W75-03716 6E

Port Authorities--Establishment.
W75-03729 6E

POTABLE WATER
Desalination - New Water for Old (Entsalzung-Frischwasserversorgung und Abwasseraufbereitung),
W75-03385 5D

Evaluation of the Georgia Water Supply Program.
W75-03435 5F

Chronic Fluoride Intoxication from Drinking Water: Preliminary Report,
W75-03695 5C

POTAMOPLANKTON
Limnological Studies on the River Yamuna at Delhi, India. Part II. The Dynamics of Potamoplankton Populations in the River Yamuna,
W75-03784 5C

POTATOES
Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

POTENTIAL EVAPOTRANSPIRATION
Actual Evapotranspiration in Relation to Leaf Area,
W75-03653 2D

Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

POULTRY
The Effect of Incorporating Hen Manure into the Diet of Young Chicks,
W75-03814 5D

POWER GENERATION
Power Generation From Hot Brines,
W75-03737 4B

PRE-IMPOUNDMENT
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

PRECIPITABLE WATER
Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

PRECIPITATION (ATMOSPHERIC)
Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

On the Spring Maximum of the Concentration of Trace Constituents in Atmospheric Precipitation,
W75-03621 5B

PREDICTION
Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

PRESCRIPTIVE RIGHTS
Mehling v. Deines (Action to Compel Defendant to Reopen Ditch to Provide Proper Drainage).
W75-03475 6E

Jones v. Scott (Action Claiming Prescriptive Right in Public over Navigable Water).
W75-03712 6E

PRESERVATION
Scenery Preservation Council.
W75-03673 6E

A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

PRIMARY PRODUCTIVITY
Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

PRIMARY SLUDGE
Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

PROBABILITY
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

PRODUCTIVITY
Specific Production of Aquatic Invertebrates,
W75-03327 5C

Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

PROFILES
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

PROGRAMS
Great Lakes Water Quality, 1973 Annual Report to the International Joint Commission.
W75-03640 5G

PROJECT AQUA
'Project Aqua' in Poland, (In Polish),
W75-03843 2A

PROPERTY VALUES
The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

Commonwealth of Kentucky, Department of Highways v. Fitzpatrick (Eminent Domain Action for Taking of River Bottom Lands).
W75-03477 6E

PROTOZOA
Marine Flora and Fauna of the Northeastern United States. Protozoa: Ciliophora,
W75-03787 5C

PUBLIC ACCESS
Jones v. Scott (Action Claiming Prescriptive Right in Public over Navigable Water).
W75-03712 6E

PUBLIC HEALTH
Study and Survey of Lake Michigan Shore Line,
W75-03357 6E

Dams and Reservoirs.
W75-03694 6E

Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

PUBLIC TRUST DOCTRINE
Jones v. Scott (Action Claiming Prescriptive Right in Public over Navigable Water).
W75-03712 6E

PUBLIC UTILITIES
How Do You Explain the Cost,
W75-03333 6C

State Ex Rel. Indianapolis Water Co. v. Boone Cir. Ct. (Action by Water Company for Writ of Prohibition).
W75-03473 6E

PUBLICATIONS
Publications List of the Idaho Water Resources Research Institute.
W75-03321 10C

PUERTO RICO
Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

PULP AND PAPER INDUSTRY
Method of Bleaching Wood Pulp,
W75-03562 5D

Slime Control Compositions and Their Use,
W75-03575 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

PULP WASTES
Method of Bleaching Wood Pulp,
W75-03562 5D

Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

Unique New Secondary Oxygen Treatment System for Effluent,
W75-03587 5D

Pulping Process Prevents Pollution,
W75-03588 5D

Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

Slime Control in Industrial Waters,
W75-03594 5D

Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

PUMPING PLANTS
Packaged Pumping Stations for Suburban Water Distribution,
W75-03451 5F

Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

PURINES
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

PVC SEWER PIPES
PVC Sewer Pipe Meets Tight Specifications.
W75-03547 8A

QUADRATIC PROGRAMMING
Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

QUASILINEARIZATION
On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

QUINEBAUG RIVER (MASS)
East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

RADIATION
The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

Evacuation Risks - An Evaluation,
W75-03424 6G

Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

RADIO-ECHO
Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

RADIOACTIVE WASTE
Transuranic Solid Waste Management Research Programs - Quarterly Report, January-March 1974.
W75-03420 5A

RADIOACTIVE WASTE DISPOSAL
Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.
W75-03430 5D

RADIOACTIVE WASTES
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

RADIOACTIVITY
Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

RADIOACTIVITY DAMAGE
Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

RADIOACTIVITY EFFECTS
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Lichens of the Enterprise Radiation Forest,
W75-03405 5C

Flora of the Enterprise Radiation Forest,
W75-03406 5C

Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Evacuation Risks - An Evaluation,
W75-03424 6G

RADIOISOTOPES
The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

RADIORESPIROMETRY
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

RAIN WATER
Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

RAINFALL
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

RAINFALL DISPOSITION
Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

RAINFALL INTENSITY
A simple Device for Analyzing the Energy Load and Intensity of Rainstorms,
W75-03838 2B

RAINFALL-RUNOFF RELATIONSHIPS
Opportunities for Watershed Management in Wyoming,
W75-03326 4D

RANGE MANAGEMENT
Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

RANGE OF CUMULATIVE SUMS
Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

RATES OF APPLICATION
Pollutional Aspects and Crop Yields Resulting from High Manure Applications on Soil,
W75-03310 5B

REASONABLE USE
Pierce v. Riley (Action by Lake Owners for Injunctive Relief).
W75-03476 6E

Beaunit v. Alabama Power Co. (Action Against Corporation for Lowering River Level by Dam).
W75-03719 6E

RECIRCULATED WATER
Slime Control Compositions and Their Use,
W75-03575 5D

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

Category Versus Successive-Intervals Scales,
W75-03802 6B

RECLAIMED WATER
Category Versus Successive-Intervals Scales,
W75-03802 6B

RECOVERY
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

RECREATION
Ames Reservoir Environmental Study, Appendix 1. Natural and Archaeological Resources of the Reservoir Site and Stream System.
W75-03318 6G

1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

Water Recreation Act of 1973.
W75-03726 6E

Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

RECREATION DEMAND
Factors Influencing Participation in Recreation Activities in Southeast Iowa, and Camper Attendance at Macbride State Park,
W75-03317 6B

A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

RECYCLING
System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

Process of and Installation for Purifying Sewage,
W75-03752 5D

Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

RED TIDE
The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

REEFS
Mechanical Reef,
W75-03738 2J

REFEEDING
The Effect of Incorporating Hen Manure into the Diet of Young Chicks,
W75-03814 5D

REGIONAL ANALYSIS
Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

REGIONAL ECONOMICS
Economic Development and Water Resources Investments,
W75-03343 6B

REGRESSION ANALYSIS
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

REGULATION
McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

Dams and Reservoirs.
W75-03694 6E

Water Resources (As Amended).
W75-03699 6E

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

Groundwater Use Act of 1972.
W75-03722 6E

RELATIVE RIGHTS
Campbell v. Village of Oquawka (Action to Enjoin City From Maintaining a Levee Abutting its Property).
W75-03472 6E

Pierce v. Riley (Action by Lake Owners for Injunctive Relief).
W75-03476 6E

Beaunit v. Alabama Power Co. (Action Against Corporation for Lowering River Level by Dam).
W75-03719 6E

RELOCATION
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

REMOTE SENSING
National Environmental Research Center - Las Vegas: A Staff Study,
W75-03347 5A

The NASA Role in Major Areas of Human Concern.
W75-03349 5A

Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

Remote Sensing of Algal Blooms by Aircraft and Satellite in Lake Erie and Utah Lake,
W75-03760 5A

REPRO-MODELING
The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

REPRODUCTION
Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
W75-03529 3C

RESEARCH AND DEVELOPMENT
Publications List of the Idaho Water Resources Research Institute.
W75-03321 10C

State University System of Florida Sea Grant Program 1972.
W75-03714 6E

Sea Grant Program 1973, State University System of Florida.
W75-03720 9A

Hydrometallurgy,
W75-03793 3E

RESEARCH FACILITIES
Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

RESERVOIR SILTING
Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

RESERVOIRS
Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

Dams.
W75-03672 6E

Altering Alabama's History,
W75-03688 4A

Dams and Reservoirs.
W75-03694 6E

RESINS
Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

RESISTANCE
Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

RESOURCE ALLOCATION
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

RESOURCE USE
1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

RESPIRATION
Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

RETRICULATION
Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

REVEGETATION
Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

REVERSE OSMOSIS
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

Desalination - New Water for Old (Entsalzung-Frischwasserversorgung und Abwasseraufbereitung),
W75-03385 5D

Storage of Tritium and Noble Gases,
W75-03418 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

Method of Preparing Water Purification Membranes,
W75-03756 3A

REVIEWS
Disinfection,
W75-03369 5D

Anaerobic Digestion of Organic Matter,
W75-03371 5D

State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

Mixing and Transport, (Literature Review),
W75-03554 5B

The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

Mercury in Tunas: A Review,
W75-03622 5C

A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

RHODESIA (LAKE KARIBA)
Observations on a Breeding Pair of Tilapia Rendalli Rendalli Boulenger 1896 in an Experimental Tank at Lake Kariba Fisheries Research Institute,
W75-03501 8I

RIPARIAN LAND
Bonelli Cattle Co. v. Arizona (Quiet Title Action).
W75-03493 6E

RIPARIAN RIGHTS
The Necessity of Zoning Variance or Amendments Notice to the Wisconsin Department of Natural Resources Under the Shoreland Zoning and Navigable Waters Protection Act,
W75-03364 6E

Pierce v. Riley (Action by Lake Owners for Injunctive Relief).
W75-03476 6E

Oliver v. Milliken and Farwell, Inc. (Action Involving Division Among Riparian Owners of Alluvial Deposits).
W75-03481 6E

Effluent Neighbors: The Mexico-United States Water Quality Dilemma.
W75-03677 5G

RIVER BASIN COMMISSIONS
The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

RIVER BASIN DEVELOPMENT
The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

RIVER BASINS
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

RIVER DANUBE
The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

RIVER REGULATION
Report of Proceedings at Public Hearing Concerning the Reclassification of Various Streams in the Cape Fear (Lower Section), Lumber, Neuse and White Oak River Basins.
W75-03717 4A

RIVER YAMUNA (INDIA)
Limnological Studies on the River Yamuna at Delhi, India. Part II. The Dynamics of Potamoplankton Populations in the River Yamuna,
W75-03784 5C

RIVERS
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects,
W75-03352 6G

Winnipesaukee River Basin Control.
W75-03690 6E

Limnological Studies on the River Yamuna at Delhi, India. Part II. The Dynamics of Potamoplankton Populations in the River Yamuna,
W75-03784 5C

RIVERS AND HARBORS ACT
United States v. Chesapeake and Delaware Shipyard, Inc. (Suit by Government to Recover Under the 'Wreck Act').
W75-03358 6E

United States v. Raven (Appeal from Conviction for Failing to Remove Sunken Vessel and Obstructing Navigable Waterway).
W75-03462 6E

Di Vosta Rentals Inc. v. Lee (Review of Denial of Fill Permit).
W75-03492 6E

U.S. V. Colgate-Palmolive Co. (Action Charging Unlawful Discharge of Refuse Matter Into Navigable Waters),
W75-03702 6E

United States v. Republic Steel Corp. (Refuse Discharge into Navigable Waters).
W75-03727 6E

ROAD CONSTRUCTION
Commonwealth of Kentucky, Department of Highways v. Fitzpatrick (Eminent Domain Action for Taking of River Bottom Lands).
W75-03477 6E

ROCK MECHANICS
Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

ROCK PROPERTIES
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

ROCKFILL DAMS
Monitoring of Earth-Rock Dams,
W75-03533 8D

ROCKS
Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

ROCKY MOUNTAIN REGION
Economic Development and Water Resources Investments,
W75-03343 6B

ROMANIA
The Problem of Determining the Maximum Storm Runoff Yield in Small Rivers (In problema determinarii debitelor maxime din ploi pe riuri mici),
W75-03535 2A

ROMANIA (DANUBE RIVER)
Observations on the Nutrition of Larvae of Chironomus f.l. Plumosus in the Waters of the Danube Flood Area, (In Romanian),
W75-03827 2I

ROOT TEMPERATURE
Lucerne in Wet Soils: The Effect of Stage of Regrowth, Cultivar, Air Temperature and Root Temperature,
W75-03847 2I

ROOTED AQUATIC PLANTS
Static Pressure Fractionation Characteristics of Water Hyacinth,
W75-03302 4A

ROUTING
Conservation--Alteration of Streams.
W75-03675 6E

RUBBER
Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

New Rubber Expansion Joints for Pipelines.
W75-03819 8G

RUNNING WATERS
Snail Population in Running Water,
W75-03803 2I

RUNOFF FORECASTING
The Hydrology of a Small Catchment Basin at Samaru, Nigeria: III. Assessment of Surface Run-Off Under Varied Land Management and Vegetation Cover,
W75-03765 4A

SAFETY
Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.
W75-03430 5D

Dams and Reservoirs.
W75-03694 6E

SAHARA LAKES
Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

SALINE WATER
Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

SALINE WATER-FRESHWATER INTERFACES
Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

SALINE WATER SYSTEMS
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

SALINITY
Guidelines for Land Disposal of Feedlot Lagoon Water.
W75-03306 5G

Influence of Salinity on the Eggs and Larvae of the California Killifish Fundulus Parvipinnis,
W75-03334 5C

Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

SALMON RIVER ESTUARY (ORE)
1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

SALMONELLA
Epidemiologic Relationships Between Human and Animal Salmonella Carriers and Their Environment in the Swiss Region of the Lake of Constance, (In German),
W75-03330 5C

SALMONIDS
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

Sewage and Aquacultural Production,
W75-03524 5L

SALT MARSHES
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland Australia,
W75-03836 5C

SALT MINES
Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5E

SALT RIVER BASIN (KENT)
Changes in the Economy and Ecology a Proposed Lake Sites in the Salt River Basin Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

SALT RIVER SALT BANKS (ARIZ)
Proposed Natural Areas, Salt River Salt Banks Report No 2,
W75-03396 6E

SALT TOLERANCE
Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
W75-03529 3C

Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

SALTS
The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

SAND LAKE ESTUARY (ORE)
1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

SANITARY ENGINEERING
In Re Barker Sargent Corp (Appeal from Environmental Board Decision).
W75-03466 6E

Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

SCALING
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

SCAVENGING
A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

SCREENS
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659 8B

Floating Water Screen,
W75-03745 8I

SEA ICE
Effects of Oil Under Sea Ice,
W75-03646 2C

Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

Differential Sea-Ice Drift. II. Comparison of Mesoscale Strain Measurements to Linear Drift Theory Predictions,
W75-03650 2C

SEA WATER
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

SEASONAL
On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

SEDGELAND WATERS
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

SEDIMENT TRANSPORT
Sediment in Streams and Its Effects on Aquatic Life,
W75-03303 2J

SEDIMENTATION
Unnatural Shoreline,
W75-03459 5G

SEDIMENTS
Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

SEEPAGE
Moss Rose Manufacturing Co. v. Foster (Action for Recovery of Water Damage Caused by Seepage).
W75-03455 6E

SEISMOLOGY
A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

SELECTIVITY
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

SELENIUM
Selenium Biochemistry,
W75-03620 5C

SELF PURIFICATION
Investigations About Population Dynamics and Nutritional Aspects on the Simulid-Larvae of a Mountain Stream Polluted by Organic Waste Water, (In German),
W75-03479 5B

SEPARATION TECHNIQUES
Waterless Sanitation for Rest Areas,
W75-03370 5D

Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

Wastewater Degassing by Adiabatic Flashing,
W75-03446 5D

Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

Treatment of Sewage,
W75-03746 5D

Hydrometallurgy,
W75-03793 3E

SEVERANCE BASIN (COLO)
Ground-Water Quality Study,
W75-03534 5B

SEWAGE
A Program for the Future--Water and Sewer in Rural America.
W75-03488 5D

Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

SEWAGE DISPOSAL
Waterless Sanitation for Rest Areas,
W75-03370 5D

Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

Disposal of Alum Sludge to the Existing Activated Sludge Wastewater Treatment Plant,
W75-03774 5D

Replaces New Works 1900 Installation.
W75-03817 5D

SEWAGE EFFLUENTS
Commonwealth v. Washington Township (Action to Order Compliance with Clean Streams Law).
W75-03468 6E

Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

SEWAGE SLUDGE
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

SEWAGE TREATMENT
Unique New Secondary Oxygen Treatment System for Effluent.
W75-03372 5D

Combined Chemical-Biological Treatment Studies,
W75-03383 5D

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

A Program for the Future--Water and Sewer in Rural America.
W75-03488 5D

The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

Sewage and Aquacultural Production,
W75-03524 5D

A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

Phosphorus Removal Practice.
W75-03558 5D

Sewage Treatment in the City of Plymouth,
W75-03561 5D

Sewage Treatment System,
W75-03563 5D

Treatment of Sewage,
W75-03746 5D

Water Pollution Research in Canada 1973,
W75-03770 5D

The Effects of Aluminum Sludge from Water Purification on Municipal Primary Sewage Treatment,
W75-03778 5D

Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

SEWERAGE
Waterless Sanitation for Rest Areas,
W75-03370 5D

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

The Sewage System of the City of Rangoon,
W75-03544 5D

SEWERS
The Sewage System of the City of Rangoon,
W75-03544 5D

PVC Sewer Pipe Meets Tight Specifications.
W75-03547 8A

Sewer Pipe: Infiltration is the Issue,
W75-03548 5D

SHEEP
Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
W75-03529 3C

Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

SHELLFISH
Recent Developments in the New Zealand Rock Oyster Farming Industry (1970-72) and Problems Regarding Aquatic Pollution,
W75-03516 5C

SHELLFISH FARMING
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

SHELTERBELTS
The Effect of Shelter Belts and Irrigation on Water Use in a Dry Region,
W75-03652 3F

SHORE PROTECTION
Anti-Heave Protective System,
W75-03732 8B

Mechanical Reef,
W75-03738 2J

Anti-Erosion Device,
W75-03742 2J

Beach-Protectors,
W75-03748 2J

Reinforced Mattress for Protecting Shorelines and the Like,
W75-03749 2J

SHORELINE
Unnatural Shoreline,
W75-03459 5G

SHORELINES
Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

SHRIMPS
Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

SILVER
Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

SIMULATION ANALYSIS
Water Quality Models for Urban and Suburban Areas.
W75-03311 5B

Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

SIMULIID LARVAE
Investigations About Population Dynamics and Nutritional Aspects on the Simulid-Larvae of a Mountain Stream Polluted by Organic Waste Water, (In German),
W75-03479 5B

SITES
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

SKILLET FISH
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

SKIMMERS
Rotary Skimmer,
W75-03736 5G

SKIMMING
Pollution Suction Water Sweeper,
W75-03733 5G

Rotary Skimmer,
W75-03736 5G

SLIME
Slime Control Compositions and Their Use,
W75-03575 5D

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

Slime Control in Industrial Waters,
W75-03594 5D

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

SLUDGE
Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

Talking Tankers.
W75-03560 5E

Measurements of Sludge Level and Sludge Density in Clarifier Installations (Messungen von Schlamminiveau und Schlammdichte in Klaeranlagen),
W75-03586 5D

Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

SLUDGE DIGESTION
A Performance Study of Aerobic Sludge Digestion,
W75-03773 5D

SLUDGE DISPOSAL
Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

Talking Tankers.
W75-03560 5E

Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

The Effects of Aluminum Sludge from Water Purification on Municipal Primary Sewage Treatment,
W75-03778 5D

SLUDGE TREATMENT
Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

Alum Recovery from Water and Wastewater Treatment Plant Sludges,
W75-03542 5D

The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

Process of and Installation for Purifying Sewage,
W75-03752 5D

Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

Replaces New Works 1900 Installation.
W75-03817 5D

SMALL ANIMALS (MAMMALS)
Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

SMALL GAME
Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

SMALL WATERSHEDS
Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

SNAILS
Snail Population in Running Water,
W75-03803 2I

SNOW SURVEYS
Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

SNOWMELT
Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

SNOWPACKS
Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

SOCIAL ADJUSTMENT
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

SOCIAL CHANGE
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

SOCIAL COSTS
Reconciling Conflicts Among Different Economic Interest Groups in the Management of Fisheries,
W75-03392 6B

SOCIAL IMPACT
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

SOCIAL PARTICIPATION
Factors Influencing Participation in Recreation Activities in Southeast Iowa, and Camper Attendance at Macbride State Park,
W75-03317 6B

The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

SOCIAL WELL-BEING
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

SOIL CONTAMINATION
Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

SOIL CONTAMINATION EFFECTS
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

SOIL DISPOSAL FIELDS
Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

SOIL EROSION
A simple Device for Analyzing the Energy Load and Intensity of Rainstorms,
W75-03838 2B

SOIL LOSSES
Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

SOIL MOISTURE
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

Moisture Profiles in Swelling Soils,
W75-03527 2G

Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

The Effect of Shelter Belts and Irrigation on Water Use in a Dry Region,
W75-03652 3F

Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

Effects of Experimental Soil Moisture Fluctuations on Turnover Rates of Testacea,
W75-03681 2G

SOIL PROFILES
Moisture Profiles in Swelling Soils,
W75-03527 2G

SOIL TEMPERATURE
Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

Autumn, Winter and Spring Soil Temperatures in Okstindan, Norway,
W75-03665 2C

SOIL TEMPERATURE PLASTICS
Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

SOIL WATER
Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

SOIL WATER MOVEMENT
Moisture Profiles in Swelling Soils,
W75-03527 2G

Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

SOIL-WATER-PLANT RELATIONSHIPS
Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

Actual Evapotranspiration in Relation to Leaf Area,
W75-03653 2D

Snow-Vegetation Relationships in the Forest Tundra of Nouveau-Quebec, Hudson Bay, (In French),
W75-03849 2I

SOILS
Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

SOLAR DISTILLATION
Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

SOLAR RADIATION
Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

SOLAR RADIOMETER
Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

SOLEA-SOLEA
Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

SOLUBILITY
The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

SOLVENTS
The Opening Up of Insoluble Oxides (Tantalum, Niobium, Chromium, Aluminium, and Others), With Liquid Selenium Dioxide,
W75-03614 5A

SORGHUM HYBRIDS
Physiological Analysis of the Response of Sorghum Hybrids 'CSH-1' and 'CSH-2' to Rain-Fed Cultivation,
W75-03368 3F

SOUTH CAROLINA
Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

State Ex Rel. McLeod V. Murrell's Inlet Camp and Marina, Inc. (Quiet Title Action Involving Riparian Land),
W75-03704 6E

SOUTH DAKOTA
Jewett v. Redwater Irrigating Association (Action for Adjudication of Water Rights).
W75-03471 6E

SOUTHBRIDGE (MASS)
East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

SOVEREIGN IMMUNITY
State of Minnesota V. Environmental Protection Agency (Action of Impoundment of FWPCA Funds),
W75-03705 6E

SPECIATION
Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

SPECIFIC PRODUCTION
Specific Production of Aquatic Invertebrates,
W75-03327 5C

SPECTROPHOTOMETRY
Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

SPECTROSCOPY
The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

SPHAGNUM
The Sphagnum Flora of Hot Springs in Iceland,
W75-03526 2I

SPRINKLER IRRIGATION
Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

ST. JOHNS RIVER BASIN (FLA)
Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

ST. LAWRENCE RIVER
Great Lakes-St. Lawrence Seaway System and the Mid-Continent Economy,
W75-03394 6B

STABLE ISOTOPES
The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

STATE GOVERNMENTS
Department of Pollution Control and Ecology.
W75-03700 6E

State Ex Rel. McLeod V. Murrell's Inlet Camp and Marina, Inc. (Quiet Title Action Involving Riparian Land),
W75-03704 6E

Water Quality Mangement Plans--Proposed Rules.
W75-03718 6E

Pollution Control Awards Program.
W75-03731 6E

STATE POLICY
Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

Rivers, Streams and Brooks--Alteration.
W75-03698 6E

STATISTICAL METHODS
Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

STATISTICAL MODELS
Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

STEM DIAMETER
Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

STOCK WATER
Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
W75-03529 3C

STOMATAL OPENINGS
Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

STORAGE CAPACITY
Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

STORAGE TANKS
Protected Offshore Storage Facility,
W75-03744 5G

STORM RUNOFF
Water Quality Models for Urban and Suburban Areas.
W75-03311 5B

Pesticide Analysis from Urban Storm Runoff,
W75-03312 5A

The Problem of Determining the Maximum Storm Runoff Yield in Small Rivers (In problema determinarii debitelor maxime din ploi pe riuri mici),
W75-03535 2A

Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

STORM WATER
The Problem of Determining the Maximum Storm Runoff Yield in Small Rivers (In problema determinarii debitelor maxime din ploi pe riuri mici),
W75-03535 2A

Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

STORMWATER DRAINAGE
Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

STRAIN
Differential Sea-Ice Drift. II. Comparison of Mesoscale Strain Measurements to Linear Drift Theory Predictions,
W75-03650 2C

STREAMFLOW
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

Conservation--Alteration of Streams.
W75-03675 6E

STREAMS
Musumeci v. State (Action by Downstream Landowners to Recover Flooding Damages Caused by Relocation of Highway).
W75-03469 6E

Calculation of Temperature Variations of Small Mountain Streams,
W75-03655 2E

Rivers, Streams and Brooks--Alteration.
W75-03698 6E

STRIPED BLENNIE
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

STRUCTURAL DESIGN
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

STRUCTURAL ENGINEERING
Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

STRUCTURAL MODELS
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

STRUCTURES
Conservation--Alteration of Streams.
W75-03675 6E

SUBLETHAL EFFECTS
Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

SUBLETHAL LIMIT
Physiological Effects of a Sublethal Concentration of Phenol in the Pike (Esox Lucius L.) in Pure Brackish Water,
W75-03507 5C

SUBMERGED LANDS
People Ex Rel Gazlay v. Murray (Action to Enjoin Filling Parcel of Submerged Land).
W75-03460 6E

SUBSURFACE INVESTIGATIONS
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

SUCTION TENSIONS
The Nature of Water Potential Gradients in Trees, (In German),
W75-03336 2I

SUCTION WATER SWEEPER
Pollution Suction Water Sweeper,
W75-03733 5G

SULFATES
Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

SULFITE LIQUORS
Pulping Process Prevents Pollution,
W75-03588 5D

SULFUR
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

SUNFISHES
Chronic Cadmium Toxicity to the Bluegill (Lepomis Macrochirus Rafinesque),
W75-03511 5C

SURCHARGES (POLLUTION CONTROL)
Determining an Equitable Surcharge for Industrial Wastes,
W75-03397 5G

SURFACE ACTIVE SUBSTANCES
Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

SURFACE DRAINAGE
Miller Land Co., Inc. v. Liberty Township (Action for Injunction to Remove Drain Tile and Restore Condition of Land).
W75-03713 6E

SURFACE RUNOFF
The Hydrology of a Small Catchment Basin at Samaru, Nigeria: III. Assessment of Surface Run-Off Under Varied Land Management and Vegetation Cover,
W75-03765 4A

SURVEYS
Factors Influencing Participation in Recreation Activities in Southeast Iowa, and Camper Attendance at Macbride State Park,
W75-03317 6B

Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

Guidelines for Development of Criteria for Control of Ocean Waste Disposal.
W75-03632 5E

Autumn, Winter and Spring Soil Temperatures in Okstindan, Norway,
W75-03665 2C

SUSPENDED SOLIDS
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

SWARDS
Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

SWEDEN
Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

SWELLING SOILS
Moisture Profiles in Swelling Soils,
W75-03527 2G

SWITZERLAND
Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

SWITZERLAND (LAKE OF CONSTANCE)
Epidemiologic Relationships Between Human and Animal Salmonella Carriers and Their Environment in the Swiss Region of the Lake of Constance, (In German),
W75-03330 5C

SYDNEY (AUST)
Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

SYNERGISTIC EFFECTS
Comparative Studies of the Toxicity of Heavy Metals to Phytoplankton and Their Synergistic Interactions,
W75-03775 5C

SYNTHETIC CHEMICALS
Nonbiodegradable and Other Recalcitrant Molecules,
W75-03497 5B

SYNTHETIC HYDROLOGY
On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

SYSTEMATICS
The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

SYSTEMS ANALYSIS
The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

TACNA MARSH (ARIZ)
Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

TAIWAN
Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

TALL OIL
Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

TASMANIA (LAKE PEDDER)
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

TAX RATES
Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6E

TAXES
On Taxation as a Pollution Control Policy,
W75-03329 5G

Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6E

TECHNOLOGY
Oil on the Sea.
W75-03762 5C

TEMPERATURE
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

Calculation of Temperature Variations of Small Mountain Streams,
W75-03655 2E

Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

TEMPERATURE DIFFERENTIALS
New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

TEMPERATURE DISTRIBUTION
New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

TEMPORAL DISTRIBUTION
Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

TENNESSEE
Environmental Defense Fund v. Tennessee Valley Authority (Action to Enjoin TVA From Completing Construction of Tellico Dam).
W75-03362 6E

TENNESSEE VALLEY AUTHORITY
Environmental Defense Fund v. Tennessee Valley Authority (Action to Enjoin TVA From Completing Construction of Tellico Dam).
W75-03362 6E

TERRITORIAL SEAS (JURISDICTION)
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

TERRITORIAL WATERS
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

TERTIARY TREATMENT
Houston Suburbs Profits from Building the State's Wastewater Treatment Plant.
W75-03340 5D

Sewage and Aquacultural Production,
W75-03524 5D

State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

Phosphorus Removal Practice.
W75-03558 5D

TESLA FAULT (CALIF)
A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

TESTACEA
Effects of Experimental Soil Moisture Fluctuations on Turnover Rates of Testacea,
W75-03681 2G

TESTING PROCEDURES
On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

TEXAS
Houston Suburbs Profits from Building the State's Wastewater Treatment Plant.
W75-03340 5D

Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

Costs - Exercising Equitable Powers to Award Attorney's Fees to Losing Party Seeking Compliance with the National Environmental Policy Act. Sierra Club v. Lynn, 364 F. Supp. 834 (W.D. Tex. 1973),
W75-03825 6E

TEXTILES
Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

THEORETICAL ANALYSIS
Differential Sea-Ice Drift. II. Comparison of Mesoscale Strain Measurements to Linear Drift Theory Predictions,
W75-03650 2C

THERMAL CAPACITY
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

THERMAL STRESS
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

THERMAL TREATMENT
Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

THERMISTORS
New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

THERMODYNAMIC
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

THERMODYNAMIC BEHAVIOR
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

THERMOMECHANICAL PULP REFINING
Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

THINNING (TREES)
Effects of Thinning on Needle Water Potential in Red Pine,
W75-03499 2I

THIOCARBAMATE PESTICIDES
Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

THIODAN
Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

THREE SLUDGE SYSTEM
The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

THREE-SPINED STICKLEBACK
Observations on the Ecology of Lacrustrine Populations of the Threespine Stickleback (Gasterosteus Aculeatus L., 1758) in the Matamek River System, Quebec,
W75-03625 5C

TILAPIA-RENDALLI-RENDALLI
Observations on a Breeding Pair of Tilapia Rendalli Rendalli Boulenger 1896 in an Experimental Tank at Lake Kariba Fisheries Research Institute,
W75-03501 8I

TIME SERIES ANALYSIS
On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

TITANIUM
Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

TL50
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

TNT
The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

TOMATOS
Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

TOXICANTS
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

TOXICITY
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters, (In Russian),
W75-03505 5C

Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

Chronic Cadmium Toxicity to the Bluegill (Lepomis Macrochirus Rafinesque),
W75-03511 5C

Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

Chronic Fluoride Intoxication from Drinking Water: Preliminary Report,
W75-03695 5C

Comparative Studies of the Toxicity of Heavy Metals to Phytoplankton and Their Synergistic Interactions,
W75-03775 5C

Mercury,
W75-03797 6C

Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

Effect of Biotic and Abiotic Factors on the Toxicity of Entobacterin for Larvae of Blood-Sucking Mosquitoes and Biting Midges, (In Russian),
W75-03845 5C

TRACE ELEMENTS
Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

On the Spring Maximum of the Concentration of Trace Constituents in Atmospheric Precipitation,
W75-03621 5B

Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

TRAINING
Chemical Analyses for Water Quality - Training Manual.
W75-03785 5A

TRAINING MANUALS
Chemical Analyses for Water Quality - Training Manual.
W75-03785 5A

TRANSITION FLOW
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

TRANSMISSIBILITY
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

TRANSPIRATION
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

TRANSPORT
Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

Mixing and Transport, (Literature Review),
W75-03554 5B

TRANSPORTATION
Great Lakes-St. Lawrence Seaway System and the Mid-Continent Economy,
W75-03394 6B

TRANSURANIC WASTES
Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.
W75-03430 5D

TRANSURANICS
Transuranic Solid Waste Management Research Programs - Quarterly Report, January-March 1974.
W75-03420 5A

TREATMENT FACILITIES
How Do You Explain the Cost,
W75-03333 6C

Houston Suburbs Profits from Building the State's Wastewater Treatment Plant.
W75-03340 5D

Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

Evaluation of the Georgia Water Supply Program.
W75-03435 5F

A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

Sewage Treatment in the City of Plymouth,
W75-03561 5D

Sewage Treatment System,
W75-03563 5D

Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

Measurements of Sludge Level and Sludge Density in Clarifier Installations (Messungen von Schlamminiveau und Schlammdichte in Klaeranlagen),
W75-03586 5D

Unique New Secondary Oxygen Treatment System for Effluent,
W75-03587 5D

Kentucky Pollution Abatement Authority,
W75-03707 6E

Replaces New Works 1900 Installation.
W75-03817 5D

Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

TREES
The Nature of Water Potential Gradients in Trees, (In German),
W75-03336 2I

Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

TRICKLING FILTERS
Apparatus for Biologically Purifying Effluent,
W75-03734 5D

TRITIUM
Storage of Tritium and Noble Gases,
W75-03418 5D

TRITIUM

Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

TROPICAL STORMS

Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

TROPOSPHERE

On the Spring Maximum of the Concentration of Trace Constituents in Atmospheric Precipitation,
W75-03621 5B

TUNA

Mercury in Tunas: A Review,
W75-03622 5C

TUNNEL LININGS

Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

TUNNEL SUPPORTS

Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

TUNNELS

Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

TURBIDITY

Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

TYPHA LATIFOLIA

Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

ULTRAFILTRATION

Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

ULTRAVIOLET ABSORPTION

Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

UNITED NATIONS

Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

UNITED STATES

Great Lakes Water Quality, 1973 Annual Report to the International Joint Commission.
W75-03640 5G

Effluent Neighbors: The Mexico-United States Water Quality Dilemma.
W75-03677 5G

UNSTEADY FLOW

On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

UPFLOW FILTRATION

Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

UPWELLING

The Coastal Upwelling Cycle on a Beta-Plane: Hydrodynamics and Thermodynamics,
W75-03642 2L

URBAN HYDROLOGY

Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

URBAN RUNOFF

Water Quality Models for Urban and Suburban Areas.
W75-03311 5B

Pesticide Analysis from Urban Storm Runoff,
W75-03312 5A

Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

A Study of Pollution Loadings from Urban Runoff,
W75-03772 5B

UREA

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

URIC ACID

Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

USSR

Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

UTAH LAKE (UTAH)

Remote Sensing of Algal Blooms by Aircraft and Satellite in Lake Erie and Utah Lake,
W75-03760 5A

VACUUM PUMPS

Talking Tankers.
W75-03560 5E

VARIABILITY

Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

VARIETIES

Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

VASCULAR TISSUES

Flora of the Enterprise Radiation Forest,
W75-03406 5C

VEGETATION

Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

The Hydrology of a Small Catchment Basin at Samaru, Nigeria: III. Assessment of Surface Run-Off Under Varied Land Management and Vegetation Cover,
W75-03765 4A

VEGETATION COVER

Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

VEGETATION REGROWTH

Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

VEGETATIONAL ANALYSIS

Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

VERMONT

In Re Barker Sargent Corp (Appeal from Environmental Board Decision).
W75-03466 6E

Lands Lying Under Public Waters.
W75-03671 6E

Dams.
W75-03672 6E

Scenery Preservation Council.
W75-03673 6E

Interagency Committee.
W75-03674 6E

Conservation—Alteration of Streams.
W75-03675 6E

VERTEBRATES

Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

VICIA-FABA

Effect of Water Stress Upon Endogenous Ethylene Levels in Vicia Faba,
W75-03841 2I

VIRGINIA

A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

VIRUSES

Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

VOLLENWEIDER'S MODEL

A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

WASHINGTON

Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

Pulping Process Prevents Pollution,
W75-03588 5D

Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

Watershed Behavior After Forest Fire in Washington,
W75-03820 4C

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

WASTE DILUTION
Boundary Effects on Dilution of Buoyant Jets,
W75-03780 8B

WASTE DISPOSAL
Transuranic Solid Waste Management Research Programs - Quarterly Report, January-March 1974.
W75-03420 5A

Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.
W75-03430 5D

Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Guidelines for Development of Criteria for Control of Ocean Waste Disposal.
W75-03632 5E

Dairy Manure Management Methods,
W75-03636 5D

Ocean Disposal Practices and Effects (Report of Meeting Held in New York on September 26-29, 1972).
W75-03697 5G

Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

WASTE MANAGEMENT
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

WASTE REPOSITORY
Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

WASTE STORAGE
Salvage of Alpha-Contaminated Metals,
W75-03417 5D

Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.
W75-03430 5D

Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

WASTE TREATMENT
Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

Storage of Tritium and Noble Gases,
W75-03418 5D

Transuranic Solid Waste Management Research Programs - Quarterly Report, January-March 1974.
W75-03420 5A

Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

Guidelines for the Interim Storage of AEC-Generated Solid Transuranic Wastes.
W75-03430 5D

Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

Measurements of Sludge Level and Sludge Density in Clarifier Installations (Messungen von Schlamminiveau und Schlammdichte in Klaeranlagen),
W75-03586 5D

Decolorizing Dye Wastes,
W75-03608 5D

Removing Three Air Pollutants at Once.
W75-03631 5D

Dairy Manure Management Methods,
W75-03636 5D

Water Pollution Research in Canada 1973,
W75-03770 5D

Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

The Effect of Incorporating Hen Manure into the Diet of Young Chicks,
W75-03814 5D

WASTE WATER DISPOSAL
Guidelines for Land Disposal of Feedlot Lagoon Water.
W75-03306 5G

Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

WASTE WATER (POLLUTION)
Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

WASTE WATER TREATMENT
Practical Treatment of Feedlot Runoff,
W75-03313 5D

Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

Purified Wastewater-The Untapped Water Resource,
W75-03337 5D

Houston Suburbs Profits from Building the State's Wastewater Treatment Plant.
W75-03340 5D

Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

Disinfection,
W75-03369 5D

Waterless Sanitation for Rest Areas,
W75-03370 5D

Anaerobic Digestion of Organic Matter,
W75-03371 5D

Unique New Secondary Oxygen Treatment System for Effluent.
W75-03372 5D

New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

WASTE WATER TREATMENT

Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

Comparison of Completely Mixed and Plug Flow Biological Systems,
W75-03381 5D

High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Combined Chemical-Biological Treatment Studies,
W75-03383 5D

Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

Desalination - New Water for Old (Entsalzung-Frischwasserversorgung und Abwasseraufbereitung),
W75-03385 5D

Adsorption Processes,
W75-03386 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part I,
W75-03387 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

Temperature-Substrate Interactions in Biological Treatment,
W75-03445 5D

Wastewater Degassing by Adiabatic Flashing,
W75-03446 5D

A Program for the Future--Water and Sewer in Rural America.
W75-03488 5D

The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

Sewage and Aquacultural Production,
W75-03524 5D

Alum Recovery from Water and Wastewater Treatment Plant Sludges,
W75-03542 5D

Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

A Basic Study of Biological Nitrification and Denitrification, (In Japanese),
W75-03550 5D

Treatment for Oily Waste Water Using Magnetic Powder, (In Japanese).
W75-03551 5D

Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

Phosphorus Removal Practice.
W75-03558 5D

Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

Sewage Treatment in the City of Plymouth,
W75-03561 5D

Method of Bleaching Wood Pulp,
W75-03562 5D

Sewage Treatment System,
W75-03563 5D

Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

Operating Experience and Design Criteria for 'UNOX' Wastewater Treatment Systems, Design Seminar for Wastewater Treatment Facilities.
W75-03565 5D

Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

Slime Control Compositions and Their Use,
W75-03575 5D

Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

Measurements of Sludge Level and Sludge Density in Clarifier Installations (Messungen von Schlamminiveau und Schlammdichte in Klaeranlagen),
W75-03586 5D

Unique New Secondary Oxygen Treatment System for Effluent,
W75-03587 5D

Pulping Process Prevents Pollution,
W75-03588 5D

Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

Slime Control in Industrial Waters,
W75-03594 5D

Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

Ultrafiltration Offers 'Good' Removal of Color, COD, BOD.
W75-03600 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

Decolorizing Dye Wastes,
W75-03608 5D

Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

Apparatus for Biologically Purifying Effluent,
W75-03734 5D

Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

Treatment of Sewage,
W75-03746 5D

Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

Waste Treatment Process,
W75-03751 5D

Process of and Installation for Purifying Sewage,
W75-03752 5D

Ejector Aerated Oxidation Ditch for Waste Treatment,
W75-03753 5D

Liquid Waste Treatment,
W75-03754 5D

Waste Water Purification System,
W75-03755 5D

Determination of the Size Distribution of Dissoved Organics in Effluents,
W75-03771 5D

Disposal of Alum Sludge to the Existing Activated Sludge Wastewater Treatment Plant,
W75-03774 5D

Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

Replaces New Works 1900 Installation.
W75-03817 5D

Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

WATER ALLOCATION (POLICY)

Jewett v. Redwater Irrigating Association (Action for Adjudication of Water Rights).
W75-03471 6E

WATER ANALYSIS

An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

Determination of Total Water Hardness by Conductometric Titration with Complexing Agents (Determinarea duritatii toale a apei prin titrari conductometrice cu complexoni),
W75-03604 5A

Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

WATER BALANCE

Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

WATER BUDGET

Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

WATER CHEMISTRY

Determination of Total Water Hardness by Conductometric Titration with Complexing Agents (Determinarea duritatii toale a apei prin titrari conductometrice cu complexoni),
W75-03604 5A

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

WATER CONSERVATION

Water Conservation in Three Grain Crops in the Zambezi Valley,
W75-03332 3F

Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

Jackson v. Texas Water Rights Commission (Suit Seeking Cancellation of Comm'n. Orders Designating Underground Water Conservation District).
W75-03463 6E

Slime Control Compositions and Their Use,
W75-03575 5D

Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

WATER DEMAND

East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

WATER DISTRIBUTION

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

Packaged Pumping Stations for Suburban Water Distribution,
W75-03451 5F

WATER EQUIVALENT

Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

WATER FLUCTUATION LEVELS

Dams.
W75-03672 6E

WATER HYACINTH

Static Pressure Fractionation Characteristics of Water Hyacinth,
W75-03302 4A

WATER LAW

Mehling v. Deines (Action to Compel Defendant to Reopen Ditch to Provide Proper Drainage).
W75-03475 6E

Lands Lying Under Public Waters.
W75-03671 6E

Dams.
W75-03672 6E

Conservation--Alteration of Streams.
W75-03675 6E

Ohio v. Wyandotte Chemicals Corp., Restatement of the Original Jurisdiction of the Supreme Court of the United States,
W75-03680 6E

Environmentalists Attack Administration, Industry Plans to Weaken NEPA and Set Back Recent Clean Air Gains.
W75-03687 5G

Explanatory Statement: Implementation of NPDES, (EPA).
W75-03693 5G

WATER LAW

Pollution Control Awards Program.
W75-03731 6E

WATER LEVEL FLUCTUATIONS

Regulation of Great Lakes Water Levels--Appendix G--Regulatory Works--Report to the International Joint Commission.
W75-03682 4A

WATER LEVELS

Dams.
W75-03672 6E

WATER MANAGEMENT

Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

Lands Lying Under Public Waters.
W75-03671 6E

Environmentalists Attack Administration, Industry Plans to Weaken NEPA and Set Back Recent Clean Air Gains.
W75-03687 5G

WATER MANAGEMENT (APPLIED)

Watershed Protection and Flood Prevention Program and Resource Conservation and Development Program--Proposed Water Quality Management Guidelines.
W75-03491 5G

Water Management Districts in North Dakota,
W75-03701 6E

WATER PERMITS

Water Resources (As Amended).
W75-03699 6E

WATER POLICY

On Taxation as a Pollution Control Policy,
W75-03329 5G

Water Management Districts in North Dakota,
W75-03701 6E

WATER POLLUTION

The Necessity of Zoning Variance or Amendments Notice to the Wisconsin Department of Natural Resources Under the Shoreland Zoning and Navigable Waters Protection Act,
W75-03364 6E

Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

New Legislation for Water Quality.
W75-03679 5G

Ohio v. Wyandotte Chemicals Corp., Restatement of the Original Jurisdiction of the Supreme Court of the United States,
W75-03680 6E

Environmentalists Attack Administration, Industry Plans to Weaken NEPA and Set Back Recent Clean Air Gains.
W75-03687 5G

Taxation--Exemption--Property Used for Pollution Control or Water Impoundment.
W75-03724 6E

Pollutant Spill Prevention and Control Act (As Amended).
W75-03728 6E

Water Pollution Research in Canada 1973,
W75-03770 5D

WATER POLLUTION CONTROL

Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

U.S. Checking Up on Firms' Spill-Prevention, Cleanup Plans.
W75-03373 5G

The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

Water: Its Quality Often Depends on the Forester,
W75-03589 5B

New Legislation for Water Quality.
W75-03679 5G

Agriculture's Pollution Solution for Lake Apopka,
W75-03686 5C

Water Strategy Paper Highlights EPA Policies.
W75-03691 5G

Water Program Policy Issues, (EPA Policy Directives).
W75-03692 5G

Ocean Disposal Practices and Effects (Report of Meeting Held in New York on September 26-29, 1972).
W75-03697 5G

The New Federal Water Pollution Control Law,
W75-03715 5G

Pollution Control Awards Program.
W75-03731 6E

Pollution Suction Water Sweeper,
W75-03733 5G

Rotary Skimmer,
W75-03736 5G

Protected Offshore Storage Facility,
W75-03744 5G

Oil on the Sea.
W75-03762 5C

An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

WATER POLLUTION EFFECTS

Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

Advisory Report on Health Effects of Nitrates in Water.
W75-03484 5C

Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

WATER POLLUTION SOURCES

Pollutional Aspects and Crop Yields Resulting from High Manure Applications on Soil,
W75-03310 5B

Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

People v. Oceana Terminal Corp. (Prosecution for an Oil Spill).
W75-03456 6E

Ground-Water Quality Study,
W75-03534 5B

Water: Its Quality Often Depends on the Forester,
W75-03589 5B

A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

Ground-Water Quality Modeling,
W75-03661 5B

Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

Agriculture's Pollution Solution for Lake Apopka,
W75-03686 5C

U.S. V. Colgate-Palmolive Co. (Action Charging Unlawful Discharge of Refuse Matter Into Navigable Waters),
W75-03702 6E

Committee For the Consideration of the Jones Falls Sewage System V. Train (Action Seeking Injunctive Relief Restraining the Granting of Sewer Hook-Up Permits),
W75-03710 6E

Gulf Oil Corporation, et al. v. Morton (Action for Writ of Mandamus).
W75-03721 6E

Pollutant Spill Prevention and Control Act (As Amended).
W75-03728 6E

A Study of Pollution Loadings from Urban Runoff,
W75-03772 5B

ATER POLLUTION TREATMENT
Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

ATER POTENTIAL GRADIENTS
The Nature of Water Potential Gradients in Trees, (In German),
W75-03336 2I

ATER PROPERTIES
Determination of Total Water Hardness by Conductometric Titration with Complexing Agents (Determinarea duritatii toale a apei prin titrari conductometrice cu complexoni),
W75-03604 5A

ATER PURIFICATION
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

Method of Preparing Water Purification Membranes,
W75-03756 3A

The Effects of Aluminum Sludge from Water Purification on Municipal Primary Sewage Treatment,
W75-03778 5D

TER QUALITY
Water Quality Models for Urban and Suburban Areas.
W75-03311 5B

fluence of Fertilizer Practices on Water and e Quality of the Environment (Phase II),
75-03315 5B

he Delaware Estuary System, Environmental pacts and Socio-Economic Effects,
75-03352 6G

timation Theoretic Approach to Analysis, nthesis, and Solution of Dynamic Systems, rt I,
75-03387 5D

e Delaware Estuary System, Environmental pacts and Socio-Economic Effects. Upper tuary Pollution and Transfer Relationships,
75-03440 5B

atershed Protection and Flood Prevention ogram and Resource Conservation and velopment Program--Proposed Water Quali- Management Guidelines.
75-03491 5G

cent Developments in the New Zealand ck Oyster Farming Industry (1970-72) and oblems Regarding Aquatic Pollution,
75-03516 5C

ound-Water Quality Study,
75-03534 5B

e Influence of a Paper Mill with Adjacent ating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

Great Lakes Water Quality, 1973 Annual Report to the International Joint Commission.
W75-03640 5G

Ground-Water Quality Modeling,
W75-03661 5B

New Legislation for Water Quality.
W75-03679 5G

Chemical Analyses for Water Quality - Training Manual.
W75-03785 5A

WATER QUALITY CONTROL
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

Commonwealth v. Borough of Galeton (Petition to Enforce Clean Streams Law).
W75-03465 6E

Robert E. Nilles, Inc. v. Illinois Pollution Control Bd. (Action Against Pollution Control Board for Denial of Sewerage Permits).
W75-03474 6E

Agreement Between the United States of America and Canada on Great Lakes Water Quality.
W75-03480 5G

A Program for the Future--Water and Sewer in Rural America.
W75-03488 5D

A Study: Effects of Geology and Nutrients on Water Quality Development,
W75-03539 5G

Estuaries of Oregon-Ecosystems in Crisis, Problems and Legal Solutions,
W75-03678 5G

New Legislation for Water Quality.
W75-03679 5G

Interstate Mining Compact (As Amended),
W75-03708 6E

WATER QUALITY STANDARDS
Guidelines for Land Disposal of Feedlot Lagoon Water.
W75-03306 5G

Evaluation of the Georgia Water Supply Program.
W75-03435 5F

Guidelines for Development of Criteria for Control of Ocean Waste Disposal.
W75-03632 5E

Water Program Policy Issues, (EPA Policy Directives).
W75-03692 5G

Report of Proceedings at Public Hearing Concerning the Reclassification of Various Streams in the Cape Fear (Lower Section), Lumber, Neuse and White Oak River Basins.
W75-03717 4A

WATER RESOURCE DEVELOPMENT
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

WATER RESOURCES
Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

Lands Lying Under Public Waters.
W75-03671 6E

Groundwater Use Act of 1972.
W75-03722 6E

Water Recreation Act of 1973.
W75-03726 6E

Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

WATER RESOURCES DEVELOPMENT
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

Economic Development and Water Resources Investments,
W75-03343 6B

The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

Watershed Protection and Flood Prevention Program and Resource Conservation and Development Program--Proposed Water Quality Management Guidelines.
W75-03491 5G

WATER RESOURCES INSTITUTE
Publications List of the Idaho Water Resources Research Institute.
W75-03321 10C

WATER REUSE
Purified Wastewater-The Untapped Water Resource,
W75-03337 5D

Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

WATER REUSE

Method of Preparing Water Purification Membranes,
W75-03756 3A

Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

WATER RIGHTS

Jewett v. Redwater Irrigating Association (Action for Adjudication of Water Rights).
W75-03471 6E

Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

WATER RIGHTS (NON-RIPARIANS)

Compensatory Storage,
W75-03676 6E

Jones v. Scott (Action Claiming Prescriptive Right in Public over Navigable Water).
W75-03712 6E

WATER SAMPLING

A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

WATER SHEDS (BASINS)

Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

WATER SOURCES

East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

WATER STORAGE

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

Moss Rose Manufacturing Co. v. Foster (Action for Recovery of Water Damage Caused by Seepage).
W75-03455 6E

Compensatory Storage,
W75-03676 6E

WATER STRESS

Effect of Water Stress Upon Endogenous Ethylene Levels in Vicia Faba,
W75-03841 2I

WATER STRUCTURES

Lands Lying Under Public Waters.
W75-03671 6E

WATER SUPPLY

Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Fifth Annual Report, Year Ended 30th June 1973.
W75-03432 5G

Metropolitan Water Sewerage and Drainage Board, Sydney, Eighty-Second Annual Report Year Ended June 1970.
W75-03433 5G

East Brimfield and Westville Reservoirs. Quantity and Value of Water Supply Storage. Quinebaug River--Massachusetts.
W75-03437 6D

McCall v. Presley (Seeking Mandamus for Issuance of Building Permit).
W75-03457 6E

Advisory Report on Health Effects of Nitrates in Water.
W75-03484 5C

The Sewage System of the City of Rangoon,
W75-03544 5D

Altering Alabama's History,
W75-03688 4A

WATER SUPPLY DEVELOPMENT

Purified Wastewater-The Untapped Water Resource,
W75-03337 5D

Future of Desalting is Bright but Costs Must Drop,
W75-03356 3A

WATER SUPPLY SURVEILLANCE

Evaluation of the Georgia Water Supply Program.
W75-03435 5F

WATER TEMPERATURE

Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

Calculation of Temperature Variations of Small Mountain Streams,
W75-03655 2E

WATER TREATMENT

Alum Recovery from Water and Wastewater Treatment Plant Sludges,
W75-03542 5D

Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

WATER USERS

Evaluation of the Georgia Water Supply Program.
W75-03435 5F

WATER UTILIZATION

Dams.
W75-03672 6E

Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

WATER WORKS

The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

WATER YIELD

Watershed Behavior After Forest Fire in Washington,
W75-03820 4C

WATER YIELD IMPROVEMENT

Opportunities for Watershed Management in Wyoming,
W75-03326 4D

Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

WATERSHED MANAGEMENT

Opportunities for Watershed Management in Wyoming,
W75-03326 4D

Rapid Creek Flood Hazard Analyses-(Including Inman Creek and West Fork Creek Tributaries) Bannock County, Idaho.
W75-03438 4A

Flood Hazard Analyses - City of Lisbon, Ransom County, North Dakota.
W75-03439 4A

Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

Altering Alabama's History,
W75-03688 4A

Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

WATERSHED PROTECTION AND FLOOD PREVENTION ACT

Evolution of the Small Watershed Program Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

WATERSHEDS (BASINS)

Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia) Part 1 - Climate, Geology, Soils,
W75-03530 4I

A Study: Effects of Geology and Nutrients o Water Quality Development,
W75-03539 5C

A Look at Legislation Defining Uses of Na tional Forest Lands, Part Two,
W75-03685 6

The Hydrology of a Small Catchment Basin Samaru, Nigeria: III. Assessment of Surfac Run-Off Under Varied Land Management an Vegetation Cover,
W75-03765 4

WAVE ACTION

Anti-Erosion Device,
W75-03742

WAXING

Hydration of Eastern Hemlock as Influenc by Waxing and Weather,
W75-03500

WEATHER
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500 2I

WEATHER MODIFICATION
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

WELL CONSTRUCTION
Evaluating Well Construction, (Part II),
W75-03813 5B

WELL DATA
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

WEST GERMANY (CONSTANCE)
Investigations on Aerobic Pectolytic Bacteria in an Eutrophic Lake, (In German),
W75-03538 5C

WEST GERMANY (LAKE URSEE)
Solution, Diffusion and Sorption in Upper Layer of Lake Sediments: III. Chemical and Physical Conditions in Sediment-Water Transition Zone of Meromictic BOG Late (Ursee) and its Relation to Accumulation of Vivianite, (In German),
W75-03571 5B

WET AIR OXIDATION
Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

WET WASTE TANKERS
Talking Tankers.
W75-03560 5E

WETTING FRONT
Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

WHEAT
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

WILDERNESS ACT
A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

WILDLIFE
Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

U.S. v. Cappaert (Action by U.S. to Have its Rights to Use of Appurtenant Waters Declared).
W75-03723 6E

WILLAMETTE RIVER (ORE)
The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

WIND EFFECTS
Anti-Erosion Device,
W75-03742 2J

WIND EROSION
Anti-Erosion Device,
W75-03742 2J

WINDS
Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

WINTER WHEAT
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

WISCONSIN
The Necessity of Zoning Variance or Amendments Notice to the Wisconsin Department of Natural Resources Under the Shoreland Zoning and Navigable Waters Protection Act,
W75-03364 6E

The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

Inland Lakes Protection and Rehabilitation.
W75-03730 6E

WISCONSIN (MILWAUKEE)
Chronic Fluoride Intoxication from Drinking Water: Preliminary Report,
W75-03695 5C

WOOD WASTES
Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

WOODY PLANTS
Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

WYOMING
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

Opportunities for Watershed Management in Wyoming,
W75-03326 4D

XANTHATE
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

XYLEM PRESSURE POTENTIAL
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500 2I

YAKIMA BASIN (WASH)
Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

YEASTS
Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

YUGOSLAVIA
The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

ZAMBIA (ZAMBEZI VALLEY)
Water Conservation in Three Grain Crops in the Zambezi Valley,
W75-03332 3F

ZINC
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

Effect of Potassium and Zinc Ions of Growth and Tryptophan Synthetase in Alkaloid Producing Culture of Aspergillus fumigatus,
W75-03791 5C

ZIRCALOY
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

ZIRCONIUM
Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

ZONING
The Necessity of Zoning Variance or Amendments Notice to the Wisconsin Department of Natural Resources Under the Shoreland Zoning and Navigable Waters Protection Act,
W75-03364 6E

ZOOPLANKTON
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

Investigations on the Incorporation of Different Algae by Some Zooplankton-Species, (In German),
W75-03643 5C

AUTHOR INDEX

AASE, J. K.
Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

ABRAHAMSSON, S.
An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

ABRAMOVA, L. M.
Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

ABSHIRE, R. L.
Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

ACKLEY, S. F.
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

ADAMS, A. B. JR.
Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

ADDIE, L. A.
Determination of the Size Distribution of Dissoved Organics in Effluents,
W75-03771 5D

ADELMAN, M.
Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

AKHMEDOVA, R. A.
Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters, (In Russian),
W75-03505 5C

AL-NAKSHABANDI, G. A.
Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

ALAM, M.
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

ALELENEI, N.
Determination of Total Water Hardness by Conductometric Titration with Complexing Agents (Determinarea duritatii toale a apei prin titrari conductometrice cu complexoni),
W75-03604 5A

ALEXANDER, M.
Nonbiodegradable and Other Recalcitrant Molecules,
W75-03497 5B

ALLISON, G. B.
Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

ALSAFFAR, A. M.
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659 8B

AMES, L. L.
Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

ANDERSSON, A.
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

ANTIA, N. J.
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

APLAN, F. F.
Hydrometallurgy,
W75-03793 3E

ARMSTRONG, A. E.
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

ASANA, R. D.
Physiological Analysis of the Response of Sorghum Hybrids 'CSH-1' and 'CSH-2' to Rain-Fed Cultivation,
W75-03368 3F

AUER-WELSBACH, C.
Novel Methods of Freshwater Preparation and Waste Water Purification in Pulp and Paper Mills (Neuere Methoden zur Frischwasseraufbereitung und Abwasserreinigung in Zellstoff- und Papierfakriken),
W75-03602 5D

AULD, D. A. L.
Willingness to Pay for Pollution Abatement: A Case Study,
W75-03389 5G

AULISA, G. D.
Rotary Skimmer,
W75-03736 5G

AYERS, E. K.
Water Management Districts in North Dakota,
W75-03701 6E

BAARDA, J. R.
Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

BABCOCK, W. H.
A Device for Maintaining Constant Oxygen Concentration in Flowing Water,
W75-03522 5G

BACHER, A. E.
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

BACHTIK, A.
The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

BAGGA, A. K.
Physiological Analysis of the Response of Sorghum Hybrids 'CSH-1' and 'CSH-2' to Rain-Fed Cultivation,
W75-03368 3F

BAGNALL, L. O.
Static Pressure Fractionation Characteristics of Water Hyacinth,
W75-03302 4A

BAKER, H.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

BANNISTER, P.
Response of Mycorrhizal and Nonmycorrhizal Rooted Cuttings of Heather (Calluna Vulgaris(L.) Hull) to Variations in Nutrient and Water Regimes,
W75-03842 3F

BARABANOVA, N. M.
Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

BARI, S. A.
Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

BARRAGER, S. M.
The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

BAUER, E. O.
Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

BAUERMANN, H. D.
Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

BAYLEY, S.
Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

BEADLE, C. L.
Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

BECK, R. E.
Water Management Districts in North Dakota,
W75-03701 6E

BEER, C.
High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Waste Treatment Process,
W75-03751 5D

BEERS, C.
Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

BEISE, C. J.
Compensatory Storage,
W75-03676 6E

BENDER, G. L.
Proposed Natural Areas, Salt River Salt Banks, Report No 2,
W75-03396 6B

Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

BENITEZ-A, J.
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

BERGER, D.
Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532 2G

BESZEDITS, S.
Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

BETZER, N.
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

BHARGAVA, S. K.
Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

BIRKEMOE, P. C.
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

BJORNN, T. C.
Sediment in Streams and Its Effects on Aquatic Life,
W75-03303 2J

BLANK, R. W.
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

BLISS, W. E. JR.
Protected Offshore Storage Facility,
W75-03744 5G

BLUMENTHAL, J. L.
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

BLUNT, C. G.
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

BOELENS, R. G.
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

BONIFACE, A.
System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

BORROR, A. C.
Marine Flora and Fauna of the Northeastern United States. Protozoa: Ciliophora,
W75-03787 5C

BOTTORF, R. G.
Floating Water Screen,
W75-03745 8I

BOUSFIELD, S.
Anaerobic Digestion of Organic Matter,
W75-03371 5D

BOUVENG, H. O.
Combined Chemical-Biological Treatment Studies,
W75-03383 5D

BOWERS, A. B.
Marine Fish Culture in Britain: IX. Growth of Cultured Plaice to Marketable Size in the Laboratory,
W75-03759 8I

BRAUN, H. E.
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

BREER, H.
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

BRINGFELT, B.
Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

BRINK, R. H. JR.
Slime Control Compositions and Their Use,
W75-03575 5D

BROBERG, S.
Physiological Effects of a Sublethal Concentration of Phenol in the Pike (Esox Lucius L.) in Pure Brackish Water,
W75-03507 5C

BROMLEY, L. A.
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

BROOKSBANK, P.
Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

BROUWERS, J.
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

BROWN, T. C.
Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

BROWNLIE, I.
A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

BRUCKER, C.
Process of and Installation for Purifying Sewage,
W75-03752 5D

BRUSVEN, M. A.
Sediment in Streams and Its Effects on Aquatic Life,
W75-03303 2J

BRUVOLD, W. H.
Category Versus Successive-Intervals Scales,
W75-03802 6B

BRYANT, C. B.
Aquatic Weed Harvesting Costs and Equipment--1972,
W75-03391 4A

BRYANT, P. A.
Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

BUCHANAN, C. C.
Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

BUCHET, J. P.
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

BUCKMAN, J. D.
Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

BUCKNEY, R. T.
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

BUECH, R. R.
Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

BUNDGAARD-NIELSEN, M.
A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

BYRNE, R. F.
On Taxation as a Pollution Control Policy,
W75-03329 5G

CAFRUNY, E. J.
Renal Concentration of Citrate as a Negative Modulator of Diuretic Response to Mercurials,
W75-03616 5C

CALKIN, P. E.
Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

CAMERON, D. G.
Lucerne in Wet Soils: The Effect of Stage of Regrowth, Cultivar, Air Temperature and Root Temperature,
W75-03847 2I

CAMMAROTA, V. A. JR.
Mercury,
W75-03797 6C

CAMPBELL, S. J.
Liquid Waste Treatment,
W75-03754 5D

CAMPLEMAN, C.
The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

CARTER, J. W.
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

CARTER, O. G.
Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

CHAN, G. L.
The Use of Pollutants for Aquaculture - Conditioning of Wastes for Aquaculture,
W75-03514 5D

CHAO, T. T.
Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

CHARBONNEAU, S. M.
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

CHEN, B. H. H.
Alum Recovery from Water and Wastewater Treatment Plant Sludges,
W75-03542 5D

CHENG, M-S.
On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

CHHATWAL, G. R.
Selective Determination of Iron in Alloys by Reaction with 2,3-Pyridinediol and Ring Colorimetry,
W75-03623 2K

CHIEN, Y. T.
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

CHO, P.
A Sludge Cake Incineration Process and Air Pollution Control System,
W75-03546 5D

CHU, G. C. Y.
Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

CLAIBORNE, H. C.
Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

CLARK, R. C. JR.
Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

CLAUSEN, J.
Flora of the Enterprise Radiation Forest,
W75-03406 5C

CLIFFORD, K. L.
Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

COAD, BRIAN W.
Observations on the Ecology of Lacrustrine Populations of the Threespine Stickleback (Gasterosteus Aculeatus L., 1758) in the Matamek River System, Quebec,
W75-03625 5C

COCHRAN, J. O.
A Device for Maintaining Constant Oxygen Concentration in Flowing Water,
W75-03522 5G

COLBECK, S. C.
A Study of Glacier Flow for an Open-Pit Mine: An Exercise in Applied Glaciology,
W75-03663 2C

COLLINS, D. C.
The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

COMODO, N.
Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

COOK, E.
Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

COPP, H. D.
Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

CORNWALL, G. M.
Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

CORRAL, F. J.
Static Pressure Fractionation Characteristics of Water Hyacinth,
W75-03302 4A

COSTA, H.
A Review of Turbidity Removal Associated With Biological Treatment of Paper Mill Wastewaters,
W75-03574 5D

COUSINS, A. G.
Treatment of Sewage,
W75-03746 5D

COUTINHO, A. B.
Snail Population in Running Water,
W75-03803 2I

COUTINHO, F. A. B.
Snail Population in Running Water,
W75-03803 2I

COWEN, W. F.
Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

CROOM, H. C.
Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

CROSS, O. E.
Pollutional Aspects and Crop Yields Resulting from High Manure Applications on Soil,
W75-03310 5B

CROW, T. R.
Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

CULP, G. L.
State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

CURTIN, L.
Recent Developments in the New Zealand Rock Oyster Farming Industry (1970-72) and Problems Regarding Aquatic Pollution,
W75-03516 5C

DAL PORTO, D. F.
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

DALY, M. P.
Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

DANNER, R. M.
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

DAPPEN, G.
Pesticide Analysis from Urban Storm Runoff,
W75-03312 5A

DATTA, A. K.
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

DAULAY, H. S.
Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

DAVEY, J.
Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

DAVIS, E. A.
Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

DAVIS, E. M.
Disinfection,
W75-03369 5D

DAVIS, R. E.
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

DAY, D. C.
Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

DAY, J. W.
The 'Shock Absorber' System of Wastewater Treatment,
W75-03584 5D

DE CLERCK, R.
Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

DE ROO, H. C.
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500 2I

DEAL, M. E.
Environmental Law--Oil Pollution Control--in the Absence of Federal Preemption and Any Fatal Conflict Between Statutory Schemes, a State May Constitutionally Exercise its Police Power to Provide for Cleanup of Oil Spillage and for Recoupement of Costs Concurrently With the Federal Government,
W75-03365 5G

DEERE, D. U.
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

DEMORY, D.
1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

DENBOEF, G.
Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

DEROUANE, A.
Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

DESHMUKH, V. S.
Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

DHAESE, A.
Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

DI BELLO, C.
Rotating Filter for Wastewater Biological Purification,
W75-03747 5D

DILLINGER, A. E.
Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

DILLON, P. J.
A Critical Review of Vollenweider's Nutrient Budget Model and Other Related Models,
W75-03761 5C

DIPERNA, J.
Pollution Suction Water Sweeper,
W75-03733 5G

DITMARS, J. D.
Mixing and Transport, (Literature Review),
W75-03554 5B

DOUGLAS, C. W.
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

DRUCKER, P.
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

DUBA, A. G.
Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

DUBOIS, E. M. R.
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

DULL, D. L.
Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

DUNAN, G. V. R.
Beach-Protectors,
W75-03748 2J

DUVAL, L. A.
Method and Apparatus for Processing Waste Water Slimes of Steel Mill Water Treatment Systems,
W75-03740 5D

EATON, J. G.
Chronic Cadmium Toxicity to the Bluegill (Lepomis Macrochirus Rafinesque),
W75-03511 5C

ECCLES, D. H.
An Outline of the Physical Limnology of Lake Malawi (Lake Nyasa),
W75-03660 2H

EDDE, H.
Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

EDWIN, J. B.
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

EL-BELTAGY, A. S.
Effect of Water Stress Upon Endogenous Ethylene Levels in Vicia Faba,
W75-03841 2I

ELLIOTT, R. D.
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

ELWELL, H. A.
Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

EMERY, K. A.
Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

ENGLAND, J.
Advance of the Greenland Ice Sheet on to North-Eastern Ellesmere Island,
W75-03645 2C

ENGLISH, J. M.
Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

ERBISCH, F. H.
Lichens of the Enterprise Radiation Forest,
W75-03405 5C

ERICKSON, L. E.
Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

ERMERT, U.
Membranes and Modules for the Water Desalination with Reverse Osmosis (Membranen und Module fur die Wasserentslzung mit Umgekehrter Osmose),
W75-03384 3A

ERNST, W.
Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

ESELBOCK, G. W. L.
Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

EVANS, H.
Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

FAIRWEATHER, V.
Sewer Pipe: Infiltration is the Issue,
W75-03548 5D

FAN, L. T.
Experimental Optimization of a Step Aeration Waste Treatment Process,
W75-03322 5D

FARMER, R. C.
Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

FARQUHAR, G. J.
Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

FARRELL, R. P. JR.
Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

FAWCETT, R. G.
Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

FERGUSON, D. R.
Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

FERGUSON, K. J.
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

FFOLLIOTT, P. F.
Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

FIELD, R.
Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

FILION, L.
Snow-Vegetation Relationships in the Forest Tundra of Nouveau-Quebec, Hudson Bay, (In French),
W75-03849 2I

FINLEY, J. S.
Tidal Aquarium for Laboratory Studies of Environmental Effects on Marine Organisms,
W75-03521 5C

FISHER, J. L.
Population Growth, Resource Availability and Environmental Quality,
W75-03331 6B

FISHER, M. J.
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

FLETCHER, J. C.
Method of Preparing Water Purification Membranes,
W75-03756 3A

FOKIN, P. S.
Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

FOLSOM, T. C.
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

FOREE, E.
Aerobic Biological Stabilization of Sanitary Landfill Leachate,
W75-03564 5D

FOSTER, P.
Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

FOWLIE, P. J. A.
A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

FRANK, R.
Organochlorine Insecticide Residues in Sediment and Fish Tissues, Ontario, Canada,
W75-03495 5C

FULLERTON, R. W.
Waterless Sanitation for Rest Areas,
W75-03370 5D

GAJMERAC, W. L.
Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

GAMBOA-G, B. R.
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

GANCZARCZYK, J.
A Performance Study of Aerobic Sludge Digestion,
W75-03773 5D

GARCIA, A. J.
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

GARDNER, N. R.
Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

GARY, H. L.
Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

GASNER, L. L.
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

GAUMER, T.
1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

GAVISH, U.
Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

GELHAR, L. W.
Ground-Water Quality Modeling,
W75-03661 5B

GERA, F.
Potential Containment Failure Mechanisms and Their Consequences at a Radioactive Waste Repository in Bedded Salt in New Mexico,
W75-03425 5B

GERDING, T. J.
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

GHARE, M. M.
Physiological Analysis of the Response of Sorghum Hybrids 'CSH-1' and 'CSH-2' to Rain-Fed Cultivation,
W75-03368 3F

GILBERT, C. K.
The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

GILLETTE, F. L. JR.
Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

GILLS, T. E.
Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

GLASCOCK, M.
Factors Influencing Participation in Recreation Activities in Southeast Iowa, and Camper Attendance at Macbride State Park,
W75-03317 6B

GLOETEL, R.
Investigations About Population Dynamics and Nutritional Aspects on the Simulid-Larvae of a Mountain Stream Polluted by Organic Waste Water, (In German),
W75-03479 5B

GOERKE, H.
Accumulation, Distribution, Transformation and Elimination of DDT-14C in Solea Solea (Pisces: Soleidae), (In German),
W75-03494 5C

GOODMAN, G. T.
Ecology and the Problem of Rehabilitating Wastes from Mineral Extraction,
W75-03626 5G

GOODSELL, L. J.
Great Lakes-St. Lawrence Seaway System and the Mid-Continent Economy,
W75-03394 6B

GOPAL, R.
Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

GOSSE, L. E.
Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

GOSSELINK, P. G.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects,
W75-03352 6G

GOULDEN, P. D.
Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

GRAHAM, L. K.
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

GRANT, M. J.
Perspectives on Coastal Management--Marine Trades and the Coastal Crisis,
W75-03458 6B

GREGORY, S.
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

GREWAL, S. S.
Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

GRUBER, G. I.
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

GRUIA, L.
Observations on the Nutrition of Larvae of Chironomus f.l. Plumosus in the Waters of the Danube Flood Area, (In Romanian),
W75-03827 2I

GUEDE, H.
Investigations on Aerobic Pectolytic Bacteria in an Eutrophic Lake, (In German),
W75-03538 5C

GUERRA, M.
Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

GUPTA, A. R.
Effect of Potassium and Zinc Ions of Growth and Tryptophan Synthetase in Alkaloid Producing Culture of Aspergillus fumigatus,
W75-03791 5C

GUYMON, G. L.
Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

HABAS, E. J.
The Economic Effects of the 1971 Florida Red Tide and the Damage it Presages for Future Occurrences,
W75-03393 5G

HACKBART, M.
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

HAGIWARA, K.
Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

HAIMES, Y. Y.
Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

HALL, M. A.
Effect of Water Stress Upon Endogenous Ethylene Levels in Vicia Faba,
W75-03841 2I

HALLETT, J.
Nucleation and Growth of Bubbles at an Ice-Water Interface,
W75-03648 2C

HANDIN, L.
Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

HANNAFORD, J. F.
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

HANS, J. M. JR.
Evacuation Risks - An Evaluation,
W75-03424 6G

HARDJAMULIA, A.
Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

HARMS, R. H.
The Effect of Incorporating Hen Manure into the Diet of Young Chicks,
W75-03814 5D

HARRIS, C.
Autumn, Winter and Spring Soil Temperatures in Okstindan, Norway,
W75-03665 2C

HARSMAR, P-O.
Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

HARTT, J. P.
A Study of Pollution Loadings from Urban Runoff,
W75-03772 5B

HARVEY, R. S.
Temperature Effects on Growth and Respiration Rates of Dolania Americana (Ephemeroptera),
W75-03510 5C

HASEBE, S.
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

HASTING, A. P. M.
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

HATCHER, H. J.
Slime Control in Industrial Waters,
W75-03594 5D

HAY, W. C.
Waste Water Purification System,
W75-03755 5D

HAZELSWATTS, D. E.
Lime Sludge: Some Problems--Some Solutions,
W75-03378 5D

HEALY, T.
Electric Energy Requirements for Environmental Protection,
W75-03399 6D

HEARD, H. C.
Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

HECKROTH, C. W.
Future of Desalting is Bright but Costs Must Drop,
W75-03356 3A

HECKTOR, E. S.
Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

HELVEY, J. D.
Watershed Behavior After Forest Fire in Washington,
W75-03820 4C

HENDERSON, D. W.
Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

HENRY, H. P.
Coastal Zone Management in Maine: A Legal Perspective,
W75-03689 6E

HERFORT-MICHIELI, T.
The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

HIBBERT, A. R.
Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

HIBLER, W. D. III
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

Differential Sea-Ice Drift. II. Comparison of Mesoscale Strain Measurements to Linear Drift Theory Predictions,
W75-03650 2C

HIGGINS, D. T.
Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

HILL, R. D.
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

HIMMELBLAU, D. M.
A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

HIRST, E.
Electric Energy Requirements for Environmental Protection,
W75-03399 6D

HOBSON, P. N.
Anaerobic Digestion of Organic Matter,
W75-03371 5D

HODGE, S. M.
Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

HOGG, K. S.
A Performance Study of Aerobic Sludge Digestion,
W75-03773 5D

HOLLAHAN, J. R.
Method of Preparing Water Purification Membranes,
W75-03756 3A

HONG, S. G.
Effects of Thinning on Needle Water Potential in Red Pine,
W75-03499 2I

HONISCH, O.
Water Conservation in Three Grain Crops in the Zambezi Valley,
W75-03332 3F

HOROWITZ, A.
The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

HORTOBAGYI, T.
The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

HOSKING, A. D.
Monitoring of Earth-Rock Dams,
W75-03533 8D

HOULT, D. P.
Effects of Oil Under Sea Ice,
W75-03646 2C

HOWE, E. D.
Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

HOYLAND, G.
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

HSU, D. Y.
Disposal of Alum Sludge to the Existing Activated Sludge Wastewater Treatment Plant,
W75-03774 5D

HSU, Y. T.
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

HUANG, Y-W.
Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

HUDGINS, R. R.
Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

HUNDLEY, N. JR.
Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

HUNT, C. H.
Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

HUTCHINSON, A. J. L.
Power Generation From Hot Brines,
W75-03737 4B

HUTCHINSON, T. C.
Comparative Studies of the Toxicity of Heavy Metals to Phytoplankton and Their Synergistic Interactions,
W75-03775 5C

Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

IGLIC, B.
The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

IGNAT, G.
Observations on the Nutrition of Larvae of Chironomus f.l. Plumosus in the Waters of the Danube Flood Area, (In Romanian),
W75-03827 2I

IKAWA, M.
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

INFANTE, A.
Investigations on the Incorporation of Different Algae by Some Zooplankton-Species, (In German),
W75-03643 5C

IPSEN, H. W.
Enforcement Under the Federal Water Pollution Control Act Amendments of 1972,
W75-03824 5G

ISTOSHIM, B. YW.
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

IVANOVA, V. P.
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

IWATA, Y.
Environmental Pollution in a Rapidly Growing Economy,
W75-03353 6G

JACK, M. E.
Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

JENG, S. S.
Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

JEPPSON, R. W.
Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

JERIS, J. S.
High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Waste Treatment Process,
W75-03751 5D

JOHNS, G. G.
Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

JONES, E. E. JR.
Evaluating Well Construction, (Part II),
W75-03813 5B

JONES, G. B.
Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

KALITSUN, V. I.
Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

KALTER, R. J.
Distributional Impacts of Environmental Management: Federal Grants for Water Pollution Control,
W75-03354 5G

KANGAS, P. M.
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

KANIA, H. J.
Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

KARNAS, J.
Mechanical Reef,
W75-03738 2J

KARSCHON, R.
Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

KASSAM, A. H.
A simple Device for Analyzing the Energy Load and Intensity of Rainstorms,
W75-03838 2B

KAWAMOTO, P. Y.
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

KAY, B. H.
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

KELTON, P.
Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

KENMUIR, D. H. S.
Observations on a Breeding Pair of Tilapia Rendalli Rendalli Boulenger 1896 in an Experi-

KENMUIR, D. H. S.

mental Tank at Lake Kariba Fisheries Research Institute,
W75-03501 8I

KENNEDY, D. C.
Decolorizing Dye Wastes,
W75-03608 5D

KERNER, J. W.
Decolorizing Dye Wastes,
W75-03608 5D

KETKAR, C. M.
Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

KHAMBATTA, S. J.
Mill Effluent and its Utilisation for Crop Cultivation Purposes,
W75-03585 5D

KHAN, A. M.
Population Dynamics of Hoplolaimus Sp. at Various Levels of Soil Moisture,
W75-03832 5C

KHAN, RASHID A.
Food Selection by Labeorohita (Ham.) and Its Feeding Relationship with Other Major Carps,
W75-03496 8I

KHASANOV, YU U.
Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters, (In Russian),
W75-03505 5C

KIEKENS, L.
Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

KIJEWSKI, W.
A simple Device for Analyzing the Energy Load and Intensity of Rainstorms,
W75-03838 2B

KIJNE, J. W.
Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

KIMURA, Y.
Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

KIPP, K. L.
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

KJELLSTROM, T.
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

KLAWE, W. L.
Mercury in Tunas: A Review,
W75-03622 5C

KLOCK, G. O.
Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

KOBAYASHI, H.
Liquid Waste Treatment Method Using Microorganism as Adsorbent (Biseibutsu o kyuchakuzai to shita haisui shoriho),
W75-03367 5D

KOEPPNER, T.
Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

KOERS, A. W.
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

KOIRTYOHANN, S. R.
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

KONTINGSBERGER, R. M.
Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

KOSOVER, V. M.
Removal of Arsenic From Effluent Sludges of Sulfate and of Pulp and Paper Production (Udalenie mysh'yaka iz shlamov sernokislotnogo i tsellyulozno-bumazhnogo proizvodstva),
W75-03568 5D

KOTT, Y.
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

KOVACS, A.
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

KOWAL, J.
The Hydrology of a Small Catchment Basin at Samaru, Nigeria: III. Assessment of Surface Run-Off Under Varied Land Management and Vegetation Cover,
W75-03765 4A

KOWAL, J. M.
A simple Device for Analyzing the Energy Load and Intensity of Rainstorms,
W75-03838 2B

KRAUTER, K.
Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

KRECH, U.
Epidemiologic Relationships Between Human and Animal Salmonella Carriers and Their Environment in the Swiss Region of the Lake of Constance, (In German),
W75-03330 5C

KRENKEL, P. A.
Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

KRISTENSEN, K. J.
Actual Evapotranspiration in Relation to Leaf Area,
W75-03653 2D

KRISTOFFERSSON, R.
Physiological Effects of a Sublethal Concentration of Phenol in the Pike (Esox Lucius L.) in Pure Brackish Water,
W75-03507 5C

KRUMHOLZ, L. A.
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

KRUPKA, M. C.
Selected Physicochemical Properties of Basaltic Rocks, Liquids, and Glasses,
W75-03419 8H

KRZECZKOWSKA-WOLOSZYN, L.
The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

KUGA, K.
The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

KUIPER-GOODMAN, T.
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

KULLEN, B. J.
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

KUNKLE, S. H.
Water: Its Quality Often Depends on the Forester,
W75-03589 5B

KUSUMADINATA, S.
Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
W75-03515 5C

LAFLEUR, P. D.
Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

LAIRD, A.
New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

LAL, PYARE
Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

LAMBERTON, B. A.
Reinforced Mattress for Protecting Shorelines and the Like,
W75-03749 2J

LAMY, J. E.
Anti-Heave Protective System,
W75-03732 8E

LANDYMORE, A. F.
Physiological and Ecological Significance of the Chemical Instability of the Uric Acid and Related Purines in Sea Water and Marine Algal Culture Medium,
W75-03512 5C

LANGE, B.
The Sphagnum Flora of Hot Springs in Iceland,
W75-03526 2I

LANGE, K. R.
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

LANGSFORD, G. L.
Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

LARSON, F. R.
Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

LAUWERYS, R. R.
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

LAVY, T. L.
Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

LAZENBY, A.
Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

LEA, D. M.
Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

LECH, J. F.
Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

LECHNER, T. G.
Slime Control in Industrial Waters,
W75-03594 5D

LECOMPTE, A. R. JR.
Ejector Aerated Oxidation Ditch for Waste Treatment,
W75-03753 5D

LEDUC, J. W.
Distribution of Potential Mosquito Vectors in the Imperial Valley, California, 1971-1972,
W75-03498 5G

LEE, G. F.
Algal Nutrient Limitation in Lake Ontario and Tributary Waters,
W75-03757 5C

Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

LEE, S. D.
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

LEE, T.
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

LEIBOVITZ, J.
New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

LENZI, F.
On the Choice of Methods for the Prediction of the Water-Activity and Activity Coefficient for Multicomponent Aqueous Solutions,
W75-03540 2K

LESLIE, M. E.
Peat: New Medium for Treating Dye House Effluent,
W75-03577 5D

LEVITZ, N. M.
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

LI, Y-H,
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

LILLELUND, V. K.
Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

LINCOLN, R. M.
Method of Bleaching Wood Pulp,
W75-03562 5D

LIND, B.
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

LINGLE, W. B.
Altering Alabama's History,
W75-03688 4A

LINNMAN, L.
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

LIOR, N.
New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

LIVINGSTON, D. P.
Powered Mobile Spray Irrigation for Productive Crop Sewage Utilization,
W75-03743 5D

LLIBOUTRY, L.
Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

LLOYD, D. K.
Ohio v. Wyandotte Chemicals Corp., Restatement of the Original Jurisdiction of the Supreme Court of the United States,
W75-03680 6E

LOCKERETZ, W.
On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

LONG, G.
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

LONG, H. G.
Sewage Treatment System,
W75-03563 5D

LONG, V. E.
Sewage Treatment System,
W75-03563 5D

LOUSIER, J. D.
Effects of Experimental Soil Moisture Fluctuations on Turnover Rates of Testacea,
W75-03681 2G

LUNA-MUNOZ, J.
Financing Resources for Fishery Development,
W75-03339 6C

LUTHIN, J. N.
Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

LYNCH, G. P.
Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

MACKENZIE, W. C.
Reconciling Conflicts Among Different Economic Interest Groups in the Management of Fisheries,
W75-03392 6B

MANNBRO, N. V.
Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

MARCHANT, W. N.
Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

MARKING, L. L.
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

MASOOD, S.
Population Dynamics of Hoplolaimus Sp. at Various Levels of Soil Moisture,
W75-03832 5C

MATHUR, P. K.
Gravimetric Estimation of Silver as Diamminesilver (I) Tetraisothiocyanatodianilinechromate (III),
W75-03790 5A

MATLACK, G. M.
The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

MATTSON, C. D.
Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

MCALLUM, W.
Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

MCAULIFFE, C. D.
Oil-In-Water Emulsions and Their Flow Properties in Porous Media,
W75-03812 8B

MCDUFF, C. R.
Slime Control in Industrial Waters,
W75-03594 5D

MCGHEE, T. J.
Practical Treatment of Feedlot Runoff,
W75-03313 5D

Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

MCINTOSH, G. H.
Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
W75-03529 3C

MCMILLAN, L.
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

MCNAUGHTON, S. J.
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

MEARNS, A. J.
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

MEERS, R.
Mercury Levels in Fishes from Some Missouri Lakes With and Without Known Mercury Pollution,
W75-03323 5B

MEHRA, I. C.
Selective Determination of Iron in Alloys by Reaction with 2,3-Pyridinediol and Ring Colorimetry,
W75-03623 2K

MEISEL, W. S.
The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

MESZAROS, E.
On the Spring Maximum of the Concentration of Trace Constituents in Atmospheric Precipitation,
W75-03621 5B

MEYERS, J. A.
Method of Bleaching Wood Pulp,
W75-03562 5D

MIKHALITSYNA, E. V.
Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

MILLER, V. L.
Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

MINEAR, R. A.
Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

MISRA, D. K.
Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

MISRA, P. K.
Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part I,
W75-03387 5D

Estimation Theoretic Approach to Analysis, Synthesis, and Solution of Dynamic Systems, Part II,
W75-03388 5D

MOESSNER, K. E.
Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

MOLENKAMP, C. R.
A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

MOLNAU, M.
Sediment in Streams and Its Effects on Aquatic Life,
W75-03303 2J

MOLODTSOV, N. K.
Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

MOORE, J. D.
Disinfection,
W75-03369 5D

MOORE, J. E.
Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

MOORE, W. JR.
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

MORGAN, R. N. C.
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland, Australia,
W75-03836 5G

MOROZOV, M. F.
Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

MOURLON, J.
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

MUDD, R. D.
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

MUELLER, J. A.
High Rate Biological Denitrification Using a Granular Fluidized Bed,
W75-03382 5D

Waste Treatment Process,
W75-03751 5D

MUIR, J. D.
Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

MULBARGER, M. C.
The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

MULDER, B. J.
The Opening Up of Insoluble Oxides (Tantalum, Niobium, Chromium, Aluminium, and Others), With Liquid Selenium Dioxide,
W75-03614 5A

MUNRO, I. C.
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

MURAKAMI, Y.
Treatment of Waste-Water Containing Surface Active Substances, (In Japanese),
W75-03376 5D

MURPHY, A. J.
Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

MURPHY, K. L.
Determination of the Size Distribution of Dissoved Organics in Effluents,
W75-03771 5D

MURPHY, L. S.
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

MURPHY, P. G.
Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

MURPHY, T. J.
Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

MURTHY, M. S.
Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

MUSTATA, L.
The Problem of Determining the Maximum Storm Runoff Yield in Small Rivers (In problema determinarii debitelor maxime din ploi pe riuri mici),
W75-03535 2A

NEAL, R. A.
Alternatives in Aquacultural Development: Consideration of Extensive Versus Intensive Methods,
W75-03398 6B

NEFF, S. E.
Changes in the Economy and Ecology at Proposed Lake Sites in the Salt River Basin, Kentucky, During Early Construction of the Dam for Taylorsville Lake,
W75-03309 5C

NELSON, G. B.
The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

NELSON, R. L.
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

NERA, E. A.
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

NESTELL, C.
An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

NETZER, A.
Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

NEUMANN, H. H.
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

NICHOLSON, M. M.
Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

NIGROVIC, V.
Renal Concentration of Citrate as a Negative Modulator of Diuretic Response to Mercurials,
W75-03616 5C

NILSSON, K. O.
Cadmium Uptake by Wheat from Sewage Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic Absorption and Neutron Activation Analysis,
W75-03503 5A

NOBE, K.
Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

NORMAN, J. D.
Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

NORTHCOTE, T. G.
Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

NORTON, W. M.
Response of Mycorrhizal and Nonmycorrhizal Rooted Cuttings of Heather (Calluna Vulgaris(L.) Hull) to Variations in Nutrient and Water Regimes,
W75-03842 3F

NOVAK, J. T.
Temperature-Substrate Interactions in Biological Treatment,
W75-03445 5D

NUNEZ, W. J.
Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

O'BLENIS, J. D.
The Effects of Aluminum Sludge from Water Purification on Municipal Primary Sewage Treatment,
W75-03778 5D

O'CONNELL, P. F.
Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

O'HARA, J.
Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

ODEGARD, H. P.
The Planning Audit: A Framework with Particular References to River Basin Planning,
W75-03525 6B

ODUM, H. T.
Energy Evaluation of Water Management Alternatives in the Upper St. Johns River Basin of Florida,
W75-03436 6A

OIKARI, A.
Physiological Effects of a Sublethal Concentration of Phenol in the Pike (Esox Lucius L.) in Pure Brackish Water,
W75-03507 5C

OKI, S.
The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

OKUDA, T.
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

OLRIK, K.
Phytoplankton Which are Pollution Indicators in Lakes, (In Swedish),
W75-03828 5B

OLSON, R. A.
Influence of Fertilizer Practices on Water and the Quality of the Environment (Phase II),
W75-03315 5B

ONUSKA, F. I.
Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

ORVINI, E.
Method for Determination of Selenium, Arsenic, Zinc, Cadmium, and Mercury in Environmental Matrices by Neutron Activation Analysis,
W75-03792 5A

OSGOOD, J. O.
Hydrocarbon Dispersion in Ground Water: Significance and Characteristics,
W75-03662 5B

OSIS, L.
1971 Alsea River Estuary Resource Use Study,
W75-03346 6C

1971 Salmon River Estuary Resource Use Study,
W75-03344 6C

1971 Sand Lake Estuary Resource Use Study,
W75-03345 6C

OTTINGER, R. S.
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

OUZILLEAU, J.
Snow-Vegetation Relationships in the Forest Tundra of Nouveau-Quebec, Hudson Bay, (In French),
W75-03849 2I

PAGON, S.
Epidemiologic Relationships Between Human and Animal Salmonella Carriers and Their Environment in the Swiss Region of the Lake of Constance, (In German),
W75-03330 5C

PANDEYA, S. C.
Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

PANDYA, S. M.
Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

PARK, F.
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

PARKER, H. W.
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

PARKER, R. O.
Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

PATTERSON, J. H.
The Dissolution of Pu-238 in Environmental and Biological Systems,
W75-03431 5B

PATTERSON, R. K.
Upflow Filtration Improves Oxidation Pond Effluent,
W75-03377 5D

PAUL, M. A.
Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

PAULSON, W. L.
Comparison of Completely Mixed and Plug Flow Biological Systems,
W75-03381 5D

PAYETTE, S.
Snow-Vegetation Relationships in the Forest Tundra of Nouveau-Quebec, Hudson Bay, (In French),
W75-03849 2I

PECK, R. B.
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

PEMRICK, S. M.
Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

PERA, J. D.
Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

PESTRONG, R.
Unnatural Shoreline,
W75-03459 5G

PETERSON, C. L.
Mercury in Tunas: A Review,
W75-03622 5C

PETRABORG, H. T.
Chronic Fluoride Intoxication from Drinking Water: Preliminary Report,
W75-03695 5C

PICKETT, E.
Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

PILLAY, T. V. R.
The Role of Aquaculture in Fishery Development and Management,
W75-03355 6C

PIPER, D. Z.
Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

PITTS, D. E.
Measurement of Atmospheric Precipitable Water Using a Solar Radiometer,
W75-03638 2B

PODLSKIY, YE. M.
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

PODOLICK, P. A.
Determining an Equitable Surcharge for Industrial Wastes,
W75-03397 5G

POFALI, R. M.
Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

POI, D. C.
Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532 2G

POLISHCHUK, L. R.
Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

POLLARD, D. A.
The Biology of a Landlocked Form of the Normally Catadromous Salmoniform Fish Galaxias Maculatus (Jonyns): V. Composition of the Diet,
W75-03597 2H

POTTER, B. J.
Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
W75-03529 3C

Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

POWER, G.
Observations on the Ecology of Lacrustrine Populations of the Threespine Stickleback (Gasterosteus Aculeatus L., 1758) in the Matamek River System, Quebec,
W75-03625 5C

PRICE, C.
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

PROCHASKA, F. J.
Regulatory Management Programs for Florida Marine Fishermen,
W75-03487 6E

PROCTOR, D. E.
Dairy Manure Management Methods,
W75-03636 5D

PRUDEN, B. B.
Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

PUGH, O.
Desalination - New Water for Old (Entsalzung-Frischwasserversorgung und Abwasseraufbereitung),
W75-03385 5D

PURDY, W. C.
Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

QUIMPO, R. G.
On the Variability of Seasonal Parameters in Hydrologic Time Series,
W75-03658 2E

RAHMANN, H.
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

RAI, H.
Limnological Studies on the River Yamuna at Delhi, India. Part II. The Dynamics of Potamoplankton Populations in the River Yamuna,
W75-03784 5C

RAISCH, J. W.
Enforcement Under the Federal Water Pollution Control Act Amendments of 1972,
W75-03824 5G

RAO, K. K.
Effect of Potassium and Zinc Ions of Growth and Tryptophan Synthetase in Alkaloid Producing Culture of Aspergillus fumigatus,
W75-03791 5C

RAO, M. N.
New Concepts for Clarification of Water Using Some Alternatives to Alum,
W75-03374 5D

RAO, T. R.
Influence of Salinity on the Eggs and Larvae of the California Killifish Fundulus Parvipinnis,
W75-03334 5C

RAPP, R. R.
Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

RAY, P.
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

RAYMOND, R. L.
Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

READ, S. M.
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

RECHARD, P. A.
Opportunities for Watershed Management in Wyoming,
W75-03326 4D

REEVES, E. B.
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

REID, R.
A Look at Legislation Defining Uses of National Forest Lands, Part Two,
W75-03685 6E

REIMERS, R. S.
Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

REITZE, A. W. JR.
The New Federal Water Pollution Control Law,
W75-03715 5G

REITZE, G.
The New Federal Water Pollution Control Law,
W75-03715 5G

RIBAKOFF, S. B.
Hawaii's Floating City Development Program. Construction Site Selection,
W75-03443 8A

RICHTER, H.
The Nature of Water Potential Gradients in Trees, (In German),
W75-03336 2I

RIDGEWAY, D. G.
How Do You Explain the Cost,
W75-03333 6C

RIDKER, R. G.
Population Growth, Resource Availability and Environmental Quality,
W75-03331 6B

RISHEL, J. B.
Packaged Pumping Stations for Suburban Water Distribution,
W75-03451 5F

RITTER, L. E.
Determining an Equitable Surcharge for Industrial Wastes,
W75-03397 5G

ROBERTSON, J. L.
Determination of the Size Distribution of Dissoved Organics in Effluents,
W75-03771 5D

ROBINSON, K.
The Use of Aerobic Processes for the Stabilization of Animal Wastes,
W75-03555 5D

ROBLES DE IRIZARRY, E.
Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

ROELS, H. A.
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

ROGNERUD, B.
The Effect of Shelter Belts and Irrigation on Water Use in a Dry Region,
W75-03652 3F

ROHM, T. J.
Kinetic-Coulometric Determination of Mercury in Biological Samples,
W75-03627 5A

ROLFE, O. E.
Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

ROTTENBURG, W.
Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

ROUTSON, R. C.
Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

ROZE, N.
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

RUCKER, R. R.
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

RUDOLPH, T. D.
The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

RUSH, R. J.
A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

SAAD, N. M.
Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

SAEED, M.
Population Dynamics of Hoplolaimus Sp. at Various Levels of Soil Moisture,
W75-03832 5C

SAGER, P. H. JR.
Multistage Flash Distillation,
W75-03739 3A

SAKSENA, V. P.
Dissolved Oxygen Requirements of Newly-Hatched Larvae of the Striped Blenny (Chasmodes Bosuianus), the Naked Goby (Gobiosoma Bosci), and the Skilletfish (Gobiesox Strumosus),
W75-03519 5C

SAKUDA, H. M.
Commercial Oyster Fishery Development Investigation,
W75-03350 6C

SALAS-LA CRUZ, J. D.
Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

SALMONSON, B. J.
Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

SANDS, D. C.
Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

SANGSTER, J.
On the Choice of Methods for the Prediction of the Water-Activity and Activity Coefficient for Multicomponent Aqueous Solutions,
W75-03540 2K

SANKS, R. L.
Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

SANTOR, M. L.
Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

SANTY, M. J.
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

SANZOLONE, R. F.
Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

SARGENT, J. W.
Light-Energized Oxidation of Organic Wastes,
W75-03578 5D

SASNER, J. J. JR.
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

SATO, H.
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

SAUBENOVA, O. G.
Effect of Biotic and Abiotic Factors on the Toxicity of Entobacterin for Larvae of Blood-Sucking Mosquitoes and Biting Midges, (In Russian),
W75-03845 5C

SAWYER, P. J.
Purification of Aphanizomenon flos-aquae Toxin and Its Chemical and Physiological Properties,
W75-03324 5C

SCHELL, S. R.
Estuaries of Oregon-Ecosystems in Crisis, Problems and Legal Solutions,
W75-03678 5G

SCHERLER, A.
Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

SCHILLER, G.
Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

SCHNEIDERMAN, S.
Gas Chromatography of Volatile Metal Chelates: Application of a New Technique to Metal Analysis in Natural Waters,
W75-03305 5A

SCHOLL, D. G.
Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

SCHOTT, C. D.
The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

SCHULTZ, D. P.
Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

SCOTT, R. B.
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

SEBASTIAN, F. P.
Purified Wastewater-The Untapped Water Resource,
W75-03337 5D

SEBBAS-BERGSTROM, E.
Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

SELL, T. C.
Evacuation Risks - An Evaluation,
W75-03424 6G

SEMPLE, R. M.
Testing and Evaluation of Prototype Tunnel Support Systems,
W75-03644 8F

SERNE, R. J.
Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

SHAFFER, R. W.
Twelve Basin Investigation: Analysis of Potential Increases in Precipitation and Streamflow Resulting from Modification of Cold Orographic Clouds in Selected River Basins of the Western United States. Volume 2,
W75-03639 3B

SHANNON, E. E.
A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

SHARITZ, R. R.
Leaf-Litter Production in the Aspen and Maple-Birch Forest Types and the Contribution by Individual Tree Species,
W75-03412 5C

Properties of the Tree Flora in the Forest Transition from Aspen to Maple-Birch Type,
W75-03409 5C

SHARMA, K. C.
Productivity in Dwarf Wheats in a Silt-Loam Soil as Influenced by Soil-Moisture Regimes and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

SHARP, F. H.
Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

SHARP, G. D.
Mercury in Tunas: A Review,
W75-03622 5C

SHARP, J. J.
Boundary Effects on Dilution of Buoyant Jets,
W75-03780 8B

SHEMA, B. F.
Slime Control Compositions and Their Use,
W75-03575 5D

SHENDE, N. K.
Study of Drainage Patterns in the Mahanadi Catchment (Above Hirakud Dam),
W75-03835 4D

SHENDRIKAR, A. D.
A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

SHERWOOD, M.
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

SIDDIQUI, A. QAYYUM
Food Selection by Labeorohita (Ham.) and Its Feeding Relationship with Other Major Carps,
W75-03496 8I

SIDDOWAY, F. H.
Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

SIEMER, D.
Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

SILVESTON, P. L.
Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

SILVEY, J. K. G.
Bacteriology of Chlorinated and Unchlorinated Wastewater Effluents,
W75-03366 5D

SINCLAIR, G. D.
Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

SINGH, D.
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

SINGH, G. P.
The Sewage System of the City of Rangoon,
W75-03544 5D

SINGH, N. T.
Effect of Organic Mulches on the Hydrothermal Regime of Soil and Growth of Potato Crop in Northern India,
W75-03837 3F

SINGH, S. D.
Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

SIONIT, N.
Changes in Stem Diameter of Herbaceous and Woody Plants as a Measure of Internal Water Balance,
W75-03840 2I

SIRISINHA, K.
Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

SKORY, L.
Hybrid Donnacona TMR Plant Features Zero Pollution,
W75-03603 5D

SLACK, E. B.
Sewage and Aquacultural Production,
W75-03524 5D

SLOAN, D. R.
The Effect of Incorporating Hen Manure into the Diet of Young Chicks,
W75-03814 5D

SMIRNOVA, L. N.
Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

SMITH, C. R.
Displacement of Persons by Major Public Works, Anthropological Analysis of Social and Cultural Benefits and Costs from Stream Control Measures---Phase 5,
W75-03308 6B

SMITH, E. L.
Proposed Natural Areas, Salt River Salt Banks, Report No 2,
W75-03396 6B

Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

SMITH, H. S.
Comparison of Completely Mixed and Plug Flow Biological Systems,
W75-03381 5D

SNYDER, W. M.
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

SONNABEND, W.
Epidemiologic Relationships Between Human and Animal Salmonella Carriers and Their Environment in the Swiss Region of the Lake of Constance, (In German),
W75-03330 5C

SPANNAGEL, D. W.
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

SPENCER, J. F. T.
Removal of Resin Acids from Culture Media and Kraft-Mill Effluents by Yeasts and Some Other Fungi,
W75-03599 5D

SPERBER, S.
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

SPIRO, M. H.
On Taxation as a Pollution Control Policy,
W75-03329 5G

SRIDHAR, S.
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

SRIDHARAN, N.
Algal Nutrient Limitation in Lake Ontario and Tributary Waters,
W75-03757 5C

STADELMANN, P.
Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light

Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

STADTMAN, T. C.
Selenium Biochemistry,
W75-03620 5C

STAINTON, M. P.
An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

STANESCU, D.
Epidemiological Survey of Workers Exposed to Cadmium, Effect on Lung, Kidney, and Several Biological Indices,
W75-03795 5C

STARA, J. F.
Radiorespirometry: Rapid Toxicological Screening of Environmental Pollutants,
W75-03619 5A

STEINBRUCHEL, A. B.
Distillation Apparatus,
W75-03735 3A

STEINDLER, M. J.
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

STEMPKOVSKAYA, L. A.
Content of Chemical Substances in Farm Crops Grown on Soil Irrigated with Waste Waters of Coke By-Product Plants, (In Russian),
W75-03846 5B

STENGELIN, A. F. J. C.
Apparatus for Biologically Purifying Effluent,
W75-03734 5D

STENGELIN, J.
Apparatus for Biologically Purifying Effluent,
W75-03734 5D

STENGELIN, V.
Apparatus for Biologically Purifying Effluent,
W75-03734 5D

STERN, A. M.
Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

STEVENS, B.
Decolorizing Dye Wastes,
W75-03608 5D

STEVENSON, K. R.
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

STILES, W.
Beach-Protectors,
W75-03748 2J

STOCKING, M. A.
Prediction of Subtropical Storm Soil Losses from Field Plot Studies,
W75-03806 2G

STOCKNER, J. G.
Recent Limnological Studies of Okanagan Basin Lakes and Their Contribution to Comprehensive Water Resource Planning,
W75-03769 2H

STOKES, J. H.
Treatment of Sewage,
W75-03746 5D

STOKES, P. M.
Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

STONE, L. J.
A Study: Effects of Geology and Nutrients on Water Quality Development,
W75-03539 5G

STONE, R. B.
Expansion and Evaluation of an Artificial Reef Off Murrell's Inlet, South Carolina,
W75-03348 6C

STORSTROM, H.
Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

STRELOW, F. W. E.
Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

STRONG, A. E.
Remote Sensing of Algal Blooms by Aircraft and Satellite in Lake Erie and Utah Lake,
W75-03760 5A

STROSS, R. G.
Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

SUCOFF, E.
Effects of Thinning on Needle Water Potential in Red Pine,
W75-03499 2I

SUGATA, K.
A Basic Study of Biological Nitrification and Denitrification, (In Japanese),
W75-03550 5D

SUGATA, Y.
Study of the Removal of Copper Ion and Cadmium Ion from Waste Water by Flotation Method Utilizing Xanthate, (In Japanese),
W75-03552 5D

SUHR, L. G.
State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

SUMMERS, R.
Anaerobic Digestion of Organic Matter,
W75-03371 5D

SUNADA, D. K.
Ground-Water Quality Study,
W75-03534 5B

SURKAN, A. J.
Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

SWERED, P.
Slime Control Compositions and Their Use,
W75-03575 5D

SZCZESNY, B.
'Project Aqua' in Poland, (In Polish),
W75-03843 2A

SZEELEY, P. J.
Urban Runoff and Combined Sewer Overflow, (Literature Review),
W75-03553 5D

TAL, M.
Salt Tolerance in the Wild Relatives of the Cultivated Tomato: Water Balance and Abscisic Acid in Lycopersicon Esculentum and L. Peruvianum Under Low and High Salinity,
W75-03549 3C

TALSMA, T.
Moisture Profiles in Swelling Soils,
W75-03527 2G

TANG, Y. K.
Predicting the Flow of Water Within a Channel Boundary of Gravel,
W75-03320 8B

TECLAFF, L. A.
The Influence of Recent Trends in Water Legislation on the Structure and Functions of Water Administration,
W75-03363 6E

TERADA, I.
The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

TERPSTRA, R. F.
Municipal Wastes - A Design for an Integrated Plant to Make a Profit,
W75-03531 5D

TESSENOW, U.
Solution, Diffusion and Sorption in Upper Layer of Lake Sediments: III. Chemical and Physical Conditions in Sediment-Water Transition Zone of Meromictic BOG Late (Ursee) and its Relation to Accumulation of Vivianite, (In German),
W75-03571 5B

THOMPSON, C. A.
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

THOMPSON, G. T.
Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

THOMPSON, J. D.
The Coastal Upwelling Cycle on a Beta-Plane: Hydrodynamics and Thermodynamics,
W75-03642 2L

THURTELL, G. W.
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

THURTELL, G. W.

Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

TIEDEMANN, A. R.
Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

TING, R. Y.
Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

TLEIMAT, B. W.
Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

TOERBER, E. D.
Comparison of Completely Mixed and Plug Flow Biological Systems,
W75-03381 5D

TOETZ, D. W.
Nitrogen Budgets of Great Plains Impoundments,
W75-03758 5C

TOMAS, F. M.
Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

TREILLE, R.
Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

TREVORROW, L. E.
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Storage of Tritium and Noble Gases,
W75-03418 5D

TRUDA, R. J.
Slime Control in Industrial Waters,
W75-03594 5D

TSAO, H. Y.
Wastewater Degassing by Adiabatic Flashing,
W75-03446 5D

TSUJII, K.
The Determination of Arsenic by Non-Dispersive Atomic Fluorescence Spectrometry with a Gas Sampling Technique,
W75-03612 5A

TUCKER, G. E.
Sewage Treatment in the City of Plymouth,
W75-03561 5D

TURNER, N. C.
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500 2I

TYLER, P. A.
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

UNESTAM, T.
An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

VALENTINCIC, Z.
The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

VAN DER LINDEN, W. E.
Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

VANDERLIP, R. L.
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

VANDERSTAPPEN, R.
Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

VARLYGIN, A. P.
Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

VARUM, K.
The Effect of Shelter Belts and Irrigation on Water Use in a Dry Region,
W75-03652 3F

VERDUYN, G.
Automatic Dosage of Sulfates by an Improved Nephelometric Method (Dosage Automatique des Sulfates par une Methode Nephelometrique Amelioree),
W75-03536 5A

VERLOO, M.
Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

VICTOR, A. H.
Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

VOGENO, W.
Problem-Free Clarifier Sludge Treatment by a New Thermal Two-Stage Process (Problemlose Klaerschlammbehandlung durch ein neues thermisches Zweistufen-Verfahren),
W75-03609 5D

VUGTS, H. F.
Calculation of Temperature Variations of Small Mountain Streams,
W75-03655 2E

VYAS, D. L.
Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

VYNCKE, W.
Mercury Content of Fish and Shrimps Caught Off the Belgian Coast,
W75-03518 5C

WADEHRA, P. K.
Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

WALDROP, W. R.
Saltwater Intrusion into a Flowing Stream,
W75-03634 2L

WALLACE, J. R.
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

WALLACE, R. L.
Sediment in Streams and Its Effects on Aquatic Life,
W75-03303 2J

WANG, G.
Boundary Effects on Dilution of Buoyant Jets,
W75-03780 8B

WARRINER, T. R.
The Effects of Aluminum Sludge from Water Purification on Municipal Primary Sewage Treatment,
W75-03778 5D

WARSHAW, M.
Some Predicted Climatic Effects of a Simulated Sahara Lake,
W75-03635 2B

WASS, M. L.
A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

WATTS, F. J.
Sediment in Streams and Its Effects on Aquatic Life,
W75-03303 2J

WEBER, W. J.
Adsorption Processes,
W75-03386 5D

WEEKS, W. F.
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

WEHRMANN, L.
Accumulation Experiments with Lindane in a Culture of Dunaliella for Standardization of an Algae Test. (Akkumulationsversuche von Linden in einer Kulter von Dunnaliella spec. zur Standarisierung eines Algentestes),
W75-03508 5C

WEINERT, C. H. S. W.
Separation of Copper (II) from Uranium (VI) and Many Other Elements by Cation-Exchange Chromatography in Acetone-Hydrobromic Acid Media - Improved Selective Separation of Copper,
W75-03628 5A

WEST, P. W.
A Study of Adsorption Characteristics of Traces of Chromium(III) and (VI) on Selected Surfaces,
W75-03613 5A

WESTERHOFF, G. P.
Water Treatment Plant Wastes Disposal-Part 2,
W75-03444 5D

WHEELER, O. H.
Determination of Mercury in Commercially Important Aquatic Organisms,
W75-03796 5B

WHIPPLE, C. H.
The Necessity of Zoning Variance or Amendments Notice to the Wisconsin Department of Natural Resources Under the Shoreland Zoning and Navigable Waters Protection Act,
W75-03364 6E

WHITE, N. F.
Ground-Water Quality Study,
W75-03534 5B

WHITEHEAD, L. W.
Disinfection,
W75-03369 5D

WHITNEY, D. A.
Relationships Between Moisture Availability and Nitrogen Response in Winter Wheat,
W75-03307 3F

WHITNEY, E. W.
Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

WIGHT, J. R.
Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

WIGHT, L. H.
A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

WILKINSON, P.
Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

WILLIAMS, J. D. SR.
Anti-Erosion Device,
W75-03742 2J

WILLIAMS, P. E. L.
Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

WILLIES, R. F.
Subacute Toxicity of Methylmercury in the Adult Cat,
W75-03448 5C

WILMOTH, R. C.
Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

WILSON, D. B.
Wastewater Degassing by Adiabatic Flashing,
W75-03446 5D

WILSON, J. L.
Ground-Water Quality Modeling,
W75-03661 5B

WISER, E. H.
Hydrologic Information Storage and Retrieval System,
W75-03316 7C

WOLFE, L. S.
Effects of Oil Under Sea Ice,
W75-03646 2C

WOODRIFF, R.
Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

WOODS, C.
Agriculture's Pollution Solution for Lake Apopka,
W75-03686 5C

WORTHLEY, E. C.
The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

WU, Y. C.
Some Effects of Nitrogen and Phosphorus Limitation on a Biological-Chemical Wastewater Treatment Process,
W75-03543 5D

WYDEVEN, T.
Method of Preparing Water Purification Membranes,
W75-03756 3A

XIROKOSTAS, D. A.
Economic Evaluation and Determination of Plant Capacity and Dam Height,
W75-03328 6B

YAKOVLEV, S. V.
Thermal Drying of Mechanically Dehydrated Urban Sewage Sludge in a Boiling Layer System (Termicheskaya sushka mekhanicheski obezvozhennykh osadkov gorodskikh stochnykh vod v kipyashchem sloye),
W75-03818 5D

YAMANOUCHI, T.
A Basic Study of Biological Nitrification and Denitrification, (In Japanese),
W75-03550 5D

YEGOROV, A. N.
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

YEH, W. W-G.
On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

YORK, M.
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

YOUNG, J. M.
Effect of Water on Bacterial Multiplication in Plant Tissue,
W75-03831 5C

YOUNG, N. A.
Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

YOUNG, R. A.
Pulping Process Prevents Pollution,
W75-03588 5D

YUMORI, I. R.
Hawaii's Floating City Development Program. Structural Sizing of Flotation Modules and Construction Barge,
W75-03442 8A

ZAIKA, V. E.
Specific Production of Aquatic Invertebrates,
W75-03327 5C

ZAVITKOVSKI, J.
Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

ZHAROVA, T. V.
Effect of BOD(5) Loads and Carbohydrate Concentration on Waste Waters on the Development of Filamentous Bacteria (Vliyanie nagruzok po BPK(5) i kontsentratsii uglevodov v stochnykh vodakh na razvitie nitchatoi bakterii),
W75-03583 5D

ZUNKER, G.
Costs - Exercising Equitable Powers to Award Attorney's Fees to Losing Party Seeking Compliance with the National Environmental Policy Act. Sierra Club v. Lynn, 364 F. Supp. 834 (W.D. Tex. 1973),
W75-03825 6E

ZYLINA, L. N.
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

ORGANIZATIONAL INDEX

ACADEMIA SINICA, TAIPEI (TAIWAN). INST. OF ZOOLOGY.
Heavy Metal Contents in Taiwan's Cultured Fish,
W75-03850 5A

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, PA.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Delaware River Estuarine Marsh Survey,
W75-03441 6G

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD.
Evaluating Well Construction, (Part II),
W75-03813 5B

AIN SHAMS UNIV., CAIRO (EGYPT). DEPT. OF HORTICULTURE.
Effect of Water Stress Upon Endogenous Ethylene Levels in Vicia Faba,
W75-03841 2I

AKADEMIYA NAUK KAZAKHSKOI SSR, ALMA-ATA. INSTITUT ZOOLOGII.
Effect of Biotic and Abiotic Factors on the Toxicity of Entobacterin for Larvae of Blood-Sucking Mosquitoes and Biting Midges, (In Russian),
W75-03845 5C

ALBERTA UNIV., EDMONTON. DEPT. OF GEOGRAPHY.
Advance of the Greenland Ice Sheet on to North-Eastern Ellesmere Island,
W75-03645 2C

ALIGARH MUSLIM UNIV. (INDIA). DEPT. OF ZOOLOGY.
Food Selection by Labeorohita (Ham.) and Its Feeding Relationship with Other Major Carps,
W75-03496 8I

AMSTERDAM UNIV. (NETHERLANDS). LAB. FOR ANALYTICAL CHEMISTRY.
Photometric Titration of Beryllium(II) with 5-Sulfosalicylic Acid,
W75-03629 2K

Determination of the Composition and the Stability Constants of Complexes of Mercury (II) With Amino Acids,
W75-03798 5A

AQUA-CHEM, INC., MILWAUKEE, WIS. (ASSIGNEE)
Distillation Apparatus,
W75-03735 3A

AQUAMARINE CORP., WAUKESHA, WIS.
Aquatic Weed Harvesting Costs and Equipment--1972,
W75-03391 4A

ARGONNE NATIONAL LAB., ILL.
Argonne National Laboratory, Waste Management Programs Quarterly Report, October-December 1973,
W75-03415 5D

Consolidation Techniques for Fuel Cladding Hulls,
W75-03416 5D

Salvage of Alpha-Contaminated Metals,
W75-03417 5D

Storage of Tritium and Noble Gases,
W75-03418 5D

ARIZONA ACADEMY OF SCIENCE, TEMPE.
Proposed Natural Areas, Salt River Salt Banks, Report No 2,
W75-03396 6B

Tacna Marsh. Natural Area Report No. 35,
W75-03400 6B

ARMY ENGINEER DISTRICT, SAN FRANCISCO, CALIF.
Humboldt Harbor and Bay Jetties and Dredging, (Final Environmental Inpact Statement).
W75-03706 4A

ARMY ENGINEER DISTRICT, ST. LOUIS, MO.
Columbia Drainage and Levee District No 3, Monroe County, Illinois (Final Environmental Statement),
W75-03452 4A

ATLANTIC RICHFIELD CO., NEW YORK.
Method of Bleaching Wood Pulp,
W75-03562 5D

ATMOSPHERIC ENVIRONMENT SERVICE, DOWNSVIEW (ONTARIO).
In Situ Measurements of Leaf Water Potential and Resistance to Water Flow in Corn, Soybean, and Sunflower at Several Transpiration Rates,
W75-03668 3F

Leaf Water Content and Potential in Corn, Sorghum, Soybean, and Sunflower,
W75-03839 3F

ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
The Enterprise, Wisconsin, Radiation Forest - Preirradiation Ecological Studies.
W75-03401 5C

BADISCHE ANILIN- UND SODA-FABRIK A.G., LUDWIGSHAFEN AM RHEIN (GERMANY).
The Role of the Chemical Industry in the Fight Against Water Pollution in the Paper Industry (Role de l'industrie chimique dans la lutte contre la pollution des eaux en papeterie),
W75-03567 5G

BAGHDAD UNIV. (IRAQ). COLL. OF AGRICULTURE.
Potential Evapotranspiration in Central Iraq Using the Penman Method with Modified Wind Function,
W75-03656 2D

BATTELLE PACIFIC NORTHWEST LAB., RICHLAND, WASH. WATER AND LAND RESOURCES DEPT.
Collection and Analysis of Pump Test Data for Transmissivity Values,
W75-03421 5B

BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH. WATER AND LAND RESOURCES DEPT.
Experimental Support Studies for the Percol and Transport Models,
W75-03422 5B

Characterization of Actinide Bearing Soils: Top Sixty Centimeters of 216-Z-9 Enclosed Trench,
W75-03423 5B

BECHTEL, INC., GAITHERSBURG, MD.
Hydrodynamic Effects on Flow Through Screens at Intakes,
W75-03659 8B

BETZ LABS., INC., TREVOSE, PA. (ASSIGNEE)
Slime Control Compositions and Their Use,
W75-03575 5D

Beneficiation of Lignin Solutions and Pulp Mill Wastes,
W75-03593 5D

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF CHEMICAL ENGINEERING.
Concentration of Polarisation in Reverse Osmosis Flow Systems Under Laminar Conditions. Effect of Surface Roughness and Fouling,
W75-03375 5D

BRITISH STEEL CORP., SHEFFIELD (ENGLAND).
Determination of Mercury in Fluorspar Mining Survey Samples,
W75-03794 5A

BUCKMAN LABS., INC., MEMPHIS, TENN.
Metal Salts of Dithiocarbamic Acid Derivatives, Their Manufacture and Use (Metallsalze von Dithiocarbamidsaeure-derivaten, deren Herstellung und Versendung),
W75-03581 5D

BUREAU OF MINES, SALT LAKE CITY, UTAH. SALT LAKE CITY METALLURGY RESEARCH CENTER.
Modified Cellulose Adsorbent for Removal of Mercury From Aqueous Solutions,
W75-03579 5D

BUREAU OF MINES, WASHINGTON, D.C. DIV. OF NONFERROUS METALS.
Mercury,
W75-03797 6C

BUREAU OF SPORT FISHERIES AND WILDLIFE, LA CROSSE, WIS. FISH CONTROL LAB.
Toxicity of 2-(Digeranylamino)-Ethanol, A Candidate Selective Fish Toxicant,
W75-03509 5C

BUREAU OF SPORT FISHERIES AND WILDLIFE, SEATTLE, WASH. WESTERN FISH DISEASE LAB.
Effect of Nitrogen Supersaturated Water on Coho and Chinook Salmon,
W75-03520 5C

BUREAU OF SPORT FISHERIES AND WILDLIFE, WARM SPRINGS, GA. SOUTHEASTERN FISH CONTROL LAB.
Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,
W75-03506 5A

CALGARY UNIV. (ALBERTA). DEPT. OF BIOLOGY.
Effects of Experimental Soil Moisture Fluctuations on Turnover Rates of Testacea,
W75-03681 2G

CALIFORNIA STATE DIV. OF HIGHWAYS, SACRAMENTO. BRIDGE DEPT.
Structural Behavior of a Flexible Metal Culvert Under a Deep Earth Embankment Using Method A Backfill,
W75-03641 8D

CALIFORNIA STATE UNIV., SAN FRANCISCO. DEPT. OF GEOLOGY.
Unnatural Shoreline,
W75-03459 5G

CALIFORNIA UNIV., BERKELEY. DEPT. OF CHEMICAL ENGINEERING.
Thermodynamic Properties of Sea Salt Solutions,
W75-03808 2K

CALIFORNIA UNIV., BERKELEY. SCHOOL OF PUBLIC HEALTH.
Category Versus Successive-Intervals Scales,
W75-03802 6B

CALIFORNIA UNIV., BERKELEY. SEA WATER CONVERSION LAB.
Twenty Years of Work on Solar Distillation at the University of California,
W75-03810 3A

New Multi-Probe Temperature-Profile Measurement System--The 'Thermistor Comb',
W75-03811 3A

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING.
Soil Moisture-Vegetation-Temperature Relationships in Central Alaska,
W75-03657 2G

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
A One-Dimensional Numerical Model of Precipitation Scavenging With Application to Rainout of Radioactive Debris,
W75-03427 5B

Effect of Fluid Content on the Mechanical Properties of Westerly Granite,
W75-03428 5B

A Geological and Seismological Investigation of the Lawrence Livermore Laboratory Site,
W75-03429 5B

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF ENGINEERING SYSTEMS.
Optimal Identification of Parameters in an Inhomogeneous Medium with Quadratic Programming,
W75-03804 2F

On the Optimal Identification of Parameters in a Parabolic System,
W75-03805 2F

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF HISTORY.
Clio Nods: Arizona v. California and the Boulder Canyon Act - A Reassessment,
W75-03801 6E

CALIFORNIA UNIV., LOS ANGELES. SCHOOL OF ENGINEERING AND APPLIED SCIENCE.
Long Term Investment Considerations of Conjunctive Desalting Systems,
W75-03807 3A

Hydrogen Evolution on Beta III Titanium Alloy,
W75-03809 2K

CAMERINO UNIV. (ITALY). ISTITUTO DI IGIENE.
Evaluation of Tolerance Limits of Some Toxic Substances in Industrial Waste Waters by the Ichthyo Toxicity Test, (In Italian),
W75-03821 5A

CANADA CENTRE FOR INLAND WATERS, BURLINGTON (ONTARIO).
Determination of N,N-Dialkyl Dithiocarbamates in Waste Water by Thin-Layer Densitometry,
W75-03537 5A

Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automotive Tires,
W75-03591 5D

Automated Phosphate Analysis in the Presence of Arsenic,
W75-03607 5A

Primary Production in Relation to Temperature Structure, Biomass Concentration, and Light Conditions at an Inshore and Offshore Station in Lake Ontario,
W75-03764 5C

CAROLLO (JOHN) ENGINEERS, SANTA ANA, CALIF.
Treatment Facility Incorporates Unique Design Features,
W75-03379 5D

CASCO A.B., STOCKHOLM (SWEDEN).
Process for Waste Water Purification (Verfahren zum Reinigen von Abwasser),
W75-03582 5D

CASE-WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Multilevel Approach for Regional Water Resources Planning and Management, Volume I,
W75-03434 6A

CELLULOSE ATTISHOLZ A.G., SOLOTHURN (SWITZERLAND).
Some Aspects of Treatment and Disposal of Biological and Nonbiological Sludges of the Paper and Board Industry (Einige Aspekte der Behandlung und Beseitigung von biologischen und nichtbiologischen Schlaemmen der Papier- und Kartonindustrie),
W75-03580 5D

CENTRAL ARID ZONE RESEARCH INST., JODHPUR (INDIA).
Comparative Study of Nitrogen Sources for Fertilisation of Rainfed Bajra,
W75-03829 3F

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, GRENOBLE (FRANCE). LABORATOIRE DE GLACIOLOGIE.
Multivariate Statistical Analysis of Glacier Annual Balances,
W75-03664 2C

CH2M-HILL, RESTON, VA.
State of the Art-Activated Carbon Treatment of Wastewater,
W75-03545 5D

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Oil-In-Water Emulsions and Their Flow Properties in Porous Media,
W75-03812 8B

CHRYSLER CORP., NEW ORLEANS, LA. SPACE DIV.
Waterless Sanitation for Rest Areas,
W75-03370 5D

COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
Differential Sea-Ice Drift. I. Spatial and Temporal Variations in Sea-Ice Deformation,
W75-03649 2C

Differential Sea-Ice Drift. II. Comparison of Mesoscale Strain Measurements to Linear Drift Theory Predictions,
W75-03650 2C

A Study of Glacier Flow for an Open-Pit Mine: An Exercise in Applied Glaciology,
W75-03663 2C

COLORADO DIV. OF WILDLIFE, FORT COLLINS.
A Device for Maintaining Constant Oxygen Concentration in Flowing Water,
W75-03522 5G

COLORADO STATE UNIV., FORT COLLINS.
Ground-Water Quality Study,
W75-03534 5B

Range of Cumulative Sums, II. Application to Storage Capacity of Reservoirs,
W75-03669 2H

COMINCO AMERICAN, INC., ST. LOUIS, MO.
Recycling Milling Water in Missouri's New Lead Belt,
W75-03799 5D

COMMISSION ON RURAL WATER, WASHINGTON, D.C.
A Program for the Future--Water and Sewer in Rural America.
W75-03488 5D

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Effect of Salt Water Ingestion on Pregnancy in the Ewe and on Lamb Survival,
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Influence of Saline Drinking Water on Mineral Balances in Sheep,
W75-03637 3C

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Moisture Profiles in Swelling Soils,
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Estimation of Groundwater Accession to and Evaporation from a South Australian Lake Using Environmental Tritium,
W75-03528 2H

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, KUNUNURRA (AUSTRALIA). DIV. OF LAND RESEARCH.
Production and Utilization of Fodder and Grain Sorghum as Forage for Cattle in the Ord River Valley, Western Australia,
W75-03830 3F

COMPAGNIE GENERALE POUR LES DEVELOPPEMENTS OPERATIONNELS DES RICHESSES SOUS-MARINES, PARIS (FRANCE). (ASSIGNEE)
Anti-Heave Protective System,
W75-03732 8B

CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN. DEPT. OF BIOCHEMISTRY.
Bacterial Production of Enzymes in Activated Sludge Systems,
W75-03380 5D

CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN. DEPT. OF ECOLOGY AND CLIMATOLOGY.
Hydration of Eastern Hemlock as Influenced by Waxing and Weather,
W75-03500 2I

CONNECTICUT UNIV., STORRS. INST. OF WATER RESOURCES.
Use of Interactive Computer Graphics in Water Resources Planning and Management,
W75-03301 6A

COPENHAGEN UNIV. (DENMARK). INST. OF SYSTEMATIC BOTANY.
The Sphagnum Flora of Hot Springs in Iceland,
W75-03526 2I

CORNELL UNIV., ITHACA, N.Y. LAB. OF SOIL MICROBIOLOGY.
Nonbiodegradable and Other Recalcitrant Molecules,
W75-03497 5B

COUNCIL FOR THE STUDY OF PRODUCTIVE FORCES, ALMA-ATA (USSR).
Marginal Cost Estimates of the Water Resources of the USSR,
W75-03342 6B

DE PAUL UNIV., CHICAGO, ILL. DEPT. OF CHEMISTRY.
Sources of Phosphorus Inputs from the Atmosphere and Their Significance to Oligotrophic Lakes,
W75-03304 5B

DELAWARE UNIV., NEWARK. ACADEMY OF NATURAL SCIENCES; AND RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. WORK GROUP ON ECONOMIC AND SOCIAL PROBLEMS OF THE DELAWARE ESTUARY REGION.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects,
W75-03352 6G

DELAWARE UNIV., NEWARK. DEPT. OF CIVIL ENGINEERING.
Mixing and Transport, (Literature Review),
W75-03554 5B

DENVER RESEARCH INSTITUTE, COLO.
The NASA Role in Major Areas of Human Concern.
W75-03349 5A

DEPARTMENT OF AGRICULTURE, LUSAKA (ZAMBIA).
Water Conservation in Three Grain Crops in the Zambezi Valley,
W75-03332 3F

DEPARTMENT OF AGRICULTURE, SIDNEY, MONT.
Estimating Soil Water Content on Native Rangeland,
W75-03800 2G

DEPARTMENT OF PRIMARY INDUSTRIES, BRISBANE (AUSTRALIA).
Lucerne in Wet Soils: The Effect of Stage of Regrowth, Cultivar, Air Temperature and Root Temperature,
W75-03847 2I

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, AUCKLAND (NEW ZEALAND). PLANT DISEASE DIV.
Effect of Water on Bacterial Multiplication in Plant Tissue,
W75-03831 5C

DEPARTMENT OF STATE, WASHINGTON, D.C.
Legal and Ecological Aspects of the International Energy Situation,
W75-03490 6G

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). WASTEWATER TECHNOLOGY CENTRE.
A Study of Nitrilotriacetic Acid (NTA) Degradation in a Receiving Stream,
W75-03601 5B

DORNBUSCH, DAVID M. AND CO., INC., SAN FRANCISCO, CALIF.
The Impact of Water Resource Quality Changes on Surrounding Property Values,
W75-03395 5G

DORR-OLIVER, INC., STAMFORD, CONN. (ASSIGNEE)
System for Recovery of Fiber from Paper Mill Effluent, Including a Sieve Bend Screen,
W75-03592 5D

DU PONT DE NEMOURS (E. I.) AND CO., AIKEN, S.C. SAVANNAH RIVER LAB.
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W75-03510 5C

ECOLE POLYTECHNIQUE, MONTREAL (QUEBEC). DEPARTMENT DE GENIE CHIMIQUE.
On the Choice of Methods for the Prediction of the Water-Activity and Activity Coefficient for Multicomponent Aqueous Solutions,
W75-03540 2K

ECOLOTROL, INC., BETHPAGE, N.Y. (ASSIGNEE)
Waste Treatment Process,
W75-03751 5D

ECONOMIC RESEARCH SERVICE, WASHINGTON, D.C. NATIONAL RESOURCE ECONOMICS DIV.
Evolution of the Small Watershed Program, Changes in Public Law 566--Watershed Protection and Flood Prevention Program, 1954-72,
W75-03483 4D

ECONOMICS LAB., INC., ST. PAUL, MINN. (ASSIGNEE)
Slime Control in Industrial Waters,
W75-03594 5D

EDGEWOOD ARSENAL, ABERDEEN PROVING GROUND, MD.
The Toxicity of TNT and Related Wastes to an Aquatic Flowering Plant, Lemna Perpusilla,
W75-03523 5C

EIDGENOSSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND).
Diffusion of Ions in Sea Water and in Deep-Sea Sediments,
W75-03611 5B

EKONO, SEATTLE, WASHINGTON.
Internal Pollution Controls in the Pulping Industry,
W75-03566 5D

ENVIRONMENT/ONE CORP., LATHAN, N.Y. (ASSIGNEE).
Aerobic Wastewater Treatment System with Partial Reuse and Infrequent Dosing to Soil,
W75-03741 5D

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST WATER LAB.
Fitting a Three-Parameter Log-Normal Distribution by Least Squares,
W75-03651 2E

ENVIRONMENTAL PROTECTION AGENCY, ATLANTA, GA.
Evaluation of the Georgia Water Supply Program.
W75-03435 5F

ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, ILL. SURVEILLANCE AND ANALYSIS DIV.
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W75-03546 5D

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB.
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W75-03824 5G

ENVIRONMENTAL PROTECTION AGENCY, GAINESVILLE, FLA.
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W75-03436 6A

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Combination Limestone-Lime Treatment of Acid Mine Drainage,
W75-03559 5D

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W75-03718 6E

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W75-03347 5A

ENVIROTECH CORP., MENLO PARK, CALIF.
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W75-03337 5D

FEDERAL WATER QUALITY ADMINISTRATION, CINCINNATI, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB.
The Three Sludge System for Nitrogen and Phosphorus Removal,
W75-03556 5D

FEHR AND GRAHAM CONSULTING ENGINEERS, FREEPORT, ILL.
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W75-03381 5D

FISHERIES AND MARINE SERVICE, OTTAWA (ONTARIO).
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W75-03392 6B

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W75-03512 5C

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W75-03334 5C

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W75-03769 2H

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An Automated Method for Determination of Chloride and Sulfate in Freshwater Using Cation Exchange and Measurement of Electrical Conductance,
W75-03576 5A

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF METEOROLOGY.
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W75-03642 2L

FLORIDA UNIV., GAINESVILLE. COLL. OF LAW.
Proposed Legislation for Artificial Groundwater Recharge,
W75-03489 4B

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W75-03302 4A

FLORIDA UNIV., GAINESVILLE. DEPT. OF POULTRY SCIENCE.
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W75-03814 5D

FLORIDA UNIV., GAINESVILLE. MARINE ADVISORY PROGRAM.
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W75-03720 9A

FMC CORP., SAN JOSE, CALIF. (ASSIGNEE)
Floating Water Screen,
W75-03745 8I

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME (ITALY).
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W75-03589 5B

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W75-03355 6C

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W75-03448 5C

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W75-03363 6E

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Using Aerial Measurements of Forest Overstory and Topography to Estimate Peak Snowpack,
W75-03570 2C

Chaparral Conversion Potential in Arizona. I. Water Yield Response and Effects on Other Resources,
W75-03572 3B

Chaparral Conversion Potential in Arizona. II. An Economic Analysis,
W75-03573 3B

Growth of Engelmann Spruce (Picea Engelmannii) Unaffected by Increased Snowpack,
W75-03844 2I

FOREST SERVICE (USDA), RHINELANDER, WIS. NORTH CENTRAL FOREST EXPERIMENT STATION.
The Enterprise Radiation Forest Research Facility,
W75-03402 5C

Description of Experimental Plot Design of Site 1 and the Control Area,
W75-03403 5C

Solar Radiation Measurements in the Enterprise Radiation Forest,
W75-03404 5C

Description and Classification of Plant Communities in Site 1 and the Control Area,
W75-03407 5C

Physical Condition and Dimensions of Trees in Site 1 and the Control Area,
W75-03408 5C

Predicted Effects of Chronic Gamma Irradiation on Northern Forest Communities,
W75-03410 5C

Temporal and Spatial Patterns of Pretreatment Litter Production in Site 1 and the Control Area,
W75-03411 5C

Vertebrates of the Enterprise Forest: A General Survey,
W75-03413 5C

Small-Mammal Populations in Site 1 and the Control Area,
W75-03414 5C

FOREST SERVICE (USDA), WENATCHEE, WASH. PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION.
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W75-03820 4C

Stream Chemistry Following a Forest Fire and Urea Fertilization in North-Central Washington,
W75-03822 2K

Firt Year Vegetation After Fire, Reseeding, and Fertilization on the Entiat Experimental Forest,
W75-03823 4D

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Investigations About Population Dynamics and Nutritional Aspects on the Simulid-Larvae of a Mountain Stream Polluted by Organic Waste Water, (In German),
W75-03479 5B

Investigations on Aerobic Pectolytic Bacteria in an Eutrophic Lake, (In German),
W75-03538 5C

GENERAL ATOMIC CO., SAN DIEGO, CALIF. (ASSIGNEE)
Multistage Flash Distillation,
W75-03739 3A

GEOLOGICAL SURVEY, DENVER, COLO.
Atomic Absorption Spectrophotometric Determination of Microgram Levels of CO, NI, CU, PB, and ZN in Soil and Sediment Extracts Containing Large Amounts of MN and FE,
W75-03618 5A

GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
The New Federal Water Pollution Control Law,
W75-03715 5G

GEOTHERMAL INVESTMENT CO., PASADENA, CALIF. (ASSIGNEE)
Power Generation From Hot Brines,
W75-03737 4B

GHENT RIJKSUNIVERSITEIT (BELGIUM). FACULTEIT LANDBOUWWETENSCHAPPEN.
Determination of Mercury in Water and Plant Material by Flameless Atomic Absorption,
W75-03504 5A

GILBERT ASSOCIATES, INC., READING, PA.
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W75-03397 5G

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and Nitrogen Fertilization Under Shallow Water Table Conditions,
W75-03557 3F

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W75-03378 5D

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W75-03394 6B

GUELPH UNIV. (ONTARIO).
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W75-03389 5G

HAMBURG UNIV. (WEST GERMANY). INSTITUT FUER HYDROBIOLOGIE UND FISCHEREIWISSENSCHAFT.
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W75-03508 5C

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W75-03350 6C

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W75-03443 8A

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W75-03442 8A

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W75-03507 5C

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W75-03612 5A

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The Nature of Water Potential Gradients in Trees, (In German),
W75-03336 2I

Light and Water Supply as Factors Influencing the Degree of Stomatal Opening in Conifers, (In German),
W75-03338 2I

HUSSONG-WALKER-DAVIS CO. CORNWELLS HEIGHTS, PA.
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W75-03577 5D

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W75-03303 2J

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W75-03321 10C

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W75-03484 5C

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W75-03305 5A

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W75-03644 8F

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W75-03835 4D

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W75-03368 3F

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Preliminary Experiments on the Effect of Thiodan and Endrin on Fish Culture in Indonesia,
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W75-03494 5C

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W75-03838 2B

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W75-03765 4A

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W75-03621 5B

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W75-03383 5D

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W75-03604 5A

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W75-03307 3F

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W75-03322 5D

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W75-03387 5D

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W75-03308 6B

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W75-03309 5C

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W75-03846 5B

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W75-03753 5D

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W75-03431 5B

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W75-03634 2L

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W75-03613 5A

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W75-03795 5C

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W75-03790 5A

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W75-03623 2K

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W75-03791 5C

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W75-03689 6E

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W75-03759 8I

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W75-03627 5A

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W75-03762 5C

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W75-03364 6E

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Disposal of Alum Sludge to the Existing Activated Sludge Wastewater Treatment Plant,
W75-03774 5D

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W75-03771 5D

Removal of Trace Metals From Wastewater by Activated Carbon,
W75-03777 5D

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W75-03616 5C

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W75-03412 5C

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W75-03405 5C

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W75-03543 5D

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W75-03386 5D

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W75-03761 5C

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W75-03499 2I

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W75-03320 8B

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W75-03445 5D

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W75-03578 5D

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W75-03393 5G

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W75-03756 3A

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W75-03619 5A

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W75-03553 5D

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W75-03424 6G

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W75-03760 5A

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W75-03620 5C

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W75-03348 6C

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W75-03398 6B

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W75-03521 5C

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W75-03310 5B

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Binary Tree Model Simulation of the Behavior of Urban Hydrologic Systems,
W75-03541 2A

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W75-03377 5D

NEBRASKA UNIV., LINCOLN. WATER RESOURCES RESEARCH INST.
Practical Treatment of Feedlot Runoff,
W75-03313 5D

Mobility and Deactivation of Herbicides in Soil-Water Systems,
W75-03314 5B

Influence of Fertilizer Practices on Water and the Quality of the Environment (Phase II),
W75-03315 5B

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W75-03312 5A

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W75-03648 2C

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W75-03324 5C

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W75-03787 5C

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Ground-Water Quality Modeling,
W75-03661 5B

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Wastewater Degassing by Adiabatic Flashing,
W75-03446 5D

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W75-03531 5D

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W75-03354 5G

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W75-03406 5C

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W75-03652 3F

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W75-03316 7C

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W75-03366 5D

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W75-03425 5B

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W75-03758 5C

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W75-03495 5C

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W75-03344 6C

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W75-03625 5C

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Removal of Phenol in Waste Water by Wet Air Oxidation,
W75-03779 5D

OWENS-ILLINOIS, INC., TOLEDO, OHIO. (ASSIGNEE)
Method of Decolorizing Waste Process Liquid Discharged by a Paper Mill,
W75-03595 5D

Method of Decolorizing Paper Mill Effluent Liquid,
W75-03596 5D

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W75-03514 5D

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W75-03614 5A

PITTSBURGH-DES MOINES STEEL CO., PITTSBURGH, PA. (ASSIGNEE)
Protected Offshore Storage Facility,
W75-03744 5G

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W75-03658 2E

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W75-03329 5G

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W75-03561 5D

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The Plankton of New Transfer-Ponds at the Golysz Farm,
W75-03502 8I

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W75-03843 2A

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W75-03328 6B

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W75-03837 3F

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W75-03836 5G

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W75-03635 2B

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W75-03374 5D

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W75-03331 6B

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W75-03458 6B

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W75-03806 2G

RIVKIN/CARSON, INC., WASHINGTON, D.C.
Economic Development and Water Resources Investments,
W75-03343 6B

Federal Action for Environmental Protection and Its Potential Significance for Housing.
W75-03485 6E

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W75-03608 5D

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W75-03653 2D

RUST ENGINEERING CO., BIRMINGHAM, ALA.
Air and Water Pollution Control in Crude Tall Oil Manufacture in the Pulp and Paper Industry,
W75-03598 5D

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. WORK GROUP ON UPPER ESTUARY POLLUTION ON TRANSFER RELATIONSHIPS.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Upper Estuary Pollution and Transfer Relationships,
W75-03440 5B

SANITAS CO. LTD., LONDON (ENGLAND). (ASSIGNEE)
Treatment of Sewage,
W75-03746 5D

SAURASHTRA UNIV., RAJKOT (INDIA). DEPT. OF BIOSCIENCES.
Ecology of River Narmada Upper Catchment Area in Central India: I. Introduction, Situation, Terrain, Lithology, Climate, General Forests and Methods of Vegetational Analysis,
W75-03826 4D

SAVANNAH RIVER ECOLOGY LAB., AIKEN, S.C.
Behavioral Alterations in a Simple Predator-Prey System Due to Sublethal Exposure to Mercury,
W75-03788 5C

SHIZUOKA UNIV., HAMAMATSU (JAPAN). FACULTY OF ENGINEERING.
The Extraction of Nickel from Various Salt Solutions with Oxine in Chloroform,
W75-03630 2K

SKOGSAGARNAS INDUSTRI A.B., VAXJO (SWEDEN). (ASSIGNEE)
Method of Reducing the Discharge of Waste Products from Pulp Mills,
W75-03590 5D

SNOWY MOUNTAINS ENGINEERING CORP., COOMA (AUSTRALIA). MATERIALS BRANCH.
Monitoring of Earth-Rock Dams,
W75-03533 8D

SOCIETE BERTIN ET CIE, PARIS (FRANCE).
Method and Apparatus for Recovering a Substance Floating as a Sheet on the Surface of a Liquid Mass,
W75-03449 5G

SOCIETE GENERALE D'EPURATION ET D'ASSAINISSEMENT DEGREMONT, SURESNES (FRANCE).
Treatment of Industrial Effluents by Flotation (Traitement d'effluents industriels par flottation),
W75-03569 5D

SOIL CONSERVATION SERVICE, AUBURN, ALA.
Altering Alabama's History,
W75-03688 4A

SOIL CONSERVATION SERVICE, BISMARCK, N. DAK.
Flood Hazard Analyses - City of Lisbon, Ransom County, North Dakota.
W75-03439 4A

SOIL CONSERVATION SERVICE, BOISE, IDAHO.
Rapid Creek Flood Hazard Analyses-(Including Inman Creek and West Fork Creek Tributaries) Bannock County, Idaho.
W75-03438 4A

SOIL CONSERVATION SERVICE OF NEW SOUTH WALES, SYDNEY (AUSTRALIA).
Survey of Erosion and Land Use Within the Catchment Area of Keepit Dam (Australia): Part 1 - Climate, Geology, Soils,
W75-03530 4D

SOIL CONSERVATION SERVICE, WASHINGTON, D.C.
Watershed Protection and Flood Prevention Program and Resource Conservation and Development Program--Proposed Water Quality Management Guidelines.
W75-03491 5G

SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT, EL SEGUNDO.
Environmental Aspects of Fin Erosion and Tumors in Southern California Dover Sole,
W75-03517 5C

STATE UNIV. OF NEW YORK, ALBANY. DEPT. OF BIOLOGICAL SCIENCES.
Nutrient Uptake Kinetics in Phytoplankton: A Basis for Niche Separation,
W75-03766 5C

STATE UNIV., OF NEW YORK, BUFFALO. DEPT. OF GEOLOGICAL SCIENCES.
Subglacial Geomorphology Surrounding the Ice-Free Valleys of Southern Victoria Land, Antarctica,
W75-03667 2C

STIRLING UNIV. (SCOTLAND). DEPT. OF BIOLOGY.
Response of Mycorrhizal and Nonmycorrhizal Rooted Cuttings of Heather (Calluna Vulgaris(L.) Hull) to Variations in Nutrient and Water Regimes,
W75-03842 3F

SUN OIL CO., PHILADELPHIA, PA. (ASSIGNEE)
Rotary Skimmer,
W75-03736 5G

SUN RESEARCH AND DEVELOPMENT CO., PHILADELPHIA, PA. (ASSIGNEE)
Reclamation of Hydrocarbon Contaminated Ground Waters,
W75-03750 5D

SWEDISH METEOROLOGICAL AND HYDROLOGICAL INST., STOCKHOLM.
Rainfall Interception in a Forest in the Velen Hydrological Representative Basin,
W75-03654 2I

SYAVSKII LESOKHIMICHESKII KOMBINAT (USSR).
Biochemical Purification of Waste Waters at the Syavsk (Wood-Pyrolysis) Combine (Biokhimicheskaya ochistka stochnykh vod na Syavskom Kombinate),
W75-03606 5D

SYRACUSE UNIV., N.Y. BIOLOGICAL RESEARCH LABS.
Heavy Metal Tolerance in Typha Latifolia Without the Evolution of Tolerant Races,
W75-03513 5C

TASMANIA UNIV., HOBART (AUSTRALIA). DEPT. OF BOTANY.
Chemistry of Some Sedgeland Waters: Lake Pedder, South-West Tasmania,
W75-03390 5B

TECHNION - ISRAEL INST. OF TECH., HAIFA. ENVIRONMENTAL ENGINEERING LAB.
Bacteriophages as Viral Pollution Indicators,
W75-03816 5A

TECHNOLOGY SERVICE CORP., SANTA MONICA, CALIF.
The Application of Repro-Modeling to the Analysis of a Photochemical Air Pollution Model,
W75-03633 5B

TEXAS UNIV. AT HOUSTON. DEPT. OF CIVIL ENGINEERING.
A Study: Effects of Geology and Nutrients on Water Quality Development,
W75-03539 5G

TEXAS UNIV., AUSTIN. DEPT. OF CHEMICAL ENGINEERING.
A Note on the Evaluation of Activity Dependent Recreational Damage Cost Functions,
W75-03341 6D

TEXAS UNIV., DALLAS. INST. FOR ENVIRONMENTAL SCIENCES.
Nitrogen and Phosphorus Availability in Lake Ontario Tributary Waters During IFYGL,
W75-03768 5C

TEXAS UNIV., HOUSTON.
Disinfection,
W75-03369 5D

THAI-AUSTRALIAN COLOMBO PLAN PROJECT, CHAINAT (THAILAND).
Utility of a Simple Soil Water Budget Model in Agronomic Research: I. Effects of Plant Density, Time-of-Sowing and Fallow Water on Available Soil Water Under Spring Wheat,
W75-03450 3F

TORONTO UNIV. (ONTARIO). DEPT. OF BOTANY.
Comparative Studies of the Toxicity of Heavy Metals to Phytoplankton and Their Synergistic Interactions,
W75-03775 5C

Heavy Metal Tolerance in Algae Isolated from Polluted Lakes Near the Sudbury, Ontario Smelters,
W75-03781 5C

TORONTO UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
A Performance Study of Aerobic Sludge Digestion,
W75-03773 5D

TORONTO UNIV. (ONTARIO). INST. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
Water Pollution Research in Canada 1973,
W75-03770 5D

TRW SYSTEMS GROUP, REDONDO BEACH, CALIF.
Recommended Methods of Reduction, Neutralization, Recovery, or Disposal of Hazardous Waste. Volume IX, National Disposal Site Candidate Waste Stream Constituent Profile Reports - Radioactive Materials,
W75-03426 5D

UNION CARBIDE CORP., TONAWANDA, N.Y. LINDE DIV.
Operating Experience and Design Criteria for 'UNOX' Wastewater Treatment Systems, Design Seminar for Wastewater Treatment Facilities.
W75-03565 5D

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, LONDON (ENGLAND).
Desalination - New Water for Old (Entsalzung-Frischwasserversorgung und Abwasseraufbereitung),
W75-03385 5D

UNITED NATIONS DEVELOPMENT PROGRAM, LAGOS (NIGERIA).
The Transition from Small-Scale to Large-Scale Industry,
W75-03351 6C

UNIV. OF EAST ANGLIA, NORWICH (ENGLAND). SCHOOL OF ENVIRONMENTAL SCIENCES.
Observations on the Internal Structure and Origin of Some Flutes in Glacio-Fluvial Sediments, Blomstrandbreen, North-West Spitsbergen,
W75-03647 2C

UNIVERSIDAD DE ORIENTE, CUMANA (VENEZUELA). INST. OF OCEANOGRAPHY.
Study of the Hydrographic and Chemical Conditions in the Water of the Lagoon of Tacarigua, (In Spanish),
W75-03335 5B

UNIVERSIDADE FEDERAL DE PERNAMBUCO, RECIFE (BRAZIL). INSTITUTO DE BIOCIENCIAS.
Snail Population in Running Water,
W75-03803 2I

UNIVERSITAET HOHENHEIM (LANDWIRTSCHAFTLICHE HOCHSCHULE) (WEST GERMANY). ZOOLOGICAL INST.
Temperature Effect on Brain Glycogen of Fish,
W75-03447 5C

UNIVERSITY COLL., CARDIFF (WALES). DEPT. OF GEOLOGY.
Autumn, Winter and Spring Soil Temperatures in Okstindan, Norway,
W75-03665 2C

UNIVERSITY COLL. OF NORTH WALES, MANAI BRIDGE. MARINE SCIENCES LAB.
Ultraviolet Absorption/Salinity Correlation as an Index of Pollution in Inshore Sea Waters,
W75-03767 5A

UNIVERSITY OF AGRICULTURE, GODOLLO (HUNGARY).
The Microflora in the Settling and Subsoil Water Enriching Basins of the Budapest Waterworks,
W75-03763 5C

UNIVERSITY OF NEW ENGLAND, ARMIDALE (AUSTRALIA). DEPT. OF AGRONOMY.
Defoliation, Leaf Area Index, and the Water Use of Four Temperate Pasture Species Under Irrigated and Dryland Conditions,
W75-03848 3F

UPPSALA UNIV. (SWEDEN). INST. FOR PHYSIOLOGIC BOTANY.
An Electrical Barrier for Preventing Migration of Freshwater Crayfish in Running Water: A Method to Stop the Spread of the Crayfish Plague,
W75-03833 8I

UTAH WATER RESEARCH LAB., LOGAN.
Axisymmetric Infiltration in Soils, II. Summary of Infiltration Characteristics Related to Problem Specifications,
W75-03670 2G

UTRECHT RIJKSUNIVERSITEIT (NETHERLANDS). INST. OF PUBLIC INTERNATIONAL LAW.
Fishery Proposals in the United Nations Seabed Committee: An Evaluation,
W75-03454 6E

UZBEKSKII NAUCHNO-ISSLEDOVATELSKII INSTITUT SANITARII, GIGIENY I PROFZABOLEVANII, TASHKENT (USSR).
Data on Substantiation of the Maximum Allowable Concentration of Butyphos in Waters. (In Russian),
W75-03505 5C

VANDERBILT UNIV., NASHVILLE, TENN. DEPT. OF ENVIRONMENTAL AND WATER RESOURCES ENGINEERING.
Kinetics of Mercury Adsorption and Desorption in Sediments,
W75-03610 5B

VANDKVALITETSINSTITUT, SOBORG (DENMARK).
Phytoplankton Which are Pollution Indicators in Lakes, (In Swedish),
W75-03828 5B

VARIAN INSTRUMENT DIV., PALO ALTO, CALIF.
Determination of Lead in Atmospheric Particulates by Furnace Atomic Absorption,
W75-03624 5A

VICTORIA UNIV., WELLINGTON (NEW ZEALAND).
Sewage and Aquacultural Production,
W75-03524 5D

VIRGINIA INST. OF MARINE SCIENCES, GLOUCESTER POINT.
A Check List of the Biota of Lower Chesapeake Bay,
W75-03786 5C

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Alum Recovery from Water and Wastewater Treatment Plant Sludges,
W75-03542 5D

VOLCANI INST. OF AGRICULTURAL RESEARCH, ILANOT (ISRAEL). FORESTRY DIV.
Microclimate and Thermal Stress of Man in an Aleppo Pine Plantation and an Oak Scrub,
W75-03834 2I

VRIJE UNIVERSITEIT, AMSTERDAM (NETHERLANDS). DEPT. OF METEOROLOGY.
Calculation of Temperature Variations of Small Mountain Streams,
W75-03655 2E

WADHAM COLL., OXFORD (ENGLAND).
A Survey of International Customary Rules of Environmental Protection,
W75-03453 5G

WALTER REED ARMY INST. OF RESEARCH, WASHINGTON, D.C. DEPT. OF ENTOMOLOGY.
Distribution of Potential Mosquito Vectors in the Imperial Valley, California, 1971-1972,
W75-03498 5G

WASHINGTON STATE UNIV., PULLMAN. COLL. OF ENGINEERING.
Hydrologic Simulation of a Complex Watershed,
W75-03325 2A

WASHINGTON STATE UNIV., PULLMAN. ENVIRONMENTAL ENGINEERING SECTION.
Dairy Manure Management Methods,
W75-03636 5D

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Rare Earth Elements in Ferromanganese Nodules and Other Marine Phases,
W75-03615 5B

WASHINGTON UNIV., SEATTLE. GEOPHYSICS PROGRAM.
Variations in the Sliding of a Temperate Glacier,
W75-03666 2C

WASHINGTON UNIV., ST. LOUIS, MO. CENTER FOR THE BIOLOGY OF NATURAL SYSTEMS.
On the Lead Content of Human Hair (1871-1971),
W75-03789 5A

WATER AND WASTES ENGINEERING, NEW YORK.
Future of Desalting is Bright but Costs Must Drop,
W75-03356 3A

WATERLOO UNIV. (ONTARIO).
Determination of Liquid Conductivity of Capillary Porous Solids,
W75-03532 2G

WATERLOO UNIV. (ONTARIO). DEPT. OF CHEMICAL ENGINEERING.
Wet Air Oxidation of Low Molecular Weight Organic Acids,
W75-03783 5D

WATERLOO UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Anaerobic Digestion of Primary Sludge Containing Iron Phosphate,
W75-03776 5D

WESTERN WASHINGTON RESEARCH AND EXTENSION CENTER, PUYALLUP.
Mercury Determination at the Microgram Level by a Reduction-Aeration Method of Concentration,
W75-03617 5A

WINDSOR UNIV. (ONTARIO). DEPT. OF CHEMICAL ENGINEERING.
Phosphorus Leaching from Sewage Sludge Used as a Landfill,
W75-03782 5D

WINDSOR UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
A Study of Pollution Loadings from Urban Runoff,
W75-03772 5B

WISCONSIN UNIV., MADISON.
Manure Stack Fly Breeding Depends on the Amount of Manure Added Daily,
W75-03815 5B

WISCONSIN UNIV., MADISON. DEPT. OF CIVIL ENGINEERING.
Algal Nutrient Limitation in Lake Ontario and Tributary Waters,
W75-03757 5C

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
An Analysis of Social Well-Being Change Associated with Resource Development Projects in Wyoming,
W75-03319 6B

Opportunities for Watershed Management in Wyoming,
W75-03326 4D

ZDRUZENE PAPIRNICE, LJUBLJANA-VEVCE (YUGOSLAVIA).
The Influence of a Paper Mill with Adjacent Coating Plant on the Biological Oxygen Demand of the Receiving Stream (Der Einfluss einer Papierfabrik mit angeschlossener Streicherei auf den biologischen Sauerstoffverbrauch des Vorfluters),
W75-03605 5B

ACCESSION NUMBER INDEX

W75-03301 6A
W75-03302 4A
W75-03303 2J
W75-03304 5B
W75-03305 5A
W75-03306 5G
W75-03307 3F
W75-03308 6B
W75-03309 5C
W75-03310 5B
W75-03311 5B
W75-03312 5A
W75-03313 5D
W75-03314 5B
W75-03315 5B
W75-03316 7C
W75-03317 6B
W75-03318 6G
W75-03319 6B
W75-03320 8B
W75-03321 10C
W75-03322 5D
W75-03323 5B
W75-03324 5C
W75-03325 2A
W75-03326 4D
W75-03327 5C
W75-03328 6B
W75-03329 5G
W75-03330 5C
W75-03331 6B
W75-03332 3F
W75-03333 6C
W75-03334 5C
W75-03335 5B
W75-03336 2I
W75-03337 5D
W75-03338 2I
W75-03339 6C
W75-03340 5D
W75-03341 6D
W75-03342 6B
W75-03343 6B
W75-03344 6C
W75-03345 6C
W75-03346 6C
W75-03347 5A
W75-03348 6C
W75-03349 5A
W75-03350 6C
W75-03351 6C
W75-03352 6G
W75-03353 6G
W75-03354 5G
W75-03355 6C
W75-03356 3A
W75-03357 6E
W75-03358 6E
W75-03359 6E
W75-03360 6E
W75-03361 6E
W75-03362 6E
W75-03363 6E
W75-03364 6E
W75-03365 5G
W75-03366 5D
W75-03367 5D
W75-03368 3F
W75-03369 5D
W75-03370 5D
W75-03371 5D
W75-03372 5D
W75-03373 5G
W75-03374 5D
W75-03375 5D
W75-03376 5D
W75-03377 5D
W75-03378 5D
W75-03379 5D
W75-03380 5D
W75-03381 5D
W75-03382 5D
W75-03383 5D
W75-03384 3A
W75-03385 5D
W75-03386 5D
W75-03387 5D
W75-03388 5D
W75-03389 5G
W75-03390 5B
W75-03391 4A
W75-03392 6B
W75-03393 5G
W75-03394 6B
W75-03395 5G
W75-03396 6B
W75-03397 5G
W75-03398 6B
W75-03399 6D
W75-03400 6B
W75-03401 5C
W75-03402 5C
W75-03403 5C
W75-03404 5C
W75-03405 5C
W75-03406 5C
W75-03407 5C
W75-03408 5C
W75-03409 5C
W75-03410 5C
W75-03411 5C
W75-03412 5C
W75-03413 5C
W75-03414 5C
W75-03415 5D
W75-03416 5D
W75-03417 5D
W75-03418 5D
W75-03419 8H
W75-03420 5A
W75-03421 5B
W75-03422 5B
W75-03423 5B
W75-03424 6G
W75-03425 5B
W75-03426 5D
W75-03427 5B
W75-03428 5B
W75-03429 5B
W75-03430 5D
W75-03431 5B
W75-03432 5G
W75-03433 5G
W75-03434 6A
W75-03435 5F
W75-03436 6A
W75-03437 6D
W75-03438 4A
W75-03439 4A
W75-03440 5B
W75-03441 6G
W75-03442 8A
W75-03443 8A
W75-03444 5D
W75-03445 5D
W75-03446 5D
W75-03447 5C
W75-03448 5C
W75-03449 5G
W75-03450 3F
W75-03451 5F
W75-03452 4A
W75-03453 5G
W75-03454 6E
W75-03455 6E
W75-03456 6E
W75-03457 6E
W75-03458 6B
W75-03459 5G
W75-03460 6E
W75-03461 6E
W75-03462 6E
W75-03463 6E
W75-03464 6E
W75-03465 6E
W75-03466 6E
W75-03467 6E
W75-03468 6E
W75-03469 6E
W75-03470 6E
W75-03471 6E
W75-03472 6E
W75-03473 6E
W75-03474 6E
W75-03475 6E
W75-03476 6E
W75-03477 6E
W75-03478 6E
W75-03479 5B
W75-03480 5G
W75-03481 6E
W75-03482 6E
W75-03483 4D
W75-03484 5C
W75-03485 6E
W75-03486 6E
W75-03487 6E
W75-03488 5D
W75-03489 4B
W75-03490 6G
W75-03491 5G
W75-03492 6E
W75-03493 6E
W75-03494 5C
W75-03495 5C
W75-03496 8I
W75-03497 5B
W75-03498 5G
W75-03499 2I
W75-03500 2I
W75-03501 8I
W75-03502 8I
W75-03503 5A
W75-03504 5A
W75-03505 5C
W75-03506 5A
W75-03507 5C
W75-03508 5C
W75-03509 5C
W75-03510 5C
W75-03511 5C
W75-03512 5C
W75-03513 5C
W75-03514 5D
W75-03515 5C
W75-03516 5C
W75-03517 5C
W75-03518 5C
W75-03519 5C
W75-03520 5C
W75-03521 5C
W75-03522 5G
W75-03523 5C
W75-03524 5D
W75-03525 6B
W75-03526 2I
W75-03527 2G
W75-03528 2H
W75-03529 3C
W75-03530 4D
W75-03531 5D
W75-03532 2G
W75-03533 8D
W75-03534 5B
W75-03535 2A
W75-03536 5A
W75-03537 5A
W75-03538 5C
W75-03539 5G
W75-03540 2K
W75-03541 2A
W75-03542 5D
W75-03543 5D
W75-03544 5D
W75-03545 5D
W75-03546 5D
W75-03547 8A
W75-03548 5D
W75-03549 3C
W75-03550 5D
W75-03551 5D
W75-03552 5D
W75-03553 5D
W75-03554 5B
W75-03555 5D
W75-03556 5D
W75-03557 3F
W75-03558 5D
W75-03559 5D
W75-03560 5E
W75-03561 5D
W75-03562 5D
W75-03563 5D
W75-03564 5D
W75-03565 5D
W75-03566 5D
W75-03567 5G
W75-03568 5D
W75-03569 5D
W75-03570 2C
W75-03571 5B
W75-03572 3B
W75-03573 3B
W75-03574 5D
W75-03575 5D
W75-03576 5A
W75-03577 5D
W75-03578 5D
W75-03579 5D
W75-03580 5D
W75-03581 5D
W75-03582 5D
W75-03583 5D
W75-03584 5D
W75-03585 5D
W75-03586 5D
W75-03587 5D
W75-03588 5D
W75-03589 5B
W75-03590 5D
W75-03591 5D
W75-03592 5D
W75-03593 5D
W75-03594 5D
W75-03595 5D
W75-03596 5D
W75-03597 2H
W75-03598 5D
W75-03599 5D
W75-03600 5D
W75-03601 5B
W75-03602 5D
W75-03603 5D
W75-03604 5A
W75-03605 5B
W75-03606 5D
W75-03607 5A
W75-03608 5D
W75-03609 5D
W75-03610 5B
W75-03611 5B
W75-03612 5A

W75-03613 5A
W75-03614 5A
W75-03615 5B
W75-03616 5C
W75-03617 5A
W75-03618 5A
W75-03619 5A
W75-03620 5C
W75-03621 5B
W75-03622 5C
W75-03623 2K
W75-03624 5A
W75-03625 5C
W75-03626 5G
W75-03627 5A
W75-03628 5A
W75-03629 2K
W75-03630 2K
W75-03631 5D
W75-03632 5E
W75-03633 5B
W75-03634 2L
W75-03635 2B
W75-03636 5D
W75-03637 3C
W75-03638 2B
W75-03639 3B
W75-03640 5G
W75-03641 8D
W75-03642 2L
W75-03643 5C
W75-03644 8F
W75-03645 2C
W75-03646 2C
W75-03647 2C
W75-03648 2C
W75-03649 2C
W75-03650 2C
W75-03651 2E
W75-03652 3F
W75-03653 2D
W75-03654 2I
W75-03655 2E
W75-03656 2D
W75-03657 2G
W75-03658 2E
W75-03659 8B
W75-03660 2H
W75-03661 5B
W75-03662 5B
W75-03663 2C
W75-03664 2C
W75-03665 2C
W75-03666 2C
W75-03667 2C
W75-03668 3F
W75-03669 2H
W75-03670 2G
W75-03671 6E
W75-03672 6E
W75-03673 6E
W75-03674 6E
W75-03675 6E
W75-03676 6E
W75-03677 5G
W75-03678 5G
W75-03679 5G
W75-03680 6E
W75-03681 2G
W75-03682 4A
W75-03683 6E
W75-03684 6E
W75-03685 6E
W75-03686 5C
W75-03687 5G
W75-03688 4A
W75-03689 6E
W75-03690 6E
W75-03691 5G
W75-03692 5G
W75-03693 5G
W75-03694 6E
W75-03695 5C
W75-03696 5G
W75-03697 5G
W75-03698 6E
W75-03699 6E
W75-03700 6E
W75-03701 6E
W75-03702 6E
W75-03703 6E
W75-03704 6E
W75-03705 6E
W75-03706 4A
W75-03707 6E
W75-03708 6E
W75-03709 6E
W75-03710 6E
W75-03711 6E
W75-03712 6E
W75-03713 6E
W75-03714 6E
W75-03715 5G
W75-03716 6E
W75-03717 4A
W75-03718 6E
W75-03719 6E
W75-03720 9A
W75-03721 6E
W75-03722 6E
W75-03723 6E
W75-03724 6E
W75-03725 6E
W75-03726 6E
W75-03727 6E
W75-03728 6E
W75-03729 6E
W75-03730 6E
W75-03731 6E
W75-03732 8B
W75-03733 5G
W75-03734 5D
W75-03735 3A
W75-03736 5G
W75-03737 4B
W75-03738 2J
W75-03739 3A
W75-03740 5D
W75-03741 5D
W75-03742 2J
W75-03743 5D
W75-03744 5G
W75-03745 8I
W75-03746 5D
W75-03747 5D
W75-03748 2J
W75-03749 2J
W75-03750 5D
W75-03751 5D
W75-03752 5D
W75-03753 5D
W75-03754 5D
W75-03755 5D
W75-03756 3A
W75-03757 5C
W75-03758 5C
W75-03759 8I
W75-03760 5A
W75-03761 5C
W75-03762 5C
W75-03763 5C
W75-03764 5C
W75-03765 4A
W75-03766 5C
W75-03767 5A
W75-03768 5C
W75-03769 2H
W75-03770 5D
W75-03771 5D
W75-03772 5B
W75-03773 5D
W75-03774 5D
W75-03775 5C
W75-03776 5D
W75-03777 5D
W75-03778 5D
W75-03779 5D
W75-03780 8B
W75-03781 5C
W75-03782 5D
W75-03783 5D
W75-03784 5C
W75-03785 5A
W75-03786 5C
W75-03787 5C
W75-03788 5C
W75-03789 5A
W75-03790 5A
W75-03791 5C
W75-03792 5A
W75-03793 3E
W75-03794 5A
W75-03795 5C
W75-03796 5B
W75-03797 6C
W75-03798 5A
W75-03799 5D
W75-03800 2G
W75-03801 6E
W75-03802 6B
W75-03803 2I
W75-03804 2F
W75-03805 2F
W75-03806 2G
W75-03807 3A
W75-03808 2K
W75-03809 2K
W75-03810 3A
W75-03811 3A
W75-03812 8B
W75-03813 5B
W75-03814 5D
W75-03815 5B
W75-03816 5A
W75-03817 5D
W75-03818 5D
W75-03819 8G
W75-03820 4C
W75-03821 5A
W75-03822 2K
W75-03823 4D
W75-03824 5G
W75-03825 6E
W75-03826 4D
W75-03827 2I
W75-03828 5B
W75-03829 3F
W75-03830 3F
W75-03831 5C
W75-03832 5C
W75-03833 8I
W75-03834 2I
W75-03835 4D
W75-03836 5G
W75-03837 3F
W75-03838 2B
W75-03839 3F
W75-03840 2I
W75-03841 2I
W75-03842 3F
W75-03843 2A
W75-03844 2I
W75-03845 5C
W75-03846 5B
W75-03847 2I
W75-03848 3F
W75-03849 2I
W75-03850 5A

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-03401 -- 03431	31
Cornell University, Policy Models for Water Resources Systems	W75-03387 -- 03388	2
East Central State College, Agricultural Livestock Wastes	W75-03814 -- 03815	2
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-03366 -- 03367 03369 -- 03386 03444 -- 03449 03451 03534 -- 03537 03539 -- 03548 03550 -- 03556 03558 -- 03565 03816 -- 03819	60
Illinois State Water Survey, Hydrology	W75-03320 -- 03321 03632 -- 03636 03638 -- 03642 03644 -- 03667 03669 -- 03670	38
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-03566 -- 03570 03572 -- 03596 03598 -- 03609	42
National Water Well Association, Water Well Construction Technology	W75-03812 -- 03813	2
University of Florida, Eastern U. S. Water Law	W75-03357 -- 03365 03452 -- 03478 03480 -- 03493 03671 -- 03680 03682 -- 03694 03696 -- 03731	109
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-03432 -- 03443	12
University of Wisconsin, Eutrophication	W75-03757 -- 03758 03760 -- 03764 03766 03768 -- 03787	28
University of Wisconsin, Water Resources Economics	W75-03317 -- 03319 03328 -- 03329 03331, 03333 03337 03339 -- 03356 03389 03391 -- 03400	37
B. State Water Resources Research Institutes		
California Water Resources Center	W75-03801 -- 03802 03804 -- 03805 03807 -- 03811	9
Connecticut Institute of Water Resources	W75-03301	1
Florida Water Resources Research Center	W75-03302	1

Source	Accession Number	Total
B. State Water Resources Research Institutes (Cont'd)		
Idaho Water Resources Research Institute	W75-03303	1
Illinois Water Resources Center	W75-03304 -- 03305	2
Kansas Water Resources Research Institute	W75-03306 -- 03307 03322	3
Kentucky Water Resources Research Institute	W75-03308 -- 03309	2
Missouri Water Resources Research Center	W75-03323	1
Nebraska Water Resources Research Institute	W75-03310 -- 03315	6
New Hampshire Water Resources Research Center	W75-03324	1
North Carolina Water Resources Research Institute	W75-03316	1
Washington Water Research Center	W75-03325 -- 03326	2
Wyoming Water Resources Research Institute	W75-03824 -- 03825	2
C. Other		
BioSciences Information Service	W75-03327, 03330 03332 03334 -- 03336 03338, 03368 03390, 03450 03479 03494 -- 03507 03526, 03538 03549, 03557 03571, 03597 03625, 03637 03643, 03668 03681, 03695 03759, 03765 03767, 03800 03803, 03806 03821 03826 -- 03850	69
Commonwealth Scientific and Industrial Research Organization, Australia	W75-03527 -- 03533	7
Effects of Pollutants on Aquatic Life (Katz)	W75-03508 -- 03524	17
Forest Service (USDA)	W75-03820 03822 -- 03823	3
Ocean Engineering Information Service (Patents)	W75-03732 -- 03756	25
Office of Water Research and Technology	W75-03525	1
Vanderbilt University, Metals Pollution	W75-03610 -- 03624 03626 -- 03631 03788 -- 03799	33

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CENTERS OF COMPETENCE
AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

8 ENGINEERING WORKS

9 MANPOWER, GRANTS, AND FACILITIES

10 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 8
APRIL 15, 1975

W75-03851 -- W75-04350

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education–Extramural; Education–In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

PHYSICAL PROPERTIES OF OXYGEN-17 WATER: ABSOLUTE VISCOSITY AND DENSITY OF H2(17)0 BETWEEN 15 AND 35C,
Weizmann Inst. of Science, Rehovot (Israel) Dept. of Isotope Research.
A. I. Kudish, D. Wolf, and F. Steckel.
Journal of the Chemical Society (London), Faraday Transactions I, No 3, p 484-489, 1974. 6 tab, 8 ref.

Descriptors: *Water properties, *Viscosity, *Density, *Isotope studies, Physicochemical properties, Heavy water, Deuterium, Oxygen isotopes, Temperature.

The absolute viscosity of four oxygen-17 water samples is reported at 5C intervals between 15 and 35C. The absolute viscosity of 100% H2(17)O is determined by extrapolation of the measured viscosity of a highly enriched oxygen-17 sample containing 86.53% O(17). The values calculated for the other samples, based on Eyring's viscosity theory, are in excellent agreement with experimental results. The isotope effect for H2 (17)O relative to natural water has been analyzed. Viscosity ratios at 25C are 1.0226 for O(17)/O(16) water, 1.0536 for O(18)/O(16) water, and 1.2316 for D2O(16)/H2O(16). (Brown-IPC)
W75-03881

2. WATER CYCLE

2A. General

DATA REDUCTION METHODS FOR HYDROLOGIC ANALYSES,
Los Angeles County Sanitation Districts, Whittier, Calif.
For primary bibliographic entry see Field 7C.
W75-03929

STOCHASTIC MODELS FOR THE INTERACTION OF RAINFALL AND GROUNDWATER LEVELS,
Purdue Univ., Lafayette, Ind.
A. Ramachandra Rao, R. L. Kashyap, and R. G. Srinivasa Rao.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 181, $3.25 in paper copy, $2.25 in microfiche. Paper presented at International Symposium on Development of Ground Water Resources, 1973, 15 p, 12 fig, 6 ref. OWRR C-3277(No 3713)(3).

Descriptors: *Groundwater, *Groundwater recharge, *Water table, Aquifers, *Precipitation, *Statistical models, Groundwater movement, Water table, Stochastic processes, Mathematical studies, Correlation analysis, Model studies.
Identifiers: *Stochastic models, Multivariate models, Univariate models, Transformed variant, Phase-spectrum test, Correlogram test, Co-spectrum test.

Aquifers are recharged by precipitation and, where the circumstances are favorable, by streamflow. Both rainfall and streamflow are considered as stochastic processes. Consequently, the recharge of an aquifer by rainfall of streamflow must also be considered as a stochastic process. Some preliminary results in developing stochastic models for the interaction of rainfall and groundwater level process are presented. Formulation and validation of univariate and multivariate models are discussed. The parameter estimation in multivariate models is discussed in detail. Because of availablility elsewhere, the parameter estimation of the univariate models is brief. The validation of both the univariate and multivariate models is dealt with in detail because of its obvious importance in model construction. Two conclusions are presented. Valid univariate models with excellent one step-ahead prediction capabilities can be developed for modelling the ground water level process. Because of its random nature, at least for the data analyzed in the present study, rainfall does not appear to be very significant in modelling the ground water level process.
W75-03949

WORLDWIDE DISTRIBUTIONS OF MEAN MONTHLY DEWPOINT,
Army Engineer Topographic Lab., Fort Belvoir, Va.
H. L. Ohman.
Department of the Army, U.S. Army Engineer Topographic Laboratories. Geographic Sciences Laboratory, Report No. ETL-SR-74-2, November, 1973, 28 p 12 fig, 14 refs.

Descriptors: *Dew point, *Isotherms, *Maps, *Distribution patterns, *Design criteria, Temperature, Elevation, Moisture availability, Vegetation, Monthly.

Twelve global maps showing the mean monthly dewpoint temperatures for each month are presented. The distributional characteristics were found to be influenced primarily by air temperature, distance from and degree of exposure to moisture surfaces, and the depressing effects of elevation. The maps for January and July provided estimates for the mean annual range of dewpoint temperature which can be useful in design engineering purposes. (Mastic-Arizona)
W75-04130

APPLICATIONS OF SYSTEMS ANALYSIS TO INTERNATIONAL WATER RESOURCES PROJECTS,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W75-04232

THE NONLINEAR RAINFALL RESPONSE OF WATERSHEDS WITH TIME DEPENDENT STORAGE AND CONVEYANCE PROPERTIES,
Cincinnati Univ., Ohio. Dept. of Engineering Analysis.
A. M. Strauss.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 361-366. 7 ref.

Descriptors: *Rainfall-runoff relationships, *Estimating equations, Mathematical models, *Time series analysis, Analytical techniques, Watersheds(Basins), Storage, Hydrologic systems.
Identifiers: *Nonlinear rainfall response, *Time dependence, Conveyance properties.

The time variability of watersheds must be taken into account if a watershed is to be accurately modeled. Mathematical formulae quantifying presently acceptable rainfall-runoff and general hydrological systems were presented and tempered in a manner to account for observed time dependent properties. Long term models, especially, must take into account such natural processes as weathering, erosion, and climatic change. Coupling these with the effects of man's activities, it was suggested that one watershed ageing term be used when modifying current methods. (See also W75-04213) (Jess-ISWS)
W75-04240

A DISCRETE LINEAR MODEL FOR THE HYDROLOGIC BASIN,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
S. Ramaseshan, U. C. Chaube, and A. K. Sharma.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 367-376. 2 fig, 1 tab, 17 ref.

Descriptors: *Hydrologic systems, *Rainfall-runoff relationships, *Model studies, Digital computers, Water loss, Storm runoff, Surface runoff, Recharge, Bank storage, Peak discharge, Hydrology, Mathematical models, *Model studies.
Identifiers: *Discrete linear model, Time series model, Differential model.

The data used in hydrologic analyses are generally discrete and facilitate the use of digital computers for their solutions. A discrete linear model for the hydrologic basin was presented. It was essentially a time series model and could be related to the differential model of Chow and Kulandaiswamy. With a discrete data representation of the process and a finite order of the model, detection of component processes like abstraction and apparent effective rainfall was attempted on the basis of the fitted model. It was indicated that abstraction is present even after the end of a storm and that recharge from bank storage and/or interflow is present generally after a flood peak. A descriptive model to explain the physical process was suggested. The procedure was illustrated with an example. (See also W75-04213) (Singh-ISWS)
W75-04242

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 5B.
W75-04254

A METHOD FOR MAINTAINING CROSS AND SERIAL CORRELATIONS AND THE COEFFICIENT OF SKEWNESS UNDER GENERATION IN A LINEAR BIVARIATE REGRESSION MODEL,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Dept. of Research, Development and Planning.
For primary bibliographic entry see Field 2E.
W75-04309

GROUNDWATER STORAGE-RIVERFLOW RELATIONS IN A CHALK CATCHMENT,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
S. S. D. Foster.
Journal of Hydrology, Vol 23, No 3/4, p 299-311, 1974. 5 fig, 2 tab, 8 ref.

Descriptors: *Base flow, *Surface-groundwater relationships, *River flow, *Watersheds(Basins), *Water storage, Transmissivity, Specific yield, Storage coefficient, Mathematical models, Recession curves, Water level fluctuations, Stage-discharge relations.
Identifiers: *United Kingdom(Hull River), Linear reservoirs, Chalk catchments.

Data from continuously monitored observation boreholes and the permanent river gaging station in the West Beck catchment of the East Yorkshire Chalk were presented and analyzed. Layered hydraulic structure in the chalk aquifer was reflected in the form of and correlation between recession characteristics. A series of fairly well defined linear storage elements, each with differ-

ing coefficients of permeability and storage, appeared to be present. The distribution and variation of storage and permeability with depth may be critical factors in catchments such as this, where schemes for augmentation of drought riverflows from groundwater storage are under consideration or in pilot development. (Visocky-ISWS)
W75-04339

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
R. G. Heerdegen.
Water Resources Bulletin, Vol 10, No 6, p 1143-1161, December 1974. 2 fig, 6 tab, 38 ref.

Descriptors: *Unit hydrographs, *Storm runoff, *Hydrograph analysis, Surface runoff, Streamflow, Hydrographs, Hydrology, Runoff, *Watersheds(Basins), *Pennsylvania, Seasonal, Climatic data, *Least squares method, Model studies, Mathematical models, Floods.
Identifiers: Watershed response, Watershed parameters.

Some 96 flood events larger than the mean annual flood from 16 watersheds in the Commonwealth of Pennsylvania were used to derive unit hydrographs by the least-squares method. Analyses of the unit hydrographs were conducted to ascertain their response to watershed parameters, climatic and storm variables, and locations within different hydrologic regions. Significant differences both within and among watersheds led to the formulation and testing of hypotheses stating that differences among watersheds are caused by physiographic differences while differences within watersheds result from climatic and storm differences. The analysis showed that while many watersheds parameters strongly influence the shape of the unit hydrograph, only the storm variables duration and volume of precipitation excess produce significant differences. Seasonal differences were apparent but not proven statistically significant. (Terstriep-ISWS)
W75-04344

2B. Precipitation

RELATIONSHIPS OF RING WIDTHS IN ARID-SITE CONIFERS TO VARIATIONS IN MONTHLY TEMPERATURE AND PRECIPITATION,
Arizona Univ., Tucson. Lab. of Tree-Ring Research.
For primary bibliographic entry see Field 2I.
W75-03964

STOCHASTIC SIMULATION OF DAILY RAINFALL,
Kentucky Water Resources Inst., Lexington.
D. M. Allen, C. T. Haan, D. Linton, J. Streeb, and D. Jordan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 268, $5.25 in paper copy, $2.25 in microfiche. Research Report No. 82, 1975. 112 p, 1 fig, 13 tab, 8 ref, 4 append. OWRT A-045-KY(1). 14-31-0001-3817, and 14-31-0001-4017.

Descriptors: Simulation analysis, *Rainfall disposition, Hydrology, Precipitation(Atmospheric), Rainfall, *Stochastic processes, *Markov processes, Distribution patterns, *Kentucky, *Model studies, Water supply, Design, Probability.

The design of many water resources projects requires knowledge of possible long-term rainfall patterns. A stochastic model based on a first order Markov chain was developed to simulate daily rainfall at a point. The model is applicable to any point in Kentucky (and other areas with similar rainfall patterns). The model in its present form is useful in providing rainfall inputs into hydrologic models for designing water supply facilities and other water resources systems. The model uses historical rainfall data to estimate the Markov transitional probabilities. A separate matrix is estimated for each month of the year. In this report 7 x 7 transitional probability matrices were used. The model is capable of simulating a daily rainfall record of any length based on the estimated transitional probabilities and frequency distributions of rainfall amounts within each class interval. The simulated data are statistical properties similar to historical data. (Grieves-Kentucky)
W75-04036

NUCLEAR METEOROLOGY,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 5B.
W75-04054

SOME CHARACTERISTICS OF UPPER CLOUDS AND SUGGESTIONS REGARDING THE UTILIZATION OF RADIOACTIVE TRACERS IN MERIDIONAL FLOWS,
N. N. Romanov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 40-41.

Descriptors: *Meteorology, *Radioactivity, *Tracers, *Climatology, *Clouds, *Weather, *Winds, Air circulation, Research equipment, Aircraft, Latitudinal studies.

The analysis of numerous reports of aircraft pilots and observations during research flights in TU-104 and IL-18 aircraft led to the establishment of a relationship between the development of upper clouds and the direction of wind with a large meridional component. Independently of the character of the baric field, the clouds develop under southern and southwestern stable flows and are destroyed (or are absent) by northern and northeastern flows. This relationship is expressed more strongly in low latitudes and is weaker in high latitudes. It is assumed that such a relationship results from stable vertical currents of positive or negative sign, appearing in meridional flows on the rotation Earth. It is suggested that direct measurement of vertical motions be conducted with the aid of radioactive tracers during a rationally selected synoptic situation. (See also W75-04054) (Houser-ORNL)
W75-04059

MEAN AND TURBULENT TRANSFER OF SUBSTANCES OVER THE USSR,
I. G. Guterman.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 42-56, 10 fig, 1 tab, 13 ref.

Descriptors: *Meteorology, *Climatology, *Winds, *Turbulence, Movement, *Mixing, *Boundary layers, *Moisture, Humidity, Precipitable water, Measurement, Atmospheric pollution, Height, Seasonal, Temperature.
Identifiers: *USSR, Fluxes.

The relation is examined between the mean and turbulent fluxes of substances at the limit of the atmospheric boundary layer (1.5 km) in January and July over the USSR. The intensity of macroturbulent fluctuations, characterized by the ratio of the vectorial standard deviation of wind Sigma (sub v) to the modulus of the resultant wind (absolute value of vector V (sub r)), is equal to 100-500% in winter and 200-2,000% in summer. This results mainly from the decrease in mean transfer, since the macroturbulent component of the motion Sigma(sub v) in summer is of the same order as in winter. Turbulent heat fluxes in January hardly attain 1-3% of the fluxes due to the mean motion, while in July this ratio increases to 4-7%. Therefore, the practically horizontal heat fluxes at that level can be calculated from data on the mean temperature and resultant wind. The streamlines of turbulent heat fluxes coincide with the direction of the temperature gradient and, over the USSR in both January and July, are generally opposite to or intersect at right angles the streamlines plotted on the basis of the average wind speed vector. Hence the total heat fluxes are vectorially somewhat smaller than the mean heat fluxes. Horizontal turbulent moisture fluxes make a more important contribution to the total moisture flux. At 1.5 km, the ratio of the turbulent moisture flux to the moisture carried by the mean motion fluctuates between 20 and 180%, and in July between 40 and 140%. (See also W75-04054) (Houser-ORNL)
W75-04060

SOME THEORETICAL NOTIONS OF RADIOACTIVITY ACQUISITION BY RAINDROPS,
For primary bibliographic entry see Field 5B.
W75-04072

DISTRIBUTION OF RAINDROPS WITH RESPECT TO SPECIFIC RADIOACTIVITY,
B. I. Styro, and B. K. Vebrene.
In: Nuclear Meterology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 133-136, 4 fig, 2 ref.

Descriptors: *Meteorology, *Nuclear energy, *Radioactivity, *Radioisotopes, Distribution, *Raindrops, Analytical techniques, Density, Fallout, Clouds, Air circulation, Polonium, Research and development, Mathematics.
Identifiers: Specific radioactivity.

The distribution of raindrops was investigated with respect to their specific radioactivity. The distribution curves of droplets are similar for a uniform distribution of the isotope and when it is introduced at some point in the cloud. The position of the maximum on the curve depends on the isotope quantity. The variation in the specific radioactivity of rain during its fall was also investigated. The first specific radioactivity maximum appears several minutes after the isotope is introduced in the cloud. The second, not so sharp maximum appears after 10-15 minutes. The very rapid (3-4 min) appearance of activated droplets at the earth's surface is associated with the accelerating effect of descending air currents. (See also W75-04054) (Houser-ORNL)
W75-04073

APPLICATION OF THE STOCHASTIC APPROACH TO THE PROBLEM OF THE RADIOACTIVITY OF RAINDROPS AND CLOUD-BORNE DROPS,
For primary bibliographic entry see Field 5B.
W75-04074

COMPARISON OF THE CHARACTERISTICS OF HYGROSCOPIC AND NON-HYGROSCOPIC AERSOL WASHOUT BY CLOUD-BORNE DROPS,
For primary bibliographic entry see Field 5B.
W75-04075

ATMOSPHERIC WASHOUT OF RADIOACTIVE CONTAMINANT IN THE MOUNTAINS OF CENTRAL CAUCASUS,
For primary bibliographic entry see Field 5B.
W75-04076

RELATION BETWEEN ATMOSPHERIC PRECIPITATION WASHOUT OF RADIO-ACTIVITY AND NONACTIVE IONS,
For primary bibliographic entry see Field 5B.
W75-04079

COSMOGONIC SODIUM-22 AND BERYLLIUM-7 ISOTOPES IN INVESTIGATIONS OF ATMOSPHERIC DYNAMICS,
For primary bibliographic entry see Field 5B.
W75-04081

ARGON SPALLATION YIELDS OF COSMOGONIC RADIOISOTOPES,
For primary bibliographic entry see Field 5B.
W75-04082

TRACE ELEMENTS AND NATUR RADIOACTIVITY IN CLOUD WATER AND ATMOSPHERIC PRECIPITATION IN THE CENTRAL CAUCASUS MOUNTAINS,
For primary bibliographic entry see Field 5A.
W75-04108

PROJECT SKYWATER.
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 3B.
W75-04265

OBJECTIVE DOUBLE-MASS ANALYSIS,
West Virginia Univ., Morgantown. Water Research Inst.
M. Chang, and R. Lee.
Water Resources Research, Vol 10, No 6, p 1123-1126, December 1974. 3 fig, 5 tab, 5 ref.

Descriptors: *Mass curves, *Precipitation(Atmospheric), *Gaging stations, *Relocation, Computers, Statistical methods, Hydrologic data, Methodology, Spatial distribution, Analytical techniques, Topography, *Time series analysis.
Identifiers: Consistent simultaneous series, Multiple inconsistencies, Subjective methods, *Data analysis.

The consistency of an observed time series was tested by double-mass analysis with an appropriate and consistent simultaneous series. Partially inconsistent series were adjusted to relative consistency with the simultaneous series. A general, completely computerized method of double-mass analysis was devised to reduce subjectivity to a minimum. The only subjective assumptions retained were that a proportionality change in annual data is worthy of note if it persists for at least 5 years and that the statistical significance of a proportionality change (at any selected alpha level) was a necessary and sufficient reason for adjusting the data of the inconsistent partial series. A general technique for handling multiple inconsistencies was developed. Data inconsistency tests suggested important physical causes for the deviations. Site and gage exposure parameters, in conjunction with local precipitation data, explained much of the statistical variability in the characteristic spatial distribution of annual precipitation in mountainous areas. (Singh-ISWS)
W75-04307

THE USE OF STEREO, HORIZONTAL, AND GROUND LEVEL ORIFICE GAGES TO DETERMINE A RAINFALL-ELEVATION RELATIONSHIP,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
Water Resources Research, Vol 10, No 6, p 1138-1141, December 1974. 3 fig, 1 tab, 39 ref.

Descriptors: *Mountains, *Precipitation(Atmospheric), Alpine, Statistical methods, Rainfall, Winds, Networks, *Rain gages, Watersheds(Basins), Measurement, *Instrumentation.
Identifiers: *Rainfall-elevation relationships, Storage gages, Wind shields, *Stereo orifices, *Switzerland(Baye de Montreux).

In the range of altitude from 1100 to 1850 m above sea level the mean rainfall totals over a 10-year period from June to September as measured by means of 22 storage gages with horizontal orifices and wind shields generally decreased with increasing elevation in the upper part (6.8 sq km) of the prealpine watershed of Baye de Montreux. The substitution of a stereo orifice for the horizontal one on the nine gages located on the slopes open to rain-bearing winds resulted in a slightly increasing mean rainfall catch with increasing elevation (r = 0.430). After 23 ground level stereo gages were set up in the watershed, a visible improvement in the rainfall-elevation relationship was registered (r = 0.710). (Jones-ISWS)
W75-04330

2C. Snow, Ice, and Frost

DETERMINATION OF RADIOISOTOPE FALLOUT FROM ITS CONTENT IN CHRONOLOGICAL LAYERS OF HIGH-ALTITUDE GLACIERS,
For primary bibliographic entry see Field 5A.
W75-04057

HORIZONTAL WATER MIGRATION OF STRONTIUM-90,
For primary bibliographic entry see Field 5B.
W75-04066

NATURAL SNOWFLAKE RADIOACTIVITY DUE TO SHORT-LIVED RADON DECAY PRODUCTS,
For primary bibliographic entry see Field 5A.
W75-04107

GENERAL DISPOSITION AND AQUATIC ENVIRONMENTAL EFFECTS OF SILVER IODIDE IN PRECIPITATION MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 3B.
W75-04255

DEEP SNOW MEASUREMENTS SUGGESTED USING COSMIC RADIATION,
National Weather Service, Silver Spring, Md.
V. C. Bissell, and Z. G. Burson.
Water Resources Research, Vol 10, No 6, p 1243-1244, December 1974. 2 fig, 8 ref.

Descriptors: Snow, Instrumentation, *Radiation, *Water equivalent, *Snow cover, Attenuation, Soil moisture, Statistical methods, *Measurement, *Nevada.
Identifiers: *Lake Mead(Nev), Cosmic radiation.

The attenuation of highly penetrating cosmic radiation shows promise as a means of measuring the water equivalent of snow cover. The attenuation of cosmic radiation by water is sufficient to make the method practicable, especially for deep snow. As an example, statistical counting errors in a two-detector setup (with 10 cm by 10 cm NaI(Tl) scintillation detectors, one above the snow and one beneath the snow) would produce a water equivalent measurement accuracy of better than 1% in measuring 100 cm of water with a 24-hour measurement time. (Jones-ISWS)
W75-04331

2D. Evaporation and Transpiration

AN ENERGY PARTITION EVAPORATION RECORDER,
Commonwealth Scientific and Industrial Research Organization, Mordiallc (Australia). Div. of Atmospheric Physics.
A. C. Dilley.
Division of Atmospheric Physics CSIRO Australia Technical Paper No 24, 1974. 25 p, 17 fig, 15 ref.

Descriptors: *Monitoring, *Evaporation, *Evaporimeters, *Energy budget, Radiation, Heat transfer, Hygrometry, Water vapor, Measurement, Instrumentation, Logging(Recording), On-site tests.

An instrument is described which provides a near-continuous measurement of evaporation from natural surfaces. The instrument employs a resistive bridge technique to sense net radiation, ambient wet-bulb temperature and dry- and wet-bulb temperature differences, and employs a servo-balance system to combine the corresponding electrical signals according to a modified version of the energy balance formula. Details are given of the instrument's construction, calibration, field operation and performance. (Levick-CSIRO)
W75-03937

EFFECTS OF LOW WATER POTENTIALS ON TRANSPIRATION AND PHOTOSYNTHESIS IN MITCHELL GRASS (ASTREBLA LAPPACEA),
Queensland Univ., Brisbane (Australia). Dept. of Botany.
D. Doley, and N. B. A. Trivett.
Australian Journal of Plant Physiology, Vol 1, No 4, p 539-550, December 1974. 8 fig, 1 tab, 33 ref.

Descriptors: *Range grasses, *Australia, *Drought tolerance, Leaves, Stomata, Transpiration control, *Transpiration, *Photosynthesis, Pastures, Semiarid climates, Moisture stress.
Identifiers: *Mitchell grass, Astrebla lappacea, Queensland.

The Mitchell grasses are an important component of the dry season forage of central and western Queensland (Australia), and curly Mitchell grass, Astrebla lappacea, is the dominant species of the association in drier sites. Preliminary studies are reported on the effects of reduced leaf water potential on gas exchange in this species. Close linear relationships were established between leaf water potential and both transpiration and net photosynthesis; most of the variation in gas exchange could be attributed to changes in stomatal diffusion resistance. Gas exchange exhibited a remarkable recovery after brief but severe drought, although there was some inhibition of both transpiration and photosynthesis for about one week following rewatering. It is concluded that A. lappacea demonstrates a high degree of true drought tolerance. (Levick-CSIRO)
W75-03938

THE THREE STAGES OF DRYING A FIELD SOIL,
Agricultural Research Service, Phoenix, Ariz., Water Conservation Lab.
S. B. Idso, R. J. Reginato, R. D. Jackson, B. A. Kimball, and F. S. Nakayama.
Soil Science Society of America, Proceedings, Vol 38, No. 5, September-October, 1974. p 831-837, 6 fig, 19 ref.

Descriptors: *Evaporation, *Soil moisture, *Albedo, *Moisture content, *Drying, Soil surfaces, Soil temperature, Clay loam, Solar radiation, Dry farming, Irrigation, *Arizona.

Drying experiments were conducted on a smooth, bare field of clay loam during all seasons at Phoenix, Arizona. Measurements were made of evaporation, Soil-water contents, soil temperature, soil heat flux, albedo, and net radiation. From these measurements, three stages of soil drying were outlined. The first stage was characterized by potential evaporation. The second stage was characterized by drying of the soil surface, and significantly reduced evaporation. Stage three appears to begin when the surface water content corresponds to a retention of two molecular layers of water about the soil particles at that level; a

value of about 0.06 in this soil. A rewetting of the soil surface at night may reinstate stage two drying on the following morning after stage three initiation. Simple albedo measurements often predicted the transition points between the different stages. (Mastic-Arizona)
W75-03965

EFFECTS OF CCC ON DROUGHT RESISTANCE OF TRITICUM AESTIVUM L AND ZEA MAYS L,
Oxford Univ. (England). Dept. of Agricultural Science.
For primary bibliographic entry see Field 3F.
W75-04011

OPEN CHANNEL FLOW EVAPORATION STUDY,
Bonneville Power Administration, Portland, Oreg.
J. R. Liaw.
Intern Report, September 1973. 112 p, 23 fig, 3 tab, 47 ref.

Descriptors: *Evaporation, *Rivers, *Thermodynamics, *Numerical analysis, Energy equation, Equations, Analysis, *Oregon, Continuity equation, Winds, Meteorological data, Temperature, On-site investigations.
Identifiers: Conservation equations, Ideal gas law, *Little Deschutes River(Ore), Kinetic theory of gases.

A better understanding of evaporation from the surface of a non-stationary water body has been needed for accurate water temperature forecasting and evaporation-loss prediction. An entirely new formula was postulated by combining kinetic molecular theory, conservation of mass and energy, and the ideal gas law. This formulation was tested by using 3-hour data from the Little Deschutes River in Oregon for July 29-31, 1969. The new evaporation equation is deterministic, but it includes a dynamic wind function. The determination of the 3 dynamic coefficients for the wind function was done by an original approach. The numerical solution required basic matrix theory, the Newton-Raphson iteration scheme, and a finite difference approximation to the one-dimensional first law of thermodynamics. (Adams-ISWS)
W75-04273

2E. Streamflow and Runoff

TRANSVERSE MIXING IN RIVERS; A NUMERICAL APPROACH,
Waterloopkundig Laboratorium, Delft (Netherlands). Mathematics Branch.
For primary bibliographic entry see Field 8B.
W75-03917

MODEL-PROTOTYPE COMPARISONS FOR TRANSVERSE MIXING IN RIVERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03918

LABORATORY STUDIES ON TRANSVERSE MIXING IN RIVERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-03928

HYDROLOGIC ANALYSIS OF THE MOJAVE RIVER, CALIFORNIA, USING A MATHEMATICAL MODEL,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W75-03967

CREST-STAGE GAGING STATIONS IN OREGON--A COMPILATION OF PEAK DATA COLLECTED FROM OCTOBER 1952 TO SEPTEMBER 1974,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 7C.
W75-03969

FLOOD-HAZARD STUDY--100-YEAR FLOOD STAGE FOR BALDWIN LAKE, SAN BERNARDINO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2H.
W75-03981

THE ULTRASONIC METHOD OF RIVER GAUGING,
Department of the Environment, Reading (England). Water Data Unit.
For primary bibliographic entry see Field 4A.
W75-04026

THE HYDRAULIC GEOMETRY OF A DISCONTINUOUS EPHEMERAL STREAM IN A BAJADA NEAR TUCSON, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
F. A. Packard.
PhD/Dissertation 1974. 127 p, 20 fig, 2 tab, 27 ref.

Descriptors: *Ephemeral streams, *Streamflow, *Hydrology, *Channel morphology, *Model studies, *Hydrologic models, Geomorphology, Alluvial fans, Alluvium, Alluvial channels, Gullies, Braiding, Chutes, Perennial streams, Channeling, Valleys, Regression analysis.
Identifiers: Bajada, Hydraulic geometry.

An attempt was made to extend knowledge of the relationships among deposition, scour, morphology, and hydraulics along ephemeral discontinuous streams; develop a model for the alluviation of valleys by discontinuous streams; provide analogies between the study stream and descriptions of perennials streams; and clarify the role of discontinuous channels in the evolution of flat, grass-covered sheetflood valleys to gullied valleys. A detailed description of a discontinuity within the study area is presented with information on braid-chute units, flow data and a comparison of flow data along braid and chute reaches. Also discussed in detail is the morphology and hydrology of a fan within the study area and included is a proposed theoretical model for valley alluviation by an ephemeral discontinuous stream. (Mastic-Arizona)
W75-04125

SPECIAL FLOOD HAZARD INFORMATION REPORT: YOCKANOOKANY RIVER, DYE DITCH AND MUNSON CREEK, KOSCIUSKO, ATTALA COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W75-04204

FLOOD PLAIN INFORMATION: JORDAN RIVER COMPLEX II, MIDVALE-DRAPER, UTAH.
Army Engineer District, Sacramento, Calif.
For primary bibliographic entry see Field 4A.
W75-04205

FLOOD PLAIN INFORMATION: NORTH RUN, HENRICO COUNTY, VIRGINIA,
Army Engineer District, Norfolk, Va.
F. B. Proctor.
February, 1966. 12 p, 3 fig, photos; Technical Appendix, 25 p, Illus.

Descriptors: *Flood forecasting, *Flood plain zoning, *Flood profiles, Flood damage, Obstruction to flow, Land use, Planning, Virginia.
Identifiers: *North Run(Virginia), *Thorpe Branch(Virginia), *Rocky Branch(Virginia), *Hungary Creek(Virginia), *Henrico County, Richmond, Flood plain management, '50-year flood', Standard Project Flood.

Flood plains along North Run and its main tributaries, Thorpe Branch, Rocky Branch, and Hungary Creek, are very steep, with relatively narrow stream channels. Classified as essentially suburban with respect to development, the watershed still has large areas of woods and dense undergrowth. Due to its proximity to Richmond, it is expected that development will continue at an accelerated rate with resultant serious flood problems unless measures are taken to keep flood damage to a minimum. Extreme floods may be caused by storms which produce rainfall over a period of 6 hours or less. Both natural and man-made features may create obstructions to flow. No records of flooding or public awareness of the flood problem exist since in prior years the area was sparsely settled. Flood flows used in this study are based on flow records on small watersheds in the surrounding areas. At the mouth of North Run, the expected peak discharge of a '50-year flood' is 7,700 cfs and of a Standard Project Flood (SPF) is 16,200 cfs. Ways and means of preventing future damage on the flood plains are discussed in the technical appendix which also includes flood profiles, rainfall data and discharge estimates. If the watershed and flood plains are developed properly, there should be no need for flood control structures. (Diefendorf-North Carolina)
W75-04208

FLOOD PLAIN INFORMATION: GILLIES CREEK, HENRICO COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va
F. B. Proctor.
October, 1966. 12 p, 3 fig, technical append, photos.

Descriptors: *Flood forecasting, *Flood plain zoning, *Flood profiles, Obstruction to flow, Land use, Planning, Flood warning, Virginia.
Identifiers: *Gillies Creek(Virginia), *Henrico County(Virginia), *Lawndale Farms Branch(Virginia), *Hechler Village Branch(Virginia), Flood plain management, Standard Project Flood, '50-Year Flood', Richmond(Virginia).

The area included is a portion of Henrico County which is being rapidly developed as the housing areas push outward from Richmond. Main stream channels of Gillies Creek and its two tributaries, Lawndale Farms Branch and Hechler Village Branch, are relatively shallow and overgrown with dense vegetation. This vegetation along with 13 bridges and culverts and 2 dams create obstructions to flood flow. There are no records of flooding or public awareness of the flood problem since flooding in prior years was largely unnoticed because the area was sparsely settled. Due to lack of records of flood experience, flood flows used in the study are entirely computed based on rainfall records and on flow records of surrounding streams. At the mouth of Gillies Creek, a '50 Year Flood' would reach a peak discharge of 6,900 cfs and a Standard Project Flood (SPF) would reach 15,850 cfs. Probable flood lines are presented for use as a guide to be considered in controlling construction on the flood plain and to inform the public on the possibility of flooding. Many of the following ways of preventing future damage on flood plains have been initiated: flood plain zoning, building codes, sub-division regulations, flood plain evacuation, flood proofing. However, as far as is known, there are no existing, planned or authorized flood control works. (Diefendorf-North Carolina)
W75-04209

FLOOD PLAIN INFORMATION: CHOCTAWHATCHEE RIVER, PEA RIVER, DOUBLE BRIDGES CREEK, CITY OF GENEVA, ALABAMA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W75-04212

EVALUATION OF WATER TEMPERATURE FIELDS RESULTING FROM HEATED WATER DISCHARGES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 5B.
W75-04215

REVIEW OF HEATED SURFACE DISCHARGE MODELS APPLICABLE TO RIVERS,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5B.
W75-04229

MATHEMATICAL MODELLING AND IDENTIFICATION OF THERMAL POLLUTION IN STREAMS: A REVIEW PAPER,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 5B.
W75-04230

SENSITIVITY ANALYSIS OF THE OPTIMUM DESIGN FLOOD EVALUATED BY AN OPTIMIZATION PROCEDURE,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 4A.
W75-04234

THE TRIANGLE AS A TENTATIVE UNIT HYDROGRAPH,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-04239

A DOUBLE-TRIANGLE MODEL FOR GENERATING STORM HYDROGRAPHS,
Tennessee Valley Authority, Knoxville, Tenn. Hydrologic Research and Analysis Office.
For primary bibliographic entry see Field 4A.
W75-04241

A DISCRETE LINEAR MODEL FOR THE HYDROLOGIC BASIN,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-04242

RUN-OFF REGULATION OF THE ST. LAWRENCE AND ITS LIABILITY,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 4A.
W75-04243

A SET OF REGIME EQUATIONS FOR INDIRECTLY ESTIMATING STREAM FLOW CHARACTERISTICS,
Ohio River Basin Commission, Cincinnati.
R. A. Joering, and H. C. Preul.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 1-426. 5 fig, 1 tab, 20 ref.

Descriptors: *Channel morphology, *Alluvial channels, *Estimating equations, *Streamflow, *Channels, Regime, Channel flow, Discharge(Water), Depth, Slopes, Width, Roughness(Hydraulic), Hydraulics, Sediment transport, Annual flood, Runoff, Velocity.
Identifiers: *Hydraulic geometry, Ungaged watersheds.

A set of downstream regime equations was presented for the purpose of indirectly estimating streamflow characteristics. For use with the regime equations, empirically determined coefficients were developed for sixteen different types of channel materials. When combined with a set of universal exponents, the coefficients provide for the use of a set of equations which define the width, depth, velocity, and slope of a natural channel under bankfull flow conditions. The general form of the equations follows that previously suggested by Leopold and Maddock (1953) in a paper on hydraulic geometry. (See also W75-04213) (Humphreys-ISWS)
W75-04245

CLASSIC CANAL THEORY WITH GRAPHS AND TABLES. VOLUME I,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 8B.
W75-04269

CLASSICAL CANAL THEORY WITH GRAPHS AND TABLES. VOLUME II,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 8B.
W75-04270

SURFACE WATER DATA OF THE UPPER MICHIGAN REGION PROJECT SANGUINE, SITE STUDY.
EDAW, Inc., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-780 290, $4.25 paper copy, $2.25 microfiche. February 1974. 44 p, 2 fig, 2 tab, 20 ref, 3 append. Contract N62472-73-C-1056.

Descriptors: *Surface water availability, *Surface drainage, *Surface runoff, Streams, Rivers, Drainage, Permeability, Storage, Quality control, Glacial drift, Bacteria, Silts, Scour, *Lake Michigan, *Lake Superior, *On-site data collections, *Michigan, Water quality, Surface waters.

The study area is drained by many streams that converge into large streams and rivers flowing out of the area. These major drainages flow in two general directions. Large streams draining the northern and western portions generally flow north to Lake Superior. Streams draining the central and southeastern portions drain southeastward into Lake Michigan, or into the Menominee River (which also drains into Lake Michigan). The drainage is poorly developed in most of the area and it is characterized by numerous ponds, lakes, and swampy areas. There are often thick and extensive deposits of permeable glacial overburden, and during rain periods, much of the rain infiltrates the ground instead of running off. The presence of significant numbers of surface water bodies allows temporary storage of surface runoff. These factors combine to produce a streamflow behavior characterized by relatively gradual rises in streams, moderate peak flows, and then gradual declines in streamflow. The quality of water in the streams is generally good. The Precambrian bedrock yields little soluble material to the streams. The overlying glacial deposits in this area yield only small amounts of soluble materials. There is some bacterial contamination of streams and lakes in highly populated parts of the area. Silt loads in the streams are generally low, although stream turbidities can be high in local areas downstream of mining operations. There are potential scour problems in areas where there are appreciable thicknesses of unconsolidated glacial deposit materials. Surface water resources are not extensively developed. The main uses of streams and lakes are for recreation, fishing, and dilution of wastes. (Dawes-ISWS)
W75-04277

A METHOD FOR MAINTAINING CROSS AND SERIAL CORRELATIONS AND THE COEFFICIENT OF SKEWNESS UNDER GENERATION IN A LINEAR BIVARIATE REGRESSION MODEL,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Dept. of Research, Development and Planning.
J. P. Kahan.
Water Resources Research, Vol 10, No 6, p 1245-1248, December 1974. 8 ref, append.

Descriptors: *Synthetic hydrology, *River flow, *Statistical analysis, Time series analysis, Stochastic processes, *Regression analysis, Hydrologic data, Model studies, Analytical techniques, Correlation analysis, Monthly.
Identifiers: *Bivariate regression model, Serial correlations, Gamma random variables.

A methodology was presented for generating a series of monthly flows at a gaging station when monthly flows at another gaging station can be generated and the historic monthly flows at the two gaging stations were correlated. The mean, standard deviation, and coefficient of skewness of the generated values were chosen to conform with known data. A stepwise process was postulated whereby, unlike the usual multiple-regression technique, an extra variable was added to the otherwise complete model. By using this technique to coefficient of skewness of the flows can be maintained, a result that circumvents any attempt to calculate the joint moment generating function of gamma random variables, which proved to be the stumbling block of prior analyses. (Singh-ISWS)
W75-04309

CRE: A METHOD FOR SOLVING PROBABILITY PROBLEMS RELATED TO HYDROLOGIC TIME SERIES,
Idrotecneco, San Lorenzo in Campo, (Italy).
L. Torelli.
Water Resources Research, Vol 10, No 6, p 1113-1122, December 1974. 9 fig, 4 ref.

Descriptors: *Time series analysis, *Distribution patterns, *Statistical analysis, *Algorithms, *Numerical analysis, Stochastic processes, Methodology, Simulation analysis, Computers, Streamflow, Hydrology.
Identifiers: *Discrete distribution, Periodically correlated processes, Discretization.

When the probability structure of a time series is known, a number of probability problems related to the series remain to be answered. A new method (CRE, event realization counter) for solving such problems was proposed. It consists of approximating the original series with continuous distribution by a suitable series with discrete distribution. Exact solutions of the problems in consideration can be derived. The validity of the approximation was checked, the algorithms used were described, and a few applications of the method were shown. (Singh-ISWS)
W75-04310

GROUNDWATER STORAGE-RIVERFLOW RELATIONS IN A CHALK CATCHMENT,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 2A.
W75-04339

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W75-04344

2F. Groundwater

INTEGRATED SYSTEM IDENTIFICATION AND OPTIMIZATION FOR CONJUNCTIVE USE OF GROUND AND SURFACE WATER, PHASE II,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
For primary bibliographic entry see Field 4B.
W75-03853

STOCHASTIC MODELS FOR THE INTERACTION OF RAINFALL AND GROUNDWATER LEVELS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 2A.
W75-03949

POSSIBLE DEVELOPMENT OF WATER FROM MADISON GROUP AND ASSOCIATED ROCK IN POWDER RIVER BASIN, MONTANA-WYOMING,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W75-03972

GEOHYDROLOGIC MAP OF SOUTHERN CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-03973

SHALLOW GROUND WATER IN SELECTED AREAS IN THE FORT UNION COAL REGION.
Geological Survey, Helena, Mont.
For primary bibliographic entry see Field 5B
W75-03974

GEOLOGY AND GROUND-WATER RESOURCES OF GORDON, WHITFIELD, AND MURRAY COUNTIES, GEORGIA,
Geological Survey, Atlanta, Ga.
C. W. Cressler.
Georgia Geological Survey Earth and Water Division Information Circular 47, 1974. 56 p, 11 fig, 3 plate, 7 tab, 20 ref.

Descriptors: *Groundwater, *Water resources, *Georgia, *Hydrogeology, Stratigraphy, Basic data collections, Hydrologic data, Springs, Water wells, Water quality, Water yield.
Identifiers: Gordon County(Ga), Whitfield County(Ga), Murray County(Ga).

Groundwater resources were studied in Gordon, Whitfield, and Murray Counties, Georgia, which lie mainly in the Valley and Ridge physiographic province. Rocks range from Early Cambrian to Mississippian in age. The east edge of the tri-county area extends into the Blue Ridge and Piedmont Provinces and is underlain by metasedimentary and igneous rocks of Precambrian and possible Cambrian age. An inventory of 850 wells revealed that moderately mineralized water in quantities of 3 to 20 gpm suitable for domestic and farm supply can be obtained at depths less than 300 feet nearly everywhere in the three counties, except on steep slopes and narrow ridges. Larger yield industrial or municipal wells have been developed only in small areas underlain by carbonate rocks. Only 16 wells supply more than 50 gpm. The largest yield obtained is 300 gpm for limestone at the top of the Conasauga Formation. In adjacent counties, yields of 300 to 1,000 gpm are produced by wells less than 350 feet deep along the larger intermittent streams that drain the Knox Group. Broad exposures of the Knox in the report area contain many sites that should supply more than 300 gpm. Large supplies of groundwater are available from springs. Twenty-six springs in the area have minimum recorded flows of 200 gpm. Most of the spring water is moderately hard to hard, has a low iron content and can be used with little or no treatment. (Knapp-USGS)
W75-03984

GEOHYDROLOGY OF NEMAHA COUNTY, NORTHEASTERN KANSAS,
Geological Survey, Lawrence, Kans.
J. R. Ward.
Ground-Water Series No 2, November 1974. 19 p, 10 fig, 3 plate, 2 tab, 15 ref.

Descriptors: *Hydrogeology, *Water resources, *Kansas, Groundwater, Water supply, Water yield, Water wells, Hydrologic data, Alluvium, Sandstones.
Identifiers: *Nemaha County(Kans).

Rocks of Late Pennsylvanian and Early Permian age underlie Nemaha County, Kansas, and are exposed along stream valleys. Glacial deposits of Pleistocene age underlie most of the county and range in thickness from a few feet to 380 feet. A deep valley that is buried by early Pleistocene deposits extends from west to east across the county. Alluvial deposits beneath the terraces and along the present stream valleys are of Illinoisan to Recent age. Wells completed in bedrock formations commonly yield 50 gpm or less. Yields to wells in the glacial deposits that fill the deep buried valley may be as much as 200 gpm. Elsewhere in the country, the glacial deposits generally yield only enough water for relatively small domestic and stock supplies. Wells in alluvial deposits commonly yield 5 to 25 gpm, but yields of as much as 150 gpm are obtained locally. Water in formations of Pennsylvanian age, in most of the glacial deposits, and in the alluvial deposits is classified as a calcium-bicarbonate type. Water in the Permian rocks and in the deeply buried glacial deposits commonly is a calcium-sulfate type. Locally, concentrations of sulfate and nitrate are as much as 2,100 and 490 milligrams per liter, respectively. (Knapp-USGS)
W75-03986

GEOLOGY AND GROUND-WATER RESOURCES OF MONTGOMERY COUNTY, SOUTHEASTERN KANSAS,
Geological Survey, Lawrence, Kans.
H. G. O'Connor.
Ground-Water Series No 1, September 1974. 12 p, 5 fig, 1 plate, 2 tab, 9 ref.

Descriptors: *Hydrogeology, *Water resources, *Kansas, Groundwater, Water supply, Water yield, Water wells, Hydrologic data, Alluvium, Sandstones.
Identifiers: *Montgomery County(Kans).

In Montgomery County, Kansas, sandstone beds in the Stranger Formation, Stanton Limestone, and Chanute Shale are the most important consolidated-rock aquifers. Locally, wells in the Stranger may yield as much as 20 gallons per minute. Wells in the Chanute may yield as much as 50 gpm. Suitable water for domestic and stock use is obtained from sandstone at depths of 200 to 400 feet. In some parts of the county, groundwater may be moderately saline at depths of 50 feet or less. Fluvial deposits of Quaternary age underlie the stream valleys, and are an important source of groundwater. These deposits yield as much as 100 gpm. The water generally is very hard, but is suitable for domestic and stock use except in local areas where excessive concentrations of sulfate, sodium, and chloride are present. Aquifers in many local areas have been contaminated by brine associated with oil and gas production. The major use of groundwater is for domestic and stock supplies. All of the cities use treated surface water, and water districts obtain surface water to serve much of the rural population. (Knapp-USGS)
W75-03987

IRREVERSIBLE THERMODYNAMIC CONCEPT ON HYDROGEOCHEMICAL TRANSPORT SYSTEMS,
Nevada Univ., Reno. Desert Research Inst
For primary bibliographic entry see Field 5B.
W75-04041

WATER RESOURCES EVALUATION OF THE SOUTHERN HIGH PLAINS OF NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B
W75-04042

DEGRADATION IN GROUNDWATER AND MOBILITY OF HERBICIDES,
Nebraska Univ., Lincoln. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-04045

HYDROGEOLOGY OF THE CAREFREE RANCH AREA, MARICOPA COUNTY, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences
J. A. Boyer.
The University of Arizona, Department of Geosciences, 1974 Master's thesis. 75 p, 6 tab, 2 append, 23 fig, 2 map, 24 ref.

Descriptors: *Hydrogeology, *Aquifers, *Groundwater, *Groundwater potential, *Water storage, Groundwater movement, Precambrian era, Tertiary period, Quaternary period, Metamorphic rocks, Alluvium, Permeability, Transmissivity, Gravity studies, Pumping, Geophysics, Structural geology.

The purpose of this study was to define the groundwater availability of the Carefree Ranch area using hydrogeologic methods. The three rock units that crop out in the area are: Precambrian metamorphic rock and granite, Tertiary extrusive volcanic rock, and Quaternary to recent alluvium. The Precambrian rocks are essentially impervious. The Tertiary volcanic rocks are a potential water source, but have not yet been drilled to determine their capacity. The valley-fill alluvium, which is considered to be the best potential aquifer in the ranch area produces 50 to 225 gpm. Gravity data indicate that the basin containing the valley-fill alluvium is 7000 feet deep, and using a minimum storage coefficient of 0.07, is estimated to contain a maximum figure of 45,000 acre feet of available water. A more detailed study will be required to determine exact locations for future well sites. (Mastic-Arizona)
W75-04145

METHODS FOR ESTIMATING TRANSPORT MODEL PARAMETERS FOR REGIONAL GROUNDWATER SYSTEMS.
Battelle-Pacific Northwest Labs., Richland Wash. Water and Land Resources Dept.
S. W. Ahlstrom, R. J. Serne, R. C. Routson, and D. B. Cearlock
Available from the National Technical Information Service, Springfield, Va. 22161, as BNWL-1717, $4.00 paper copy, $2.25 microfiche. Report No BNWL-1717, 1974. 23 p, 6 fig, 3 tab, 5 ref, append. AEC Contract AT (45-1)-2130.

Descriptors: *Methodology, *Estimating equations, Groundwater, *Dispersion, *Sorption, Transport depletion, Water quality, Model studies, Hydrologic models, Analytical models, Hydrologic data, Aquifers, *Groundwater movement, Hydraulic conductivity, Diffusion, *Path of pollutants.

Identifiers: *Convection-diffusion equation, Transport models, Hanford groundwater system.

The measurement of dispersion and sorption coefficients to the degree of detail required by a calculated transmissivity (or permeability) for the unconfined aquifer beneath the Hanford Reservation would be extremely expensive and time-consuming, if not impossible. As an alternative, methodologies were developed for estimating dispersion and sorption coefficients from correlations with characteristic soil properties. Preliminary correlations were proposed and contour maps of dispersion and sorption coefficients for the Hanford aquifer as determined from these correlations were presented. (Prickett-ISWS)
W75-04271

IDENTIFICATION OF A DISTRIBUTED PARAMETER SYSTEM IN HYDROLOGY,
California Univ., Berkeley. Operations Research Center.
A. Rath.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-781 524, $6.25 paper copy, $2.25 microfiche. Research Report No. 74-15, May 1974. 141 p, 9 fig, 5 tab, 71 ref, 2 append. NSF Grant GP-30961X2.

Descriptors: *Groundwater resources, *Hydrologic systems, *Subsurface waters, *Aquifer systems, *Simulation analysis, Groundwater movement, Hydrogeology, Hydrology, Water resources, Optimization, Mathematical models, Aquifer characteristics, Aquifer management, Parametric hydrology, Transmissivity, Computer models, Computer programs, Digital computers, Numerical analysis, Finite element analysis.
Identifiers: Parabolic partial differentials, Newton method, Gauss-Newton method.

The determination of the unknown functions governing aquifer behavior, especially the transmissibility function, was studied. The behavior of the aquifer was considered to be governed by a two-dimensional linear parabolic differential equation. The inverse or identification problem was to determine the unknown functions in the above differential equation by observations on the aquifer potentials. The identification of the unknown transmissibility function was formulated in a variational framework and consisted of minimizing a certain error functional. The above problem was not well posed without restrictions on the function spaces. The transmissibility function was restricted to a certain class and was approximated by combination of piecewise bilinear functions. The degree of detail of the approximation was made to depend on the available data. Numerical procedures were provided for the solution of the partial differential equation and the above minimization problem. The procedure outlined was used on examples and the results were presented to demonstrate the feasibility and usefulness of the approach. (Terstriep-ISWS)
W75-04280

SECOND-ORDER THEORY OF FLOW IN THREE-DIMENSIONAL DEFORMING MEDIA,
Centro di Ricerca IBM di Venezia (Italy).
G. Gambolati.
Water Resources Research, Vol 10, No 6, p 1217-1228, December 1974. 15 fig, 44 ref, 1 append.

Descriptors: *Groundwater movement, *Land subsidence, *Compaction, *Mathematical studies, *Unsteady flow, *Aquifers, Equations, Numerical studies, Artesian aquifers, Groundwater mining, Pore water, Overdraft, Sediments, Subsidence, Pore pressure.
Identifiers: *Three-dimensional flow, Horizontal soil displacement, Noordbergum effect.

A basic assumption in groundwater flow theory is that consolidation occurs in the vertical direction only. In real three-dimensional media this condition is not satisfied a priori. A second-order theory of flow was developed including the consideration of horizontal soil displacements. The 'strain nucleus' or 'tension center' approach, well-known in thermoelasticity was used. The formulation of the theory showed that volume strain in a point P of the system could be viewed as being distinctly contributed by pore pressure variations in and outside P. The latter contribution, which vanishes identically in one-dimensional media, was called the 'three-dimensional effect.' Solutions applied to a semi-infinite mechanically homogeneous medium showed that the three-dimensional effect was negligible and the diffusion equation was good as long as the ratio W between the average depth and the thickness of aquifer is greater than or equal to Z, whatever its areal exent. If W is less than 2 (shallow and thick aquifers), the above effect produces an additional compression of soil during an intermediate stage after pumping began and hence a slowing down of the rate of pressure head decline, as has been predicted by standard solutions. The most critical conditions occur for W = 1/2, i.e., in unconfined aquifers. The present theory allowed for a short qualitative analysis of the 'Noordbergum effect' or reverse water level fluctuations. (Prickett-ISWS)
W75-04308

THE SHAPE OF THE INTERFACE IN STEADY FLOW IN A STRATIFIED AQUIFER,
Technion - Israel Inst. of Tech., Haifa (Israel). Dept. of Civil Engineering.
Y. Mualem, and J. Bear.
Water Resources Research, Vol 10, No 6, p 1207-1215, December 1974. 12 fig, 1 tab, 8 ref.

Descriptors: *Groundwater movement, *Saline water-freshwater interfaces, *Stratification, *Steady flow, Equations, Model studies, Coasts, *Aquifers, *Saline water intrusion, Water pollution sources, Encroachment, Sea water, Seepage, Mathematical studies, Dupuit-Forchheimer theory, Artificial recharge, Confined water, Analytical techniques.
Identifiers: *Hele-Shaw models, Israel, Semipervious layers, *Coastal aquifers.

The shape of the interface in a coastal aquifer in which a thin horizontal semipervious layer is present was studied. Field obsrevations and laboratory experiments showed that under these conditions a discontinuity in the shape of the interface occurs such that a freshwater region exists under the semipervious layer while immediately above it, saline (or mixed) water is present in the aquifer. An approximate solution was presented for the shape of the interface below the semipervious layer and for the extent of the freshwater region above it under steady state conditions. The solution was based on the Dupuit assumption and on a linearization of part of the flow equations. Laboratory experiments on a Hele-Shaw model showed a good agreement between the forecasted interface profiles and those actually observed in the model. From the results of the experiments it follows that the separation of the interface into two parts, below and above the semipervious layer, decreases as the length of landward seawater intrusion increases. The proposed solution can readily be applied to the case of a phreatic surface under an artificial recharge basin when the aquifer is separated into subaquifers by a sequence of semipervious layers. (Prickett-ISWS)
W75-04329

RISE AND DECLINE OF THE WATER TABLE INDUCED BY VERTICAL RECHARGE,
California Univ., Davis.
M. A. Marino.
Journal of Hydrology, Vol 23, No 3/4, p 289-298, 1974. 1 fig, 9 ref.

Descriptors: *Water table, *Recharge, *Drains, *Deep percolation, Dupuit-Forchheimer theory, *Groundwater movement, Saturated flow, Hydraulic properties, Mathematical models, Water table aquifers, Analytical techniques, *Aquifers.
Identifiers: Boundary-valve problems.

Analytical expressions were presented for the water-table rise and decline in an unconfined aquifer bounded by two streams or drains and receiving vertical recharge. In addition, expressions for the maximum height of the water table were included. The water levels in the drains were considered to be at equal elevation. Two types of recharge were treated: time-varying and uniform. The solutions were expressed in terms of the head averaged over the depth of saturation. A judicious choice of the weighted mean of the depth of saturation was necessary in all applications of the solutions presented. For instance, the water-table profiles were calculated by the method of successive approximations. The weighted mean of the depth of saturation during a period of flow was taken as a first approximation equal to the initial depth of saturation. The first approximation of the height of the water table was then calculated. In the second trial the weighted mean depth was approximated by the average of the initial depth of saturation and the first approximation of the height of the water table. The procedure was repeated until the value of the calculated height of the water table converged. (Visocky-ISWS)
W75-04333

MODELS OF DISPERSION IN A GRANULAR MEDIUM,
California Univ., Davis.
M. A. Marino.
Journal of Hydrology, Vol 23, No 3/4, p 313-318, 1974. 10 ref, 1 append.

Descriptors: *Dispersion, *Porous media, *Adsorption, Mass transfer. Dissolved solids, Velocity, Convection, Analytical techniques, Solutes, *Groundwater movement, *Mathematical models, Seepage, Model studies, Path of pollutants.

Mathematical models were developed for dispersion problems within a saturated granular medium in a unidirectional flow field in which the concentration of the displacing fluid was considered to be a function of time. The medium was assumed to be homogeneous, isotropic, and semi-infinite in areal extent. The effect of adsorbing and non-adsorbing granular media was taken into account. The models are useful for predicting the concentration of contaminants in representative field problems. (Visocky-ISWS)
W75-04340

2G. Water In Soils

APPLICATION OF SURFACE MODERATORS TO MEASUREMENT OF WATER CONTENT IN FIELD TOPSOILS WITH A NEUTRON MOISTURE DEPTH GAUGE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
E. W. Pook, and T. Hall.
Field Station Record, Division of Plant Industry, CSIRO (Australia), Vol 13, No 1, p 31-42, 1974. 6 fig, 1 tab, 6 ref.

Descriptors: *Neutron meters, *Calibrations, *Soil moisture meters, *On-site tests, *Topsoils, Moisture content, Measurement, Forest soils, Soil surfaces, Plastics, Cadmium.
Identifiers: Surface moderators.

Surface moderators are considered for use with neutron moisture gauges in order to extend the application of the normal soil calibration to gauge measurements made at relatively shallow depths, and to help maintain or improve the precision of

measurements related to discrete toposil layers over a useful range of soil moisture contents. The effectiveness of a polythene surface shield along and in combination with each of two sizes of cadmium annulus as surface moderators in moderately heteorogeneous forest toposils under field conditions has been assessed. The polythene shield with a small cadmium annulus was found to be most successful in extending the range of the normal soil calibration to data obtained at 10 cm depth. Gauge estimates of water content to that depth were related with good precision to mean moisture content of the top 20 cm of soil in the range from 6% to 22% water by volume. Changes in mean moisture content of the top 20 cm layer of soil may be monitored with acceptable accuracy without surface moderators, using the normal gauge calibration. (Levick-CSIRO)
W75-03940

EFFECT OF SULFURIC ACID AND SULFUR DIOXIDE ON THE AGGREGATE STABILITY OF CALCAREOUS SOILS,
UArizona Univ., Tucson Dept. of Soils, Water and Engineering.
S. Miyamoto, H. L. Bohn , J. Ryan, and M. S. Yee.
Soil Science, Vol. 118, No. 5, Nov. 1974, p 299-303. 2 tab, 3 fig, 12 ref.

Descriptors: *Soil aggregates, *Soil erosion, *Soil stability, *Sulfur compounds, *Carbonates, *Atmospheric fallout, Soil temperatures, Calcareous soils, Druing, Southwest U. S., Silts.
Identifiers: Sulfuric acid, Sulfur dioxide.

Soils are being increasingly exposed to sulfuric acid (H2SO4) and sulfur dioxide (SO2), both common waste products from smelting, fossil fuel combustion, and other industrial activities. The proper use of sulfuric acid can contribute to increased productivity in calcareous and sodic-calcareous soils. The water-stable soil aggregates were measured for two sodic-calcareous and six calcareous soils treated with H2SO4 and SO2. The amount of sulfur which may cause significant reduction in aggregate stability depends on the soil basicity. Drying of the soils further destroyed the aggregates, probably by enhancing the reactions with H2SO4. The sorption of SO2 from moist streams also reduced aggregate stability, but to a lesser degree than an equivalent amount of H2SO4. It is uncertain whether the aggregate destroyed by this process contributes to increasing soil erosion. (Mastic-Arizona)
W75-03952

DUNE SAND STABILIZATION WITH SYNTHETIC SOIL CONDITIONERS: A LABORATORY EXPERIMENT,
Ghent Rijksuniversiteit (Belgium). Soil Physics, Soil Conditioning and Horticultural Soil Sciences Lab.
D. Gabriels, M. De Boodt, and D. Minjauw.
Soil Science, Vol. 118, No. 5, November, 1974, p 332-338. 7 tab, 3 fig, 10 ref.

Descriptors: *Dune sands, *Rainfall, *Infiltration, *Soil surface.s, *Erosion control, Raindrops, Rainfall simulators, Asphalt, Moisture content, Rainfall intensity, Runoff, Erosion.
Identifiers: *Splash erosion, Polyvinyl acetate, Polyacryl amide.

Dune sand was subjected to a range of rain intensities from which a linear relationship was found between the side splash erosion and the kinetic energy of the rainfall. This relationship was used to study the influence of different amounts of chemicals sprayed as a mulch or mixed with the top layer of sand in order to stabilize this sand under raindrop action. Polyvinyl acetate, polyacryl amide with a cross-linker, and an asphalt emulsion applied at proper rates can be used for dune sand stabilization. Further studies are needed to determine the toxicity of these treatments to plants, and to see if seeds can germinate through the soil conditioner film. (Mastic-Arizona)
W75-03953

EFFECT OF SOIL TEMPERATURE ON DIRECTION OF CORN ROOT GROWTH,
Ontario Ministry of the Environment, Toronto.
For primary bibliographic entry see Field 3F.
W75-03954

MECHANISTIC RESPONSE OF EXPANSIVE CLAYS,
Indian Inst. of Tech., Madras, Soil Engineering Lab.
K. S. Sankaran, and Rao D. Venkateshwar.
Soil Science, Vol 118, No. 5, Nov, 1974. p 289-298, 2 tab, 1 fig, 42 ref.

Descriptors: *Clay minerals, *Clays, *Compressibility, Montmorillonite, Model studies.
Identifiers: *Clay-water system, Swelling.

A microscopic model of expansive clay-water systems was developed based upon a critical examination of the literature. A mechanistic response of expansive clays is also presented. Clays may be in the form of clay platelets, clay crystals, clay aggregates, clay congolmerates, or any combination of these depending upon environmental conditions and the purity and type of the clay mineral. The compressibility characteristics of the clay and water system have been grouped into three pressure ranges: initial, intermediate, and final stage of compression. An analysis of existing data on compression and rebound characteristics was made for sodium and calcium montmorillonitic clays. The analysis conformed to the microscopic model of clay and the postulation with regard to the mechanistic response of expansive clays under pressure. (Mastic-Arizona)
W75-03955

STEADY FLOWS OF WATER AND SALT IN UNIFORM SOIL PROFILES WITH PLANT ROOTS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 2I.
W75-03956

THE THREE STAGES OF DRYING A FIELD SOIL,
Agricultural Research Service, Phoenix, Ariz., Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W75-03965

EFFECT OF SOIL MOISTURE REGIMES, PHOSPHORUS AND NITROGEN ON N AND P UPTAKE BY BARLEY (HORDEUM VULGARE L.),
Haryana Agricultural Univ., Hissar (India).
For primary bibliographic entry see Field 3F.
W75-03991

NITRATE AND CHLORIDE ACCUMULATION AND DISTRIBUTION IN FERTILIZED TILE-DRAINED SOILS,
Minnesota Univ., St. Paul. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-04022

SOIL ADSORPTION OF HUMIC COLOR,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04043

ACCUMULATION OF STRONTIUM-90 IN SOILS,
For primary bibliographic entry see Field 5B.
W75-04062

CESIUM-137, STRONTIUM-90, AND LEAD-210 IN SOIL OF THE FAR NORTH REGIONS,
For primary bibliographic entry see Field 5B.
W75-04063

COMPARATIVE DISTRIBUTION OF STRONTIUM-90 AND CESIUM-137 IN DIFFERENT TYPES OF SOILS,
For primary bibliographic entry see Field 5B.
W75-04064

DISTRIBUTION AND MIGRATION OF STRONTIUM-90 IN SOILS,
For primary bibliographic entry see Field 5B.
W75-04065

ASSESSMENT OF RADON EMANATION FROM THE SURFACE OF EXTENSIVE TERRITORIES,
For primary bibliographic entry see Field 5B.
W75-04090

GRAPHOANALYTICAL METHOD FOR DETERMINING CESIUM-137 CONCENTRATION IN SOIL SAMPLES FROM THE GAMMA SPECTRUM,
For primary bibliographic entry see Field 5A
W75-04101

FLUE-CURED TOBACCO YIELD AND OXYGEN CONTENT OF SOIL IN LYSIMETERS FLOODED FOR VARIOUS PERIODS,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center
For primary bibliographic entry see Field 3F
W75-04111

THE EFFECT OF GYPSUM TREATMENT ON THE SWELLING OF NATURAL CLODS OF A CLAY SOIL,
Commonwealth Scientific and Industrial Research Organization, Deniliquin (Australia). Div. of Plant Industry.
B. J. Bridge, and J. Tunny.
Soil Science, Vol 115, No 6, June 1973. p 414-419, 4 fig, 1 tab, 18 ref.

Descriptors: *Clays, *Porosity, *Soil moisture, *Wetting, *Soil treatment, Gypsum, Sodium, Calcium, Infiltration, Bulk density, Moisture content, Soil horizons, Submergence, Soil texture, Impervious soils.
Identifiers: Distilled water.

Three treatments were applied to clods of clay soil to reduce swelling and improve water entry. The treatments were: first, wetting with distilled water; second, wetting with saturated gypsum solution; and third, wetting with distilled water following gypsum treatment. The gypsum treatment limited the amount of swelling in the clods as a result of replacement of sodium ions with calcium ions on the clay exchange sites. The gypsum treatment also improved the air-filled pore space in clods from the B horizon with a 59 percent clay content. Investigations of the pore-space relations and swelling properties in A and B horizons of the clay soil clods were made using a saran resin coating technique. (Mastic-Arizona)
W75-04132

A FLOTATION METHOD FOR THE RAPID MEASUREMENT OF THE WET BULK DENSITY OF SOIL CLODS,
National Inst. of Agricultural Engineering, Penicuik (Scotland).
D. J. Campbell.
J Soil Sci, Vol 24, No 2, p 239-243, 1973.
Identifiers: *Clods(Soil), Coating, *Flotation method, Immersion, Measurement, Resin, Soil, Wet bulk density, *Soil density

The clods are sprayed with a waterproof coating of a resin and then immersed sequentially in liquids of different specific gravity. It is compared with the wax coating method for a selection of soil textures and moisture contents and shown to be 10 times as rapid when used to measure wet bulk density with an accuracy of plus or minus 0.05 g/cm cu. The flotation method was used to show that, for 3 contrasting soils, clod wet bulk density is independent of clod size.--Copyright 1974, Biological Abstracts, Inc.
W75-04135

INFLUENCE OF IRRIGATION WATER QUALITY ON EXCHANGEABLE SODIUM PERCENTAGE IN A SODIC SOIL,
Uttar Pradesh Agricultural Univ., Pantnagar (India).
B. S. Rawat, and T. A. Singh.
Annals of Arid Zone, Vol 13, No 1, March, 1974. p 39-46, 1 fig, 3 tab, 10 ref.

Descriptors: *Irrigation water, *Water quality, *Percolation, *Soil water, *Soil chemical properties, Sodium, Calcium, Magnesium, Leaching, Electrolytes, Permeability, Soils, Salts, Conductivity.
Identifiers: SAR(Sodium absorption ratio), ESP(Exchangeable sodium percentage).

Studies using different quality irrigation waters showed that more efficient leaching was accomplished with waters of high electrolyte concentrations and low sodium absorption ratio (SAR) values. Greater amounts of water with high SAR are required to remove a given amount of salt than water with a low SAR. In order to reclaim a sodic soil having a high exchangeable sodium percentage (ESP), leaching should be carried out with waters of high electrolytic concentrations and low SAR values. Such waters will improve permeability as well as facilitate leaching. ESP values will be lower in the upper layers compared to the lower layers of the soil because of the smaller amounts of calcium and magnesium that remain in the percolating solution to effect sodium exchange in the lower layers. (Mastic-Arizona)
W75-04136

COMPARISON OF SOME METHODS FOR DETERMINING ORGANIC PHOSPHORUS IN SOME NIGERIAN SOILS,
Institute for Agricultural Research, Zaria (Nigeria).
V. B. Ipinmidun.
Soil Science, Vol 115, No 4, April 1973. p 324-325, 1 tab, 7 ref.

Descriptors: *Phosphorus compounds, *Organic compounds, *Soil types, *Hydrolysis, *Soil texture, Solubility, Hydrogen ion concentration.
Identifiers: *Nigeria.

The purpose of this study was to find the method that would give the best approximation of the organic phosphorus in a variety of soils and also lend itself to rapid routine determination. Samples were analyzed using the ignition methods of Sauders and Williams (J. Soil Science 6:254-267, 1955), and of Legg and Black (Soil Sci. Soc. Am. Proc 19:139-143, 1965); and extraction methods of Mehta, Legg, Goring, and Black (Soil Sci Soc. Am. Proc. 18:443-449, 1955), and Harrap (J. Soil Sci 14:82-87, 1963). Results showed agreement between the Mehta et al and Harrap extraction methods and the Legg and Black ignition method. Therefore the convenience and speed, along with the accuracy of organic phosphorus determination, commend the Legg and Black ignition method for use in routine analysis on soils similar to the ones used in the study. (Mastic-Arizona)
W75-04139

DISTRIBUTION OF BORON IN SALT AFFECTED AND CONTIGUOUS NORMAL SOILS,
Central Soil Salinity Research Inst., Karnal (India).
G. P. Bhargava, S. K. Singhla, and I. C. Gupta.
Annals of Arid Zone, Vol 13, No 1, March 1974. p 32-38, 4 tab, 14 ref.

Descriptors: *Saline soils, *Sodium, *Boron, *Saline water, Chlorides, Carbonates, Bicarbonates, Hydrogen ion concentration, *Leaching, Soil profiles, Soil properties, Electrical conductance, Toxicity.

An attempt was made in this study to correlate boron in saturated soil extracts to various soil characteristics including ESP (exchangeable sodium percentage), soluble sodium carbonate, and chloride ions. A number of soil profiles were sampled having a wide variety of different soil characteristics. In the saline-sodic type soils, boron was found to be positively correlated with pH, ECe (electrical conductivity), ESP, sodium, carbonate, chloride and bicarbonate ions, but no such correlation was discovered in normal and chloride type soils. The reason for the poor correlation between boron and the various soil characteristics in the chloride and normal type soils was not clear. More efficient leaching and small amounts of exchangeable sodium in these soils were considered as possible reasons. (Mastic-Arizona)
W75-04141

EVALUATION OF EDDHA AS AN EXTRACTION AND ANALYTICAL REAGENT FOR ASSESSING THE IRON STATUS OF SOILS,
Nevada Agricultural Experiment Station, Reno.
G. V. Johnson, and R. A. Young.
Soil Science, Vol 115, No 1, January 1973. p 11-17, 1 fig, 5 tab, 21 ref.

Descriptors: *Iron, *Calcareous soils, *Acidic soils, *Spectrophotometry, Organic matter, Analytica techniques, Hydrogen ion concentration, Photosynthesis.
Identifiers: EDDHA(Ethylene di(O-hydroxyphenylacetic acid)), Iron chlorosis.

Crops growing on calcareous soils as well as many acid soils are subject to iron chlorosis. The effectiveness of EDDHA (ethylene di(O-hydroxyphenylacetic acid)) as an extraction and analytical reagent for assessing the iron status of soils was studied. Results of the study show EDDHA has potential as an extracting iron that is related to the metabolically active iron in the plant. Direct spectrophotometric analysis of EDDHA extracts yielded high results because of light absorption by soil organic matter. Procedures are outlined which can eliminate this error, which is considered minor because it was relatively constant for all soils analyzed. The methods using EDDHA offer an economic advantage over other methods and could be adapted for routine laboratory use. (Mastic-Arizona)
W75-04144

USE OF A MICROWAVE REMOTE SENSOR FOR DETERMINATION OF WATER IN SUBSOILS,
Missouri Univ., Rolla. Dept. of Electrical Engineering.
B. K. Park, J. E. Adair, and C. McDowell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 255, $3.75 in paper copy, $2.25 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, August 1974. 40 p, 8 fig, 5 tab, 2 ref. OWRT A-070-MO(1). 14-31-0001-4025.

Descriptors: Soils, *Remote sensing, *Soil moisture, Measurement, Analytical techniques, Soil properties, Soil analysis, *Subsoil, Microwaves.
Identifiers: *Microwave remote sensing devices.

Laboratory equipment using a microwave remote sensor was developed for measuring the amount of moisture in different soil materials. A technique based on the measurement of the microwave transmission properties of samples located within a waveguide was used and the frequency used was 10.525 GHz. Input impedance was measured by slotted line techniques. Calculations of the complex dielectric constant were made for each measured value of the complex propagation constant to provide a comparison with measured values of various soils. Evaluations were made for the use of passive and active microwave remote sensing devices for water content of soils under different conditions. Additional studies are needed to determine accuracy for measuring moisture in subsoils.
W75-04149

NITRIFICATION IN SOIL-WATER SYSTEMS: A COMPUTERIZED ACTIVATED COMPLEX MODEL,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 5B.
W75-04235

THE APPROXIMATE PROBABILITY DENSITY FUNCTION OF RANGE AND ADJUSTED RANGE,
National Energy Authority, Bangkok (Thailand).
For primary bibliographic entry see Field 6A.
W75-04246

EXPERIMENTAL METHODS FOR OBTAINING PERCOL MODEL INPUT AND VERIFICATION DATA,
Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-04276

LYSIMETRIC AND CHEMICAL INVESTIGATIONS OF PEDOLOGICAL CHANGES: I. LYSIMETERS AND THEIR DRAINAGE WATERS,
Missouri Univ., Columbia.
W. J. Upchurch, M. Y. Chowdhury, and C. E. Marshall.
Soil Sci. Vol 116, No 4, p 266-281. 1973, Illus.
Identifiers: *Beidellite, Cations, Chemicals, Drainage, *Lysimeters, Minerals, *Pedological changes, *Soil profiles, X-ray diffraction, Clays, Loam.

Twenty-four filled-type lysimeters with associated plots on the Mexico silt loam soil were studied over the period April 1963-Nov. 1969. Additions of 5 cations as carbonatesor bicarbonates, Ca, Mg, Na, K, and NH4, were made at 2 depths, 4-12 in. and 16-24 in., in cropped and uncropped series. The drainage waters from the lysimeters were collected, measured and analyzed for Ca, Mg, Na, K, Si, Al and Cl. In the fallow series, 2.67-15.29% of the rainfall appeared as drainage; the grass series gave 0-4.48% (mean annual rainfall was 38 in., well distributed). Chloride added initially in the top of 4 in. of the soil was recovered in 1- over 5 yr, the lysimeter showing the greatest throughput of water giving the most rapid loss. The soil profile was characterized by determinations of exchangeable cations and exchange capacity at different depths, and by X-ray diffraction on 2 fractions of the clay, 2 micro-0.2 micro and less than 0.2 micro. The dominant clay mineral is beidellite. A mixed layer of mica-beidellite is also present. Kaolinite occurs in very small amounts, especially in the fine fractions. The 0.7 in. surface layer contains less well-defined beidellite than the lower horizons. Cationic ratios such as Na/K and Mg/Ca showed significant variations with depth. The data for Mg, Na, K, pH and SiO2 from successive lysimeter samples were plotted on Garrels and Christ diagrams. For Mg the points lie close to the beidellite-kaolinite boundary, Na and K are in the

kaolinite area. Comparison with results for equilibrated soil samples from the 28-32-in. layer showed poor agreement. The gravel layer in the lysimeter had cation exchange properties different from those of the lowest layer of soil. It was therefore insufficiently inert.--Copyright 1974, Biological Abstracts, Inc.
W75-04311

EVALUATION OF CRITERIA FOR SEPARATING SOILS WITH XERIC AND UDIC MOISTURE REGIMES,
Bureau of Land Management, Portland, Oreg.
B. R. Thomas, G. H. Simonson, and L. Boersma.
Soil Sci Soc Am Proc. Vol 37, No 5, p 738-741. 1973, Illus.
Identifiers: Cambial, Criteria, *Moisture depletion, Soil classification, Pseudotsuga-Menziesii, Soils, *Udic moisture regime, *Xeric moisture regime, *Soil moisture, *Soil water suction, *Oregon, Soil-water-plant relationships.

Criteria for classifying soil series in the Coast Range Mountains of western Oregon into categories with xeric and udic moisture regimes were evaluated. Relationships among soil-water suction, plant-water suction, and cambial activity of Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco) were also evaluated. Soil-water content was measured with gypsum blocks. Plant-water suction of Douglas-fir branch tips was measured with a pressure bomb. These measurements were taken early in the morning at least once every 10 days. Experimentals sites were selected on 3 soil series and 1 north slope soil phase tentatively classified as xeric and on 4 soil series tentatively classified as udic. The 4 study sites in the xeric zone had soil-water suctions equal to or greater than 15 bars within the soil-water control section for at least 60 consecutive days. None of the 4 study sites in the udic zone were dry that long. Cumulative water deficit in the xeric zone was about 75% of the seasonal total when the entire soil-water control section attained 15 bars. Almost all available water was removed from the upper third of the profile in the xeric zone when the trees stopped producing springwood. Much less water was removed from the upper third of the profile in the udic zone. The same relationship held true for the available water in the entire profile at time of dormancy. Trees in the xeric zone produced springwood of 23 more days and have 26 more days total growing time than trees in the udic zone. Changes of soil and plant-water suction with time showed similar patterns but different magnitudes. Plant-water suction cannot be used in lieu of soil-water suction for purposes of soil classification.--Copyright 1974, Biological Abstracts, Inc.
W75-04312

TEMPERATURE REGIMES AND CLASSIFICATION OF SOME WELL-DRAINED ALPINE SOILS IN ALASKA,
Soil Conservation Service, Palmer, Alaska.
S. Rieger.
Soil Sci Soc Am Proc. Vol 37, No 5, p 806-807. 1973.
Identifiers: *Alaska, *Alpine soils, Pergelic temperature regime, *Soil terperature, *Soil classification, Soil drainage.

Temperatures at a depth of 50 cm were taken in 4 well-drained alpine soils of interior and south-central Alaska (USA) over a 3 yr period. The soils of the interior, under a strongly continental climate, have a pergelic temperature regime, but those of coastal mountain under a cool maritime climate do not.--Copyright 1974, Biological Abstracts, Inc.
W75-04314

EFFECT OF LEVEL TERRACES ON SOIL MOISTURE CONTENT AND UTILIZATION BY CORN,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 3F.
W75-04315

EFFECT OF TRACTOR TRAFFIC, SURFACE MULCH AND SEEDBED CONFIGURATION ON SOIL PROPERTIES,
Agricultural Research Service, Big Spring, Tex.
For primary bibliographic entry see Field 3F.
W75-04316

EFFECTS OF NATURAL MICROBIAL PREPARATIONS ON THE ELECTROKINETIC POTENTIAL OF BACTERIAL CELLS AND CLAY MINERALS,
New York Univ., N.Y. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-04317

EFFECT OF MOISTURE REGIMES AND GREEN MANURING ON FERROUS IRON CONCENTRATION IN SOIL AND GROWTH AND YIELD OF PADDY,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 3F.
W75-04318

LOESS DISTRIBUTION ON A WISCONSIN-AGE TILL PLAIN IN SOUTHWESTERN OHIO,
Landmark, Inc., Columbus, Ohio.
A. G. Hock, L. P. Wilding, and G. F. Hall.
Soil Sci Soc Am Proc. Vol 37, No 5, p 732-738. 1973, Illus.
Identifiers: *Carbonates, *Loess distribution, *Ohio, *Soil types, Till plains, Topography, Variability, Surface elevation, Soil classification.

Loess thickness, depth to carbonates, nature of loess-till contact, soil type and surface elevation were observed at 15 m (or alternatively 30 m) intervals along 8.5 km of pipeline trench wall; similar observations were made at 4.6 m intervals in 3 41 m x 41 m grid sites each containing 100 observation points. Over 800 observations were made. Data were statistically summarized according to soil drainage classes (landscape position) and glacio-physiographic regions. Loess blankets the landscape, but is usually thickest on poorly-drained landscape positions and, except for local pockets, thins or becomes absent on slopes more than 5%. Local distribution of loess is highly variable over horizontal distances of 7.5 m or less and is directly related to the irregular microtopography of the underlying till surface. Construction of a loess isopachous map for this area was deemed impractical because of the large number of observations that would be required to estimate mean loess thickness classes within relatively narrow limits (plus or minus 20%), even on relatively stable geomorphic areas. No source area(s) could be identified for these loess deposits based on loess thickness or particle-size parameters.--Copyright 1974, Biological Abstracts, Inc.
W75-04320

ISOLATED SOIL COLUMNS FOR PLANT RESEARCH: PROCEDURE AND UNIFORMITY TRIAL,
Agricultural Research Service, Logan, Utah.
For primary bibliographic entry see Field 3F.
W75-04321

LYSIMETER INSTALLATIONS IN SANDSTONE AT STYRRUP, NOTTINGHAMSHIRE,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
R. Kitching, and L. R. Bridge.
Journal of Hydrology, Vol 23, No 3/4, p 219-232, 1974. 7 fig, 2 tab, 2 ref.

Descriptors: *Lysimeters, *Sandstones, Neutron activation analysis, Groundwater, Infiltration, Permeability, Observation wells, Boreholes, Membranes, Instrumentation, Measurement, Pumping.
Identifiers: *Neutron probes, *Bunter Sandstone(UK).

The construction and operation were described of two relatively large lysimeters installed to measure the infiltration from rainfall on undisturbed blocks (100 sq m) of Bunter Sandstone in north Nottinghamshire, England. The lysimeters were surrounded by impermeable membranes installed in trenches to minimize disturbance of the adjacent strata and grouted into the impermeable marl below the base of the sandstone. A dewatering borehole in each lysimeter kept the water levels inside and outside equal. During 1972 pumping tests were carried out on each lysimeter to determine the rate of leakage under known head conditions Leakage varied from 0.00417 to 0.00554 cm water/day/cm head. Moisture contents inside and outside the lysimeters were measured with neutron probes. (Roberts-ISWS)
W75-04332

A GAMMA TRANSMISSION METHOD FOR THE DETERMINATION OF MOISTURE CONTENT IN SOILS,
Uttar Pradesh Irrigation Dept., Locknow (India).
R. S. Saksena, S. Chandra, and B. P. Singh.
Journal of Hydrology, Vol 23, No 3/4, p 341-352, 1974. 10 fig, 2 tab, 4 ref.

Descriptors: *Nuclear moisture meters, *Gamma rays, *Soils, *Clays, *Moisture content, Moisture, Soil moisture, *Soil moisture meters, Instrumentation, Soil density, Aquifers, Radiation, Stratification, Attenuation, Nuclear physics.
Identifiers: *Gamma transmission method, Nonsaturated soils.

Soil samples from strata down to 164 m were studied with respect to the linear attenuation coefficient (mu) and the mass absorption coefficient (mu/rho) for gamma rays and their variation with moisture content. Details were given for three samples examined. The variation of gamma counting rate with moisture for different thicknesses of strata was also given. The reaction of clay samples was determined by the gamma transmission method and the explanation of such reaction was given. It was suggested that stratification can also be determined by this method with the aid of the gamma-ray linear attenuation coefficient, which would also provide a method for the determination of the density of the soils in the various strata. The method was also suggested for the study of seasonal variation of moisture content. (Prickett-ISWS)
W75-04343

EFFECT OF STORED SOIL MOISTURE RESERVE THROUGH CONSERVATION PRACTICES AND SUPPLEMENTAL IRRIGATION ON WHEAT YIELD UNDER DRYLAND FARMING CONDITION,
Indian Agricultural Research Inst., New Delhi (India).
For primary bibliographic entry see Field 3F.
W75-04346

SULFATE REDUCTION AND SULFIDE OXIDATION IN FLOODED SOIL AS AFFECTED BY CHEMICAL OXIDANTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Office of Dredged Material Research
For primary bibliographic entry see Field 5B
W75-04347

CONVERSION OF DDT TO DDD IN FLOODED SOIL,
Bangladesh Agricultural Univ., Mymensingh Dept of Soil Science
For primary bibliographic entry see Field 5B
W75-04348

2H. Lakes

LAKES OF OREGON: VOLUME 2. BENTON, LINCOLN, AND POLK COUNTIES,
Geological Survey, Portland, Oreg.
M. V. Shulters.
Open-file report, 1974. 71 p, 5 fig, 1 tab.

Descriptors: *Lakes, *Oregon, *Data collections, Limnology, Basic data collections, Water quality, Lake morphology
Identifiers: Benton County(Oreg), Lincoln County(Oreg), Polk County(Oreg).

An inventory of lakes and reservoirs of Benton, Lincoln, and Polk Counties, Oregon, is presented. Information is provided for use by city, county, and State planning groups as well as for sportsmen, tourists, and others interested in preserving the recreational value of Oregon's lakes. In addition to office compilation of existing data, most lakes were also visited. Visits were made in late summer or early fall when lakes were most accessible and when water temperature and biological activity are at a maximum. (See also W74-06270) (Knapp-USGS)
W75-03968

LIMNOLOGICAL DATA FROM SELECTED LAKES IN THE SAN FRANCISCO BAY REGION, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
L. J. Britton, R. F. Ferreira, and R. C. Averett.
Open-file report, June 25, 1974. 79 p, 34 fig, 21 tab, 28 ref.

Descriptors: *Limnology, *Basic data collections, *Lakes, *California, Hydrologic data, Water quality, Thermal stratification, Reservoirs.
Identifiers: *San Francisco Bay area(Calif).

Limnological data were compiled on 21 lakes in the San Francisco Bay area of California. The history of each lake and of its regulating agency is presented, along with methods used for data collection and analyses. The largest reservoir, Lake Berryessa, has a volume of 1,600,000 acre-ft, with a discharge area of 576 sq mi. Pilarcitos Lake is one of the smallest reservoirs, with a volume of 3,100 acre-ft and a drainage area of 3.80 sq mi. Eleven of the 21 reservoirs are open to the public for recreation. The most intensive shoreline development and use is at Lake Berryessa and Lake Merced. All but three of the 21 reservoirs were thermally stratified during the summer. Eight of the reservoirs showed evidence of dissolved-oxygen depletion during the summer. Lafayette Reservoir and Loch Lomond are mechanically aerated in order to increase the dissolved-oxygen concentration and lower the surface-water temperature. The lake waters ranged from hard (320 mg/liter) in Calero Reservoir, to soft (27 mg/liter) in Upper Crystal Springs Reservoir. Drainage from abandoned mercury mines in Santa Clara County has resulted in mercury concentrations in Calero and Lexington Reservoir fish. (Knapp-USGS)
W75-03975

FLOOD-HAZARD STUDY--100-YEAR FLOOD STAGE FOR BALDWIN LAKE, SAN BERNARDINO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
J. J. French, and M. W. Busby.
Water-Resources Investigations 26-74, November 1974. 18 p, 4 fig, 6 tab, 8 ref, append.

Descriptors: *Floods, *Lakes, *California, Water level fluctuations, Frequency analysis, Statistics.
Identifiers: *Baldwin Lake(Calif).

Flood hazards were studied by analysis of shoreline features that represent former high-water stages on Baldwin Lake, California. These features are found at 10 different altitudes that range from 6,700 to 6,713 feet. Stage frequencies were assigned to the stages, but the date of formation of the features could be determined only for the most recent shorelines. Stage-frequency analysis involving 39 years of observed annual maximum stage record of the lake and an additional 40 years of synthetic record of annual maximum stage, based on a precipitation-stage relation, resulted in an estimate of 6,710.7 feet for the the lake altitude corresponding to the 100-year flood. (Knapp-USGS)
W75-03981

LIMNOLOGICAL STUDY OF LAKE SHASTINA, SISKIYOU COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
A. E. Dong, K. W. Beatty, and R. C. Averett.
Water-Resources Investigations 19-74, November 1974. 52 p, 12 fig, 13 tab, 27 ref.

Descriptors: *Lakes, *Limnology, *California, *Eutrophication, Water quality, Water pollution sources, Nutrients, Oxygen demand, Thermal stratification, Algae, Nitrates, Phosphates.
Identifiers: *Lake Shastina(Calif).

Surface water constituted more than 90 percent of the approximately 50,000 acre-foot inflow to Lake Shastina, California, in the 1972 water year. Annual changes in the quantity of water in storage in the lake are related mainly to variations in annual inflow. The lake is thermally stratified from spring through autumn. Water near the surface was supersaturated with oxygen while an acute dissolved-oxygen deficiency existed at depth. Nitrogen and phosphorus in solution are partly stratified during thermal stratification. Algal types consisted mainly of green algae and diatoms. Blue-green algae were absent most of the year. Benthic organisms were primarily Oligochaete, Chironomidae, and Chaoborus, all of which are adapted to a low dissolved-oxygen environment. Nitrogen and phosphorus concentrations in the lake are sufficient to support large algal blooms. Recent development of shoreline properties may accelerate the eutrophication of the lake. (Knapp-USGS)
W75-03982

A SUMMARY AND COMPARISON OF NUTRIENTS AND RELATED WATER QUALITY IN LAKES ERIE, ONTARIO, HURON, AND SUPERIOR,
Burlington (Ontario). Canada Centre for Inland Waters.
For primary bibliographic entry see Field 5B.
W75-04027

SPRING AND FALL THERMAL BAR DEVELOPMENT IN LAKE SUPERIOR,
Michigan Technological Univ., Houghton. Dept. of Chemistry and Chemical Engineering.
For primary bibliographic entry see Field 5B.
W75-04038

ADDITIONAL STUDIES OF THE EFFECTS OF SALT MARSH IMPOUNDMENTS ON MOSQUITO POPULATIONS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
For primary bibliographic entry see Field 5G.
W75-04048

BIOLOGICAL AVAILABILITY OF SEDIMENT PHOSPHORUS TO MACROPHYTES,
Wisconsin Univ., Madison. Water Chemistry Program; and Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-04053

THE MORPHOEDAPHIC INDEX, A FISH YIELD ESTIMATOR--REVIEW AND EVALUATION,
Ontario Ministry of Natural Resources, Thunder Bay. Fish and Wildlife Research Branch.
For primary bibliographic entry see Field 5C.
W75-04116

SETTING UP A SPECIAL COLLECTION ON WATER POLLUTION IN A UNIVERSITY LIBRARY,
Case Western Reserve Univ., Cleveland, Ohio. Sears Library.
For primary bibliographic entry see Field 5G.
W75-04118

ANALYTICAL MODEL FOR A HEATED SUBMERGED DISCHARGE INTO BREAK WATER WALL AREA,
Wisconsin Univ., Milwaukee. Dept. of Energetics.
R. A. Jaisinghani, V. L. Shah, and K. C. Tsao.
In: Water For The Human Environment, Vol. IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 15-31. 3 fig, 4 ref.

Descriptors: *Heated water, *Water circulation, *Flow, *Dispersion, *Analytical techniques, Momentum equation, Energy equation, Turbulence, Model studies, Recreation, *Discharge(Water).
Identifiers: *Heated submerged discharge, Conservation equations.

The effects of a submerged thermal discharge in a shielded area created by a breakwater wall in the shore line of a lake or coastal area were studied to determine if such a shielded area could be used as a recreational area with relatively warmer water, especially in the fall and spring months, thereby increasing the length of the swimming season. The thermal discharge could be from a power plant or another source. A surface discharge would require dilution pumps to disperse the thermal energy within the shielded area, an operation involving high initial and operational costs. However, submerged discharges have high mixing characteristics and require fewer, if any, dilution pumps. The analytical model developed considered a three-dimensional, rectangular, turbulent, submerged, heated discharge. The conservation equations of mass, momentum, and energy were transformed from the Cartesian coordinates to coordinates suitable for a vertically deflected jet by assuming velocity and temperature profiles. The final integrated equations were presented in non-dimensional terms. These equations have not been used to test the applicability and validity of the solutions to practical problems. (See also W75-04213) (Singh-ISWS)
W75-04214

TWO-DIMENSIONAL TRANSIENT HYDRO-THERMAL MATHEMATICAL MODEL,
Stone and Webster Engineering Corp., Boston, Mass. Environmental Engineering Div.
Y. J. Tsai, and Y. C. Chang.
In: Water For The Human Environment, Vol. IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 76-88. 4 fig, 3 ref.

Descriptors: *Powerplants, *Thermal pollution, *Analytical techniques, Hydrodynamics, *Estuaries, Heat transfer, Tides, Cooling, Diffusion, Water temperature, Coriolis force, Computers, Model studies, *Mathematical models, Finite element analysis, Conservation, Equations.

The heat conservation equation in two horizontal dimensions with the equations of motion and continuity in vertically integrated form was solved for the spatial transient temperature rises in a body of water due to thermal discharge of artificial origin. Flow patterns and water level variations induced by the plant intake and discharge, stream inflow and outflow, meteorological parameters, and tidal agitation can be obtained from the mathematical model. The multioperational method (alternate direction implicit) used in the solution for the finite difference equations of the governing partial differintial equations is unconditionally stable and appears economical. The model makes it possible to investigate environmental design considerations in conjunction with cooling system alternatives, plant operating modes, and hydrological and meteorological conditions, and to minimize the effects of thermal discharges to the environment. A case study was presented in which a multiport submerged diffuser was employed. The hydrothermal condition which prevailed in the study area was numerically simulated and the results were depicted in computer-plotted graphs. (See also W75-04213) (Singh-ISWS)
W75-04219

COOLING POND TEMPERATURE PREDICTION,
Towson State Coll., Baltimore, Md. Dept. of Computer Science.
For primary bibliographic entry see Field 5B.
W75-04222

THERMAL POLLUTION OF THE GREAT LAKES -- A NON-PROBLEM,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W75-04231

DEVELOPMENT OF A COMPLETE MATHEMATICAL MODEL FOR DESCRIBING THE POINT BEACH NUCLEAR POWER PLANT THERMAL PLUME,
Limnetics, Inc., Milwaukee, Wis.
For primary bibliographic entry see Field 5B.
W75-04238

RELATIONSHIP BETWEEN LIMNOLOGICAL CONDITIONS OF RESERVOIRS AND WATERSHED FEATURES - A SURVEY,
Ministry of Public Works, Madrid (Spain). Section of Sedimentation and Natural Pollution.
J. R. de la Torre, J. L. O. Casas, J. A. Garcia, and R. P. Martinez.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 401-410. 1 fig, 2 tab.

Descriptors: *Surveys, *Limnology, *Reservoirs, *Watersheds(Basins), Lake morphometry, Chemical properties, Physical properties, Water quality, Vegetation, Geologic formations, Climatic data, Biological properties.
Identifiers: *Spain.

A survey was performed in 42 reservoirs and their watersheds, located in southern Spain, in order to determine qualitative relationships between limnological parameters and basin features. Comparison between reservoirs also included shoreline colonizer plants. As a result of the survey, a five-stage impoundment classification was outlined from the eutrophication or nutrient-enrichment standpoint. A further classification was advanced for the presumed water degradation rate, based upon current status, age of impoundment, turnover rate and morphometric parameters. Floristic composition of shoreline colonizer plants appears to be well correlated with hydrological regulation patterns through the magnitude of impounded water level fluctuation. Yet, no significant classification of shore plants proved feasible, regarding limnological or morphometric parameters. Morphometric parameters, watershed features, and limnological parameters were tabulated for each reservoir surveyed. (See also W75-04213) (Humphreys-ISWS)
W75-04244

THE ELEMENTS OF CARRYING CAPACITY IN THE RECREATION UTILIZATION OF RESERVOIRS,
Bureau of Reclamation, Denver, Colo. Lower Missouri Region.
For primary bibliographic entry see Field 6B.
W75-04249

NATURAL PHOSPHATE REMOVAL MECHANISMS IN SOUTH FLORIDA LAKES,
Miami Univ., Coral Gables, Fla. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-04250

THE EUTROPHICATION AND POLLUTION OF LAKE PAIJANNE, CENTRAL FINLAND,
Hydrobiological Research Inst., Jyvaskyla (Finland).
For primary bibliographic entry see Field 5C.
W75-04264

SURFACE WATER DATA OF THE UPPER MICHIGAN REGION PROJECT SANGUINE, SITE STUDY.
EDAW, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 2E.
W75-04277

SAGINAW BAY: AN EVALUATION OF EXISTING AND HISTORICAL CONDITIONS,
Michigan Univ., Ann Arbor. Great Lakes Resource Management Program.
For primary bibliographic entry see Field 5C.
W75-04278

PRELIMINARY STUDY OF PHYTOPLANKTON OF LAKE ST. LOUIS, A BROADENING OF THE ST. LAWRENCE RIVER NEAR MONTREAL, QUEBEC, (IN FRENCH),
Montreal Univ., (Quebec). Dept. of Biological Sciences
For primary bibliographic entry see Field 5C.
W75-04335

2I. Water In Plants

STEADY FLOWS OF WATER AND SALT IN UNIFORM SOIL PROFILES WITH PLANT ROOTS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
P. A. C. Raats.
Soil Science Society of America, Proceedings. Vol. 38, No. 5, September-October, 1974. p 717-722, 8 fig, 20 ref.

Descriptors: Flow, *Infiltration, *Hydraulic conductivity, *Leaching, *Soil-water-plant relationships, Transpiration, Salts, Pressure head, Root zone, Saturated soils, Water table.

Upward and downward flows of water in the presence of uptake by plant roots is analyzed. Calculations are based upon an exponential increase of the hydraulic conductivity with the pressure head and an exponential decrease of the rate of uptake with depth. For downward flows, the distribution of the matric flux potential can be expressed as a function of the rate of infiltration, the leaching fraction, and two parameters describing the soil and the uptake distribution. For upward flows, the distribution of the matric flux potential can be expressed as a function of the rate of infiltration, the rate of transpiration, the hydraulic conductivity of the saturated soil, and the same two parameters describing the soil and the uptake distribution. An evaluation is also made of the distribution of salts associated with the steady downward flows. (Mastic-Arizona)
W75-03956

AGRONOMIC SURVEY OF JOJOBA IN CALIFORNIA,
California Univ., Riverside. Dept. of Plant Sciences.
For primary bibliographic entry see Field 3F.
W75-03960

NITROGEN FIXATION BY BLUE-GREEN ALGAE-LICHEN CRUSTS IN THE GREAT BASIN DESERT,
Utah State Univ., Logan. Dept. of Soil Biochemistry and Microbiology.
For primary bibliographic entry see Field 5B.
W75-03963

RELATIONSHIPS OF RING WIDTHS IN ARID-SITE CONIFERS TO VARIATIONS IN MONTHLY TEMPERATURE AND PRECIPITATION,
Arizona Univ., Tucson. Lab. of Tree-Ring Research.
H. C. Fritts
Ecological Monographs, Vol. 44, No. 4, 1974. p 411-440, 4 tab, 13 fig, 30 ref.

Descriptors: *Trees, *Arid climates, *Regression analysis, *Dendrochronology, *Arid lands, Temperatures, Precipitation(Atmospheric), Ecosystems, Seasonal, Climates, Altitude, Plant growth, Microenvironment.
Identifiers: *Tree rings, Cluster analysis, Dendroclimatology.

The effects of temperature and precipitation on the diameter growth of arid-site conifers were evaluated using newly developed empirical techniques. One technique employs multiple regression on principal components of climate. The other technique is a cluster analysis which is used to identify similarities among the response functions and then classify them by similarities and differences. Precipitation was directly related to growth throughout the year for 32 percent of the sites, but on the remaining 68 percent the effects of precipitation varied from season to season. Temperature was most commonly inversely related to ring width during autumn, spring and summer for arid-site conifers, but in cases of high altitudes, high latitudes, or on north facing slopes, a direct relationship was often noted. The variety of ring-width responses to climatic variations suggested a need for more physiological studies of trees on arid or other extreme sites which may reveal unique growth-environment relationships that have not been observed on the more optimum sites. (Mastic-Arizona)
W75-03964

RELATION OF SOYBEAN LEAF WATER POTENTIAL TO SOIL WATER POTENTIAL,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
For primary bibliographic entry see Field 3F.
W75-03989

A FIELD STUDY OF THE HEAT AND DROUGHT TOLERANCE OF GRAIN SORGHUM (SORGHUM BICOLOR (L.) MOENCH) AS AN APPROACH TO GENETIC IMPROVEMENT,
Nebraska Univ., Lincoln. Dept. of Agronomy.
V. B. Ogunlela.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 238, $4.75 in paper copy, $2.25 in microfiche. M.S. Thesis, August 1974. 93 p, 23 tab, 66 ref, append. OWRT A-026-NEB(1).

Descriptors: *Water utilization, Crop production, *Drought tolerance, *Grain sorghum, Genetics, Plant breeding, Heat, Measurement, Leaves, Electrical conductance.
Identifiers: *Heat tolerance(Plants), Leaf tissue(Plants).

The purpose was to study the feasibility of selecting for heat and drought tolerance among sorghum genotypes under field conditions. A field study was conducted on 21 grain sorghum lines to screen them for heat and drought tolerance using a combination of laboratory techniques and field measurements. These lines had previously been classified into three groups of heat tolerance (high, medium and Low) based on a 1972 study. An electrical conductivity method using leaf discs was employed to test for heat and drought tolerance of leaf tissue during the growing season. Several agronomic characteristics were measured and related to heat and drought tolerance. These included flag leaf area, area of the four top leaves, grain yield per head, 1,000-seed weight, grain yield per hectare, plant height, 50% bloom date and number of heads. Results have shown that some closely related sorghum lines are consistently more heat or drought tolerant than others, and that techniques can be applied to separate these lines into distinguishable categories with regard to responses to these environmental stresses. A positive correlation often existed between heat and drought tolerance in these grain sorghums.
W75-04044

SOME CONSIDERATIONS ON PLANT TYPES FOR DRYLAND AGRICULTURE,
Central Arid Zone Research Institute, Jodhpur (India).
M. V. R. Prasad.
Annals of Arid Zone, Vol 12, No 3 and 4, September/December, 1973. p 125-134, 2 tab, 46 ref.

Descriptors: *Crop production, *Agriculture, *Arid lands, *Drought resistance, *Soil-water-plant relationships, Drought, Dry farming, Plant breeding.

An analysis of crop growth on unirrigated lands was made to determine the factors most important in selecting plant types for dry land agriculture. Crop varieties that are currently cultivated are those that have been selected for their ability to resist drought rather than productivity. Attributes that are essential for plant survival are not necessarily the same needed for productivity. In order to better insure against crop failure, it is necessary to develop plant types suitable for mixed cropping, taking competitive ability and complementary characteristics into consideration. Plant breeding is warranted for eliminating undesirable traits and combining drought resistance and productivity characteristics suitable for dryland agriculture. (Mastic-Arizona)
W75-04126

THE EFFECT OF INTERVAL AND INTENSITY OF DEFOLIATION ON THE DRY MATTER PRODUCTION OF SOME IMPORTANT GRASS SPECIES OF WESTERN RAJASTHAN,
Indian Grassland and Fodder Research Inst., Jhansi.
P. M. Dabadghao, R. Deb Roy, and S. P. Marwaha.
Annals of Arid Zone, Vol 12, No 1 and 2, March-June 1973. p 1-8, 1 tab, 13 ref.

Descriptors: *Grasses, *Plant growth, *Pasture management, *Production, Rainfall, Weather.
Identifiers: Lasiurus sindicus Henr., Panicum antidotale Retz., Cenchrus ciliarus Linn., Cenchrus setigerus Vahl.

The effect of three intervals and three intensities of defoliation on dry matter production of Lasiurus sindicus Henr., Panicum antidotale Retz., Cenchrus ciliarus Linn., and Cenchrus setigerus Vahl., were studied in Rajasthan. During a 30 day dry interval L. sindicus and C. setigerus produced greater yields, irrespective of variation in rainfall. Similar results were observed for C. ciliarus and P. antidotale only in drought years. Clipping at 15 cm. stubble height in L. sindicus gave maximum yields irrespective of the season. Interaction between interval and intensity of clipping was significant only in L. sindicus and P. antidotale. A safe degree of utilization appears to be 15 cm. in all species, particularly in L. sindicus and C. setigerus; however, C. ciliarus and P. antidotale can be used down to 10 cm. under proper management. (Mastic-Arizona)
W75-04131

EFFECT OF QUALITY OF IRRIGATION WATER ON DRY MATTER PRODUCTION, AND ON CALCIUM, MAGNESIUM AND PHOSPHORUS CONTENT OF WHEAT, BARLEY AND PEA,
Udaipur Univ. (India). Coll. of Agriculture.
M. U. Khan, and S. N. Saxena.
Annals of Arid Zone, Vol 13, No 1, March, 1974. p 11-16, 2 tab, 10 ref.

Descriptors: *Irrigation water, *Water quality, *Phosphorus, *Calcium, *Magnesium, *Plant growth, Wheat, Barley, Boron, Conductivity, Crops.
Identifiers: Pea, SAR(Sodium absorption ratio).

Conductivity, SAR (sodium absorption ratio) and boron content of applied irrigation water were evaluated for barley, wheat, and pea. In all 3 crops, increasing levels of the 3 variables caused a suppression in dry matter production. Interactions of SAR with boron resulted in a definite increase in calcium, magnesium and phosphorus content in pea, but in barley and what the phosphorus content increased and the calcium and magnesium contents decreased. Calcium absorption increased with an increase in conductivity in all three crops, but magnesium absorption increased in wheat and pea, and not in barley. Phosphorus content also increased in pea and wheat with increased conductivity. (Mastic-Arizona)
W75-04137

THE EFFECT OF VARIOUS RATES OF SEMICONTINUOUS DRIP IRRIGATION ON LETTUCE, (LACTUCA SATIVA L.) GROWN IN GREENHOUSE,
Oak Ridge National Lab., Tenn.
D. Shinshi, and J. W. Michel.
Available from the National Technical Information Service, Springfield, Va 22161 as ORNL-TM-4302, $4.00 in paper copy, $2.25 in microfiche. Nuclear Desalination Program, August, 1973. 36 p, 5 tab, 6 fig, 4 ref.

Descriptors: *Irrigation, *Irrigation effects, *Soil moisture, *Moisture stress, *Lettuce, *Soil-water-plant relationships, Moisture tension, Tensiometers, Plant growth, Evapotranspiration, Soil profile, Greenhouses, Regime.
Identifiers: *Drip irrigation.

The response of lettuce plants to semicontinuous drip irrigation treatments was studied under greenhouse conditions. Treatments corresponded to 100, 70, and 50 percent of the estimated potential evapotranspiration for three weeks, followed by one week where the 70 and 50 percent treatments were reduced to 50 and 35 percent respectively. Soil moisture tension was monitored throughout the soil profile by a grid of small tensiometers. During the first three weeks, the growth, dry matter accretion, and indices of plant water status in the three treatments were essentially equal. During the fourth week, the treatment that was restricted to 35 percent of potential evapotranspiration showed growth cessation and other signs of water-stress. It was suggested that a relatively high performance in plants may be maintained if water is supplied continuously even if the amount is markedly restricted. (Mastic-Arizona)
W75-04146

EVALUATION OF CRITERIA FOR SEPARATING SOILS WITH XERIC AND UDIC MOISTURE REGIMES,
Bureau of Land Management, Portland, Oreg.
For primary bibliographic entry see Field 2G.
W75-04312

2J. Erosion and Sedimentation

METHOD AND APPARATUS FOR BREAKING WAVES,
For primary bibliographic entry see Field 8B.
W75-03868

DEVICE FOR PRODUCING AND PROTECTING DEPOSITS OF SEDIMENTARY MATERIAL ON THE FLOOR OF BODIES OF WATER,
For primary bibliographic entry see Field 8B.
W75-03871

PROTECTING CREEKSHEDS: DEVELOPMENT AND EVALUATION OF A METHOD TO MANAGE SMALL, URBANIZING WATERSHEDS THROUGH LOCAL GOVERNMENT ACTIONS,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03947

PROTECTING CREEKSHEDS, ANALYSIS AND ACTION,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03948

DUNE SAND STABILIZATION WITH SYNTHETIC SOIL CONDITIONERS: A LABORATORY EXPERIMENT,
Ghent Rijksuniversiteit (Belgium). Soil Physics, Soil Conditioning and Horticultural Soil Sciences Lab.
For primary bibliographic entry see Field 2G.
W75-03953

CHARACTERISTICS AND PREDICTION OF SOIL EROSION ON A WATERSHED IN THE PALOUSE,
Idaho Univ., Moscow.
L. Druffel.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 251, $5.25 in paper copy, $2.25 in microfiche. M Sc Thesis, May 1973. 95 p, 8 fig, 4 tab, 5 append. OWRR A-029-IDA(5).

Descriptors: *Soil erosion, Regression analysis, *Erosion, *Idaho, Watersheds(Basins), *Data collections, *Forecasting.
Identifiers: *Palouse region(Ida).

The objective was to study the process of soil loss by water on a watershed and determine the effect of various hydrologic parameters. The 1971-72 wateryear provided good data and 3.71 tons/acre soil loss was measured on a storm basis. The annual figure is estimated to be 4 tons/acre which would include unmeasured events and low flow periods with minimal losses. The 1972-73 wateryear was a poor year from the standpoint of erosion data as it was quite dry. However, three of the events which occurred were of the frozen

ground type which provided valuable hydrologic data. Frozen ground events were deleted from the erosion data analysis. The soil loss events that were not on frozen ground were analyzed on a storm basis and a predictive equation for use on this watershed was developed by multiple regression techniques using several hydrologic parameters. Soil loss was found to depend mainly on amounts and timing of precipitation, volume of runoff, snow melt, and the conditions of the soil. The data collected yielded good results but left unanswered the question of the effect of cropping pattern, tillage practice, slope, slope length, and slope aspect on soil erosion. These parameters are all very important to amount of soil loss but did not vary in this case because the work was done on one watershed with one cropping practice.
W75-04033

A REVIEW OF DESERTIZATION IN AFRICA--WATER, VEGETATION, AND MAN,
Secretariat for International Ecology (Sweden).
A. Rapp.
Secretariat for International Ecology, SIES Report No. 1, 1974. 77 p, 25 fig, 4 tab, 81 ref.

Descriptors: *Africa, *Deserts, *Desert plants, *Arid climates, *Arid lands, *Reclamation, *Remote sensing, Wind erosion, Vegetation effects, Vegetation establishment, Surveys, Monitoring, Rainfall, Grazing, Dry farming, Degradation, Soils, Soil stability, Soil erosion.
Identifiers: *Desertization.

The causes of actual desertization in the African arid countries are discussed based on available literature, reports by and interviews with experts, and visits to field projects. Desertization is primarily man-caused as a result of overgrazing, overcultivation, wood cutting, and burning. This overexploitation destroys the plant cover required to protect the soil against rapid erosion by wind or water. To serve as a basis for checking the spread of desertization, it is recommended that surveys and monitoring of desertization should be systematically undertaken in selected transects. In addition, pilot trial plots should be used for the purpose of research and development of ecologically sound methods of desert land use. (Mastic-Arizona)
W75-04142

HYDRAULIC AND FLOW STUDIES RELATED TO SEDIMENT TRANSPORT, KENTUCKY RIVER, KENTUCKY,
Kentucky Water Resources Inst., Lexington.
B. R. Moore.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 259, $4.25 in paper copy, $2.25 in microfiche. Research Report No. 81, 1974. 58 p, 7 fig, 2 tab, 3 ref, 2 append. OWRT A-054-KY(1), 14-31-0001-4017.

Descriptors: *Sediment transport, *Scour, Dredging, Kentucky, Open channel flow, Hydraulics, *Sands, Waste disposal, *Path of pollutants, *Sediment distribution, Distribution patterns.
Identifiers: *Kentucky River(Kent), Ohio River(Kent).

This study related the conditions of flow and channel shape to distribution of sediment types in the Kentucky River. Seven distinct types of sediment association were delineated and these have a regular pattern of distribution influenced by the presence of navigation locks and dams. The most suitable locations for commercial extraction of bed material were clearly indicated and the variations of sand size delineated. The irregular discharge pattern of the stream indicates potential problems in the disposal of solid waste pollutants. A remeasurement of the dredge hole in the Ohio River indicated a continuation of the same vortex scour action and sand deposition analysed in earlier work. (See also W70-06132 and W73-08468) (Grieves-Kentucky)
W75-04147

POLLUTION POTENTIAL OF AQUATIC SEDIMENTS,
Missouri Univ., Rolla. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-04150

DISPOSAL OF POLLUTED DREDGINGS FROM THE GREAT LAKES AREA,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 5B.
W75-04251

2K. Chemical Processes

PHYSICAL PROPERTIES OF OXYGEN-17 WATER: ABSOLUTE VISCOSITY AND DENSITY OF H2(17)0 BETWEEN 15 AND 35C,
Weizmann Inst. of Science, Rehovot (Israel) Dept. of Isotope Research.
For primary bibliographic entry see Field 1A.
W75-03881

THE PROCESSING AND STORAGE OF WATER-QUALITY DATA IN THE NATIONAL WATER DATA STORAGE AND RETRIEVAL SYSTEM,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03970

THE OBSERVATION-WELL NETWORK OF THE U.S. GEOLOGICAL SURVEY IN FLORIDA,
Geological Survey, Tallahassee, Fla
For primary bibliographic entry see Field 7C.
W75-03971

QUALITY AND AVAILABILITY OF WATER IN WESTERNMOST TEXAS,
Geological Survey, El Paso, Tex.
J. S. Gates.
Open-file report, 1975. 8 p.

Descriptors: *Water quality, *Groundwater, *Surface waters, *Water resources, *Texas, Alluvium, Return flow, Sulfates, Chlorides, Water supply, Water yield
Identifiers: *El Paso(Tex).

In westernmost Texas, the availability and quality of water are dominated by the natural dissolved-mineral content. The predominant dissolved minerals are sodium chloride and calcium sulfate. The quality of water in the Rio Grande varies with the amount of discharge and with location along the stream. During the spring and summer, the mineral content of water in the Rio Grande at El Paso is about 600 to 700 mg/liter. At this time, water is being released from reservoirs upstream, and the discharge consists mostly of surface runoff. During the fall and winter when no water is released from the reservoirs, the discharge is derived mostly from groundwater seepage into the river, and the dissolved-solids concentration at El Paso, which is dominantly sodium sulfate, normally ranges from 1,000 to 2,000 mg/liter or more. Much of this groundwater seepage represents return flow of irrigation water applied to the Mesilla Valley. This return flow contains minerals leached from the soil, and it is concentrated because part of the water originally applied to the land was lost by evaporation and transpiration. At the lower end of the Hueco Bolson at Fort Quitman, the mineral content of water in the Rio Grande ranges from 1,000 to 3,000 mg/liter or more at all times of the year, and reached 10,700 mg/liter in June 1953. Most of the water for municipal and domestic supply in westernmost Texas is groundwater. The total amount of water pumped from deep wells in the El Paso area in 1972 for municipal and military supply, industrial use, and irrigation was about 115,000 acre-feet. Most of this water contained less than 500 mg/liter dissolved solids. (Knapp-USGS)
W75-03979

SPECIAL TECHNIQUES FOR DETERMINING CHEMICAL PROPERTIES OF GEOTHERMAL WATER,
Geological Survey, Menlo Park, Calif.
T. S. Presser, and I. Barnes.
Available from NTIS, Springfield, Va. 22161 as PB-235 148, $3.25 in paper copy, $2.25 in microfiche. Water-Resources Investigations 22-74, August 1974. 11 p, 1 tab, 3 ref.

Descriptors: *Water analysis, *Geothermal studies, *Chemical analysis, *Analytical techniques, Sampling, Methodology, On-site investigations, Thermal water, Laboratory tests, Aqueous solutions, Water chemistry, Trace elements, Heavy metals, Hydrogen ion concentration, Filtration
Identifiers: *Water sample preservation, Field preparation, Water sample stability.

A reliable determination of the chemical composition of geothermal fluids may require special sampling and preservation techniques. A sample collected without pretreatment is usually adequate for the analysis of sodium, potassium, and chloride. Other constituents may require further treatment of even analysis in the field, depending on the data requirements. The collection and preservation methods described permit accurate results for 31 chemical variables, including major and minor chemical constituents. (Woodard-USGS)
W75-03980

PRECONSTRUCTION ASSESSMENT OF BIOLOGICAL QUALITY OF THE CHENA AND LITTLE CHENA RIVERS IN THE VICINITY OF CHENA LAKES FLOOD CONTROL PROJECT NEAR FAIRBANKS, ALASKA,
Geological Survey, Anchorage, Alaska
For primary bibliographic entry see Field 5B.
W75-03988

DETERMINATION OF PARTS PER BILLION SULFIDE IN WATER WITH THE SULFIDE SELECTIVE ELECTRODE,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5A.
W75-04021

IRREVERSIBLE THERMODYNAMIC CONCEPT ON HYDROGEOCHEMICAL TRANSPORT SYSTEMS,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5B.
W75-04041

BENTHOS AND ALLOCHTHONOUS ORGANIC MATTER IN STREAMS,
Waterloo Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-04119

COMPARISON OF SOME METHODS FOR DETERMINING ORGANIC PHOSPHORUS IN SOME NIGERIAN SOILS,
Institute for Agricultural Research, Zaria (Nigeria).
For primary bibliographic entry see Field 2G.
W75-04139

EVALUATION OF EDDHA AS AN EXTRACTION AND ANALYTICAL REAGENT FOR ASSESSING THE IRON STATUS OF SOILS,
Nevada Agricultural Experiment Station, Reno
For primary bibliographic entry see Field 2G.
W75-04144

WATER QUALITY ASPECTS OF THE 1973 OPENING OF THE MISSISSIPPI RIVER DIVERSION SPILLWAY AT BONNET CARRE, LOUISIANA, U.S.A.,
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 5B.
W75-04256

EXPERIMENTAL METHODS FOR OBTAINING PERCOL MODEL INPUT AND VERIFICATION DATA,
Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 5B.
W75-04276

LYSIMETRIC AND CHEMICAL INVESTIGATIONS OF PEDOLOGICAL CHANGES: I. LYSIMETERS AND THEIR DRAINAGE WATERS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 2G.
W75-04311

SULFATE REDUCTION AND SULFIDE OXIDATION IN FLOODED SOIL AS AFFECTED BY CHEMICAL OXIDANTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Office of Dredged Material Research.
For primary bibliographic entry see Field 5B.
W75-04347

2L. Estuaries

METHOD AND APPARATUS FOR BREAKING WAVES,
For primary bibliographic entry see Field 8B.
W75-03868

DEVICE FOR PRODUCING AND PROTECTING DEPOSITS OF SEDIMENTARY MATERIAL ON THE FLOOR OF BODIES OF WATER,
For primary bibliographic entry see Field 8B.
W75-03871

PNEUMATIC BARRIERS TO REDUCE SALT INTRUSION THROUGH LOCKS,
Waterloopkundig Laboratorium, Delft (Netherlands). Density Currents Branch.
For primary bibliographic entry see Field 8A.
W75-03920

EXPERIENCES WITH TIDAL SALINITY MODEL EUROPOORT,
Delta Works, The Hague (Netherlands). Hydraulics Div.; and Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 8B.
W75-03927

THE THERMAL REQUIREMENTS AND TOLERANCES OF KEY ESTUARINE ORGANISMS,
Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research.
For primary bibliographic entry see Field 5C.
W75-03944

THE COMPARATIVE MARINE GEOCHEMISTRIES OF LEAD 210 AND RADIUM 226,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W75-04029

ENHANCEMENT OF RECREATIONAL USES OF ESTUARINE WATERS THROUGH STUDY OF POTENTIAL CONTROL METHODS FOR STINGING SEA NETTLES,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-04037

ANALYTICAL MODEL FOR A HEATED SUBMERGED DISCHARGE INTO BREAK WATER WALL AREA,
Wisconsin Univ., Milwaukee. Dept. of Energetics.
For primary bibliographic entry see Field 2H.
W75-04214

TWO-DIMENSIONAL TRANSIENT HYDROTHERMAL MATHEMATICAL MODEL,
Stone and Webster Engineering Corp., Boston, Mass. Environmental Engineering Div.
For primary bibliographic entry see Field 2H.
W75-04219

DATA COLLECTION AND ANALYSIS TECHNIQUES FOR GLOBAL MARINE POLLUTION STUDIES,
Department of the Environment, Ottawa, (Ontario). Marine Sciences Directorate.
For primary bibliographic entry see Field 5A.
W75-04236

MECHANICS OF DISPERSION OF POLLUTANTS IN COASTAL ENVIRONMENT,
Department of Water Affairs, Orania (South Africa).
For primary bibliographic entry see Field 5B.
W75-04237

RUN-OFF REGULATION OF THE ST. LAWRENCE AND ITS LIABILITY,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 4A.
W75-04243

COMPUTATION OF TIDES, CURRENTS, AND DISPERSAL OF POLLUTANTS IN THE NEW YORK BIGHT FROM BLOCK ISLAND TO ATLANTIC CITY WITH LARGE GRID SIZE, SINGLE AND TWO-LAYER HYDRODYNAMICAL-NUMERICAL MODELS, PART 4,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
For primary bibliographic entry see Field 5B.
W75-04262

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA, PART V; DATA REPORT, TEMPERATURE, SALINITY, OXYGEN AND HYDROGEN ION CONCENTRATION IN OUTER LOS ANGELES HARBOR, JUNE 1971 TO NOVEMBER 1973.
Southern California, University of Los Angeles. Sea Grant Program.
For primary bibliographic entry see Field 5B.
W75-04272

AQUATIC SURVEY OF THE KONA COAST PONDS, HAWAII ISLAND,
Hawaii Univ., Honolulu. Sea Grant Program.
R. E. Brock.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM 74-11037, $4.75 paper copy, $2.25 microfiche. Report No. UNIHI-SEAGRANT-AR-74-04, April 1974. 73 p, 10 ref, 6 append. NOAA Grant 04-3-158-29.

Descriptors: *Aquatic habitats, *Intertidal areas, *Hawaii, *Biological communities, *Aquatic environment, Fish, *Ponds, Surface waters, Aquatic weeds, Aquatic plants, Balance of nature, Habitats, Marine biology, Ecology, Salinity, Temperature, Dissolved oxygen, Geology.
Identifiers: Kona Coast, Anchialine ponds, Coastal ponds.

During a 17-month period beginning July 1972, 318 shoreline ponds were located and surveyed in the five land districts of Hawaii Island's leeward coast. The survey concerned an inventory of environmental and biological characteristics for the purpose of assessing their scientific and natural resource values. This inventory included all coastal waters--from excavated wells and small fissures to large Hawaiian fishponds--that are not part of the marine ecosystem. Relevant information on geology and terrestrial vegetation was presented. Collectively, the ponds have distinctive environmental features. Characteristic aquatic vegetation consists of the vascular aquatic pondweed, Ruppia maritima, and two types of encrusting algal communities. Pond animal communities were divided into two main groups depending upon their connections to the sea. The 13 ponds with surface connections to the sea have diverse species that are mainly of marine origin. The remaining 305 ponds with only subterranean water connections contain fewer but more distinctive animals. In these 'closed' ponds, crustaceans and mollusks are the most abundant and characteristic animals among the 55 taxons recognized. Detailed maps and biota catalogs were provided. (Henley-ISWS)
W75-04275

A DRIFT CARD STUDY IN MONTEREY BAY, CALIFORNIA: SEPTEMBER 1971 TO APRIL 1973,
California State Univ., San Jose. Dept. of Natural Science.
D. D. Blaskovich.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-11266, $4.75 paper copy, $2.25 microfiche. Technical Publication 73-4, 1973. 79 p, 17 fig, 4 tab, 35 ref, 1 append. SGP2-94.

Descriptors: *Oceanography, *Ocean circulation, *Ocean currents, Tides, Pacific Ocean, Bays, *California, Winds, *Drifting(Aquatic), Movement, On-site data collections, Seasonal.
Identifiers: *Monterey Bay(Calif) Drift cards.

Drift cards were released in Monterey Bay, California, to detect seasonal variations in the California Current system, and seasonal and diurnal wind variations in the immediate vicinity of the bay. About 23% of the cards were recovered, although the recovery rate varied from about 5% in the winter to about 60% in the late summer. Drift card speeds ranged from 1 to 8 km/day, in the winter and summer months respectively. Good agreement was observed between geostrophic currnt, wind, drogue, and drift card data, although drift cards were observed to be primarily wind driven. A weekend bias in drift card recoveries was observed for the entire period of study; however, it was less pronounced for those cards released during the summer months. Two bogus releases were used to estimate the discovery lag time, reported position accuracy, and longshore drift currents. Diurnal winds were observed during a 24-hour study which indicated that daily variations in the wind field may be as important as seasonal changes in moving surface water. The drift card speed was observed to be about 3% of the wind velocity, and 1 m/sec was estimated as the minimum effective wind. The wind factor, ranging from 2.2% to 4.0%, was used to estimate the actual paths of drift cards and to examine the role of diurnal winds in affecting surface water movement. (Gibb-ISWS)
W75-04279

BIOLOGICAL PROCESSES INVOLVED IN POLLUTION OF COASTAL AQUACULTURE WATERS,
Central Inland Fisheries Research Inst., Barrackpore (India).
For primary bibliographic entry see Field 5C.
W75-04281

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. ANNEX TO VOLUME I. MANAGEMENT AGENCY PROBLEMS IN THE DELAWARE ESTUARY,
Delaware Univ., Newark; and Academy of Natural Sciences of Philadelphia, Pa.
For primary bibliographic entry see Field 6F.
W75-04328

THE SHAPE OF THE INTERFACE IN STEADY FLOW IN A STRATIFIED AQUIFER,
Technion - Israel Inst. of Tech., Haifa (Israel). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-04329

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

MILTI-STAGE FLASH EVAPORATOR,
Aqua-Chem, Inc., Milwaukee, Wis. (assignee)
P. J. P. Liu.
US Patent No 3,855,072, 5 p, 5 fig, 14 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 1188, December 17, 1974.

Descriptors: *Patents, *Evaporators, *Condensation, *Heat exchangers, *Desalination, *Distillation, Sea water, Water treatment, Vapor compression distillation, Equipment, *Flash distillation.
Identifiers: *Flash evaporation, Multi-stage flash evaporators.

A flash evaporator has at least one flash chamber divided into an evaporating space and a condensing space. Heat exchange tube bundles are disposed in the condensing space and extend in a direction generally transverse to the direction of feed water flow through the chamber. The heat exchange tube is arranged such that a first margin is exposed to the vapors flashed in the chamber and a vent is located in a second unexposed margin. The straight line of distance from any point on the exposed margin is equal and the number of tubes to which the vapors are exposed constantly decreases as the vapors traverse the tube bundle from the exposed margin to the vent. (Sinha-OEIS)
W75-03860

METHOD AND APPARATUS FOR USE IN WATER PURIFICATION BY REVERSE OSMOSIS,
Ultrascience, Inc., Skokie IH. (assignee).
For primary bibliographic entry see Field 5D.
W75-03874

APPARATUS FOR SOLAR DISTILLATION,
H. R. Hay.
U. S. Paten No 3,846,251, 6 p, 9 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 250, November 5, 1974.

Descriptors: *Patents, *Distillation, *Solar stills, *Solar distillation, *Waste water treatment, Separation techniques, Equipment.

The app the distilland basin and the substances with it. The substances may be liquids or solids, absorbent or non-abisorbent, for aiding in the process of recovery of water from the atmosphere. The movement of natural or forced air over the distilland basin at night results in the deposition of water subsequently recovered by solar distillation during the daytime. The cover is radiation-transmitting, - it is transparent or translucent to solar rays and is capable of transmitting energy to convert distilland to vapors condensed on the cover. One or more distilland-retaining components is exposed to the night sky for purposes of lowering their temperatures below that which would be obtained if the cover remained. By forcing the air through the still during the nighttime when the outside air has a higher moisture content than air within the still allows the deposition of dew to occur in convenient areas for recovery. (Sinha-OEIS)
W75-03876

HOT BALL DESALINATION PROCESS,
Occidental Petroleum Corp., Los Angeles, Calif. (assignee).
J. R. Phillips.
U. S. Patent No 3,843,462, 8 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1622, October 22, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Condensation, *Flash distillation, *Waste water treatment, Sea water, Brackish water, Fresh water, Potable water, Equipment.

A daeslination system utilizes the following steps: pressurizing the saline water to insure that it will remain liquid during heating; heating a stream of the pressurized relatively cool saline water to at least the flash distillation temperature of the initial flash distillation stage by counter-currently flowing a moving stream of heated pellets through the stream of saline water, the saline water being pressurized throughout the zone of contact with the pellets and remaining liquid; separating the exiting, thus relatively cooled pellets from the stream of heated saline water; and transferring the stream of heated saline water free of pellets to the initial flash distillation stage. Then the pressure and temperature are reduced to condense the water vapor produced by the distillation on the surfaces of the separated relatively cooled pellets. The condensate may then be removed for collection and the pellets returned for reuse. (Sinha-OEIS)
W75-03878

REGIONAL WATER SUPPLY DEVELOPMENT UTILIZING BRACKISH WATER RESOURCES IN THE SOUTHERN ARAVA REGION,
Mekorot Water Co. (Israel).
P. Glueckstern, Y. Kantor, and A. Ardman.
Presented at the International Symposium on Brackish water s a Factor in Development, held at the Ben-Gurion University of the Negev, Beer-Sheva, Israel, January 5-10, 1975. 21 p 5 tab, 6 fig, 3 ref.

Descriptors: *Brackish water, *Sea water, *Desalination, *Semiarid climates, *Water quality, Evaluation, Water supply development, Reverse osmosis, Potable water, Drinking water, Arid climates.
Identifiers: *Israel (Arava Valley).

Economic evaluations of alternative development programs were made for a semiarid region presently dependent on brackish and desalinated sea water for its water supply. Results showed that at prevailing energy prices the total coast of desalting brackish water is considerably lower than the energy cost only of desalting sea water. An economic incentive now exists to supply blended water of the lowest acceptable quality. Because of the current energy prices and differences in cost between desalted sea water and brackish water, the alternative of using all of the still undeveloped brackish water resources is by far the most economic. (Mastic-Arizona)
W75-03962

PUTTING THE SUN TO WORK: A HISTORY AND DIRECTORY OF CURRENTLY AVAILABLE SOLAR ENERGY APPLICATIONS,
Arizona State Fuel and Energy Office, Phoenix. Conservation Section.
K. Bacher.
State of Arizona, Office of the Governor, Arizona State Fuel and Energy Office, 1974. 27 p, 3 fig, 19 ref.

Descriptors: *Solar radiation, *Solar stills, *Heated water, *Thermal radiation, *Desalination, Desalination apparatus.
Identifiers: *Solar energy systems, *Solar cells, *Solar water heaters, *Solar thermal energy.

The purpose of this brochure is to inform the public of the equipment and uses of solar energy currently available. Brief discussions are presented of heliothermal, helioelectric, and heliochemical collection methods. Current systems employing solar energy are also discussed, and include water heaters which can be used in various systems to provide increased hot water to the residence, or to heat and cool houses. Other uses include solar stills for converting small amounts of brackish or sea water to fresh water, solar ovens and broilers, and swimming pool heaters. In addition to new and experimental systems being developed, equipment is available to 'retro-fit' existing facilities. A list of firms supplying solar equipment and references to solar energy books and articles is contained in the brochure. (Mastic-Arizona)
W75-04128

3B. Water Yield Improvement

AGRONOMIC SURVEY OF JOJOBA IN CALIFORNIA,
California Univ., Riverside. Dept. of Plant Sciences.
For primary bibliographic entry see Field 3F.
W75-03960

VEGETATION MANAGEMENT FOR INCREASED WATER YIELD IN ARIZONA,
Arizona Univ., Tucson. Dept. of Watershed Management.
P. F. Ffolliott, and D. B. Thorud
Technical Bulletin 215, Agricultural Experiment Station, University of Arizona, Tucson, September 1974. 38 p 19 fig.

Descriptors: *Watershed management, *Water yield improvement, *Riparian plants, *Forestry, *Arizona, Ponderosa pine trees, Chapparal, Coniferous forests, Desert plants, Grasslands, Pinyon pine trees, Juniper trees, Alpine, Vegetation, Precipitation (atmospheric), Isohyets, Forest management.

A brief summary is presented of an analysis designed to define the potential for increasing water yields from watersheds in Arizona. Nine vegetation zones were recognized and characteristics and water yield improvement opportunities of each are given. The zones include the alpine, mixed conifer forests, aspen forests, ponderosa pine forests, pinyon-juniper woodlands, chapparal, grassland, desert shrub, and riparian association zones. A general methodology was used to obtain estimates of yield potentials by dividing Arizona into 15 drainage areas on which the vegetation zones were mapped. Total acreage for each area and zone was obtained from land ownership patterns. Finally, precipitation isohyets were superimposed to enable estimates to be made of potential amounts of water available in each area. This study suggests that the potential for

water yield improvement is significant particularly in the mixed conifer and ponderosa pine forests, and the chapparal zones. The range in potential water yield was calculated to be approximately 600,000 to 1,200,000 acre-feet per year. (Mastic-Arizona)
W75-03961

HYDROLOGIC DATA FOR 1973, BROWARD COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
H. W. Bearden.
Open-file report, 1974. 64 p, 42 fig, 5 tab, 18 ref.

Descriptors: *Hydrologic data, *Surface waters, *Groundwater, *Water quality, *Florida, Data collections, Rainfall, Runoff, Groundwater movement, Canals, Water management(Applied), Water analysis, Water yield improvement.
Identifiers: *Broward County(Fla).

This report, the third of an annual series, includes hydrologic data for Broward County, Florida for the 1973 water year. These data are compared with long-term records from rainfall, groundwater, surface-water, and water-quality stations. The average water-year rainfall, on the basis of 30 years of record (1943-1972), is 58.60 inches. Rainfall averaged 49.08 inches during the 1973 water year. Groundwater levels in the county during the 1973 low-water period were almost as low as during the 1971 record low-water period, although January-April rainfall was 7.58 inches in 1973 and 1.94 inches in 1971. Discharge throughout the surface flow system in Broward County was dependent on the intensity and duration of rainfall until the establishment of the water-management system in the county. Major modifications to the regional canal system began about 1953 and were virtually complete by 1962. The extreme flows have been greatly modified and the duration of moderate or optimum flows greatly lengthened. The chief threat to surface-water quality in urban areas is manmade contamination. Total coliforms exceeded the permissible limits for Class III waters (Recreation-propagation and management for fish and wildlife) and water for public supply in Broward canals except at site 43 in Snake Creek Canal during the 1973 water year. (Woodard-USGS)
W75-03976

THE DEVELOPMENT OF SUPPLEMENTAL WATER: RESOURCE FLEXIBILITY AND FARM MANAGEMENT OPTIONS,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 3F.
W75-04031

WATER RESOURCES EVALUATION OF THE SOUTHERN HIGH PLAINS OF NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B.
W75-04042

GENERAL DISPOSITION AND AQUATIC ENVIRONMENTAL EFFECTS OF SILVER IODIDE IN PRECIPITATION MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
H. L. Teller, D. A. Klein, and D. R. Cameron.
In: Water For The Human Environment, Vol. IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 537-547. 1 fig, 7 tab, 7 ref.

Descriptors: *Weather modification, *Snow management, *Silver iodide, *Nucleation, *Hail, Cloud seeding, Water supply, Precipitation(Atmospheric), Storms, Winds, Air circulation, Meteorology, Aquatic environment, Mud, Ecosystems, Anaerobic bacteria, Microbial degradation, Cellulose, Grasslands, Vegetation, *Colorado.
Identifiers: *San Juan Mountains(Colo), Ground-based generator, Pyrotechnic devices, Hail suppression.

Studies of silver disposition on a winter-orographic and a summer-convective precipitation management project showed that additions of silver from cloud seeding are unlikely to be detectable by available methods. Apparent seasonal variation, but no increase in silver levels, was observed on both target areas. Silver accumulation in litter and soil, and uptake by plants, did occur at a ground-generator site. The addition of silver at 1 and 10 ppm to an aquatic mud environment resulted in an apparent decrease in cellulose decomposition in a laboratory test. Similar additions of silver compounds to the cellulose substrate itself appeared to enhance decomposition rates. Silver additions to aquatic mud environments may have discernible effects on microbial degradation processes. Silver and nitrogen appear to have opposing effects on these microbial activities, and the iodide, of itself, may cause changes in degradation rates. The observation of possible increased degradation when silver is directly in contact with substrates indicated that additional, more subtle, effects on decomposer processes may be occurring. (See also W75-04213) (Visocky-ISWS)
W75-04255

PROJECT SKYWATER.
Nevada Univ., Reno. Desert Research Inst.
Available from the National Technical Information Service, Springfield, Va 221611 as PB-231 460, $6.25 in paper copy, $2.25 in microfiche. Supplementary Final Report, July 1, 1972-September 30, 1973. 155 p, 135 fig, 7 tab. Contract No. 14-06-D-6632-1968.

Descriptors: *Weather modification, *Storms, Cloud seeding, Climatology, Cloud physics, Instrumentation, Radar, Data collections, *Nevada, *California, *Meteorology.
Identifiers: Storm patterns, *Sierra Nevada Mountains.

As the primary source of water for much of Nevada and California, the winter storms that bring moist Pacific air over the central Sierra Nevada mountain range were studied intensively over the past few years. The data acquisition systems and reduction procedures used were described, with particular emphasis on the systems aboard the instrumented B-26 aircraft. With a goal of determining the structure and organization of the winter storms, the data from six specific storms were presented in detail. While there is much variability between the different storms, there is nevertheless a tendency for the higher liquid water contents to occur at low levels along the western edge and over the main crest in all the storms studied. (Jones-ISWS)
W75-04265

OPEN CHANNEL FLOW EVAPORATION STUDY,
Bonneville Power Administration, Portland, Oreg.
For primary bibliographic entry see Field 2D.
W75-04273

EFFECT OF STORED SOIL MOISTURE RESERVE THROUGH CONSERVATION PRACTICES AND SUPPLEMENTAL IRRIGATION ON WHEAT YIELD UNDER DRYLAND FARMING CONDITION,
Indian Agricultural Research Inst., New Delhi (India).
For primary bibliographic entry see Field 3F.
W75-04346

3C. Use Of Water Of Impaired Quality

THE INFLUENCE OF SOIL SALINITY UPON FRUITING AND SHEDDING, BOLL CHARACTERISTICS, FIBER QUALITY, AND YIELDS OF TWO COTTON SPECIES,
Texas A and M Univ., El Paso. Agricultural Research Station.
D. E. Longenecker.
Soil Science, Vol 115, No 4, April, 1973. p 294-302, 6 tab, 1 fig, 13 ref.

Descriptors: *Cotton, *Soil water, *Salinity, Salts, *Irrigation, *Irrigation water, Saline water, Moisture stress, Moisture deficit, Plant growth, Crop production, Root zone, Salt tolerance.

The effects of substrate salinity were visible in both cotton species by reduction in plant growth and yields which were more evident at the highest salinity level of 8000 ppm salt in the water. Both Acala and Pima cotton species were affected in a similar manner which appeared to be primarily a stunting of growth. Also evident was a reduction in stem diameter, total number of fruiting forms initiated, total number of squares shed, total number of bolls matured, weights of both seed and lint per boll, and fiber length. The possibility exists of substituting moderate salinity for some degree of induced moisture stress which is believed to be desirable in late summer in order to slow vegetative growth and enhance fruiting. Application of saline water may be more desirable since plant moisture stress could be induced without the danger of acute moisture deficiencies caused by too long a delay of irrigation waters. (Mastic-Arizona)
W75-04134

A DEMONSTRATION OF WASTE HEAT USE IN AGRICULTURE,
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W75-04224

3D. Conservation In Domestic and Municipal Use

MANAGEMENT OF WATER RESOURCES FOR URBAN ENVIRONMENTAL ENHANCEMENT,
Environments for Tomorrow, Inc., McLean, Va.
For primary bibliographic entry see Field 6B.
W75-04151

3E. Conservation In Industry

USE AND DISPOSAL OF SOLID WASTES FROM PULP AND PAPER PRODUCTION (VYUZITIE A LIKVIDACIA PEVNYCH ODPADOV Z VYROBY BUNICINY A PAPIERA),
Vyskumny Ustav Papier a Celulozy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W75-03886

AN EXAMPLE OF TREATMENT OF EFFLUENTS FROM PAPERMAKING WITH A VIEW TOWARD RECYCLING (UN EXEMPLE DE TRAITEMENT DES EFFLUENTS DE PAPETERIE EN VUE DU RECYCLAGE),
For primary bibliographic entry see Field 5D.
W75-03887

USE OF WASTE CHEMICALS IN KRAFT MILL EFFLUENT TREATMENT,
Finnish Pulp and Paper Research Inst., Helsinki.
For primary bibliographic entry see Field 5D.
W75-03891

POSSIBILITIES FOR PURIFYING RECYCLED OR WASTE WATERS FROM PAPER MILLS, TAKING PHYSICAL-CHEMICAL PROCESSES INTO ACCOUNT (LES POSSIBILITES D'EPURATION DES EAUX RECYCLEES OU RESIDUAIRES DES PAPETERIES, COMPTE-TENU DES PROCEDES CHIMICO-PHYSIQUES),
For primary bibliographic entry see Field 5D.
W75-03893

MILL ACHIEVES MAXIMUM REUSE OF WATER WITH REVERSE OSMOSIS,
For primary bibliographic entry see Field 5D.
W75-03899

NEW SCREENING CONCEPT BOOSTS WATER REUSE AT BOXBOARD MILL,
Sweco, Inc., Los Angeles, Calif. Environmental Systems Div.
For primary bibliographic entry see Field 5D.
W75-03900

AN ALARMING SYSTEM FOR HIGH-SOLIDS WHITE WATER,
For primary bibliographic entry see Field 5G.
W75-03901

KNOWLTON (BROTHERS INC., WATERTOWN, NEW YORK) MILL CLOSES LOOP ON WASTE TREATMENT/WATER REUSE,
Malcolm Pirnie, Inc., White Plains, N.Y.
For primary bibliographic entry see Field 5D.
W75-03904

HOW TO REDUCE BOD LEVELS FROM SIZE-PRESS STARCHES,
National Starch and Chemical Corp., New York.
For primary bibliographic entry see Field 5G.
W75-03906

CORRUGATED INK AND STARCH WASTES MEET EPA STANDARDS AT ST. REGIS.
For primary bibliographic entry see Field 5D.
W75-03907

SPILL PREVENTION AND CONTROL ASPECTS OF PAPER INDUSTRY WASTE WATER MANAGEMENT PROGRAMS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5G.
W75-03912

CHANGING WATER USE IN SELECTED MANUFACTURING INDUSTRIES,
National Bureau of Economic Research, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-03922

WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN THE NORTHERN GREAT PLAINS COAL REGION OF EASTERN MONTANA, 1974-75.
Geological Survey, Helena, Mont.
For primary bibliographic entry see Field 7C.
W75-03977

THE STORY OF WONDER, CHURCHILL COUNTY, NEVADA,
Geological Survey, Carson City, Nev.
H. A. Shamberger.
Available from Nevada Historical Press, Star Route 1, Box 751, Carson City, Nev. 89701, $5.00. Nevada Historical Press, Carson City, Nevada, 1974. 80 p.

Descriptors: *Mining, *Water supply, *Nevada, *History, Water rights, Municipal water, Industrial water.
Identifiers: *Wonder(Nev).

The Wonder Mining District, Nevada, was one of 12 substantial mining districts that blossomed and boomed during the first decade of this century. While it was not so flamboyant as some of the other mining camps which flourished during this period, it was one of the most stable, as well as one of the most productive. Only a very few of the old mining camps in Nevada were situated near an adequate water supply for either the mining camp or town or for its mills. When a mining camp began developing, and where such development indicated that the camp would be a producer, one of the first problems encountered was where to obtain a water supply. The town of Wonder was somewhat of an anomaly with respect to its water supply, as compared to other mining camps. Within two months after the Wonder townsite was recorded in 1906, it was announced that Bench Creek water rights were purchased and piped to the town. On December 23, 1907, the company's mining operation filed application No. 760 to appropriate the waters of Sage Hen Creek for mining and milling purposes. (Knapp-USGS)
W75-03985

A COMBINED SYSTEM CONCEPT FOR POWER GENERATION AND WASTEWATER RENOVATION,
Arizona Univ., Tucson. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5D.
W75-04227

3F. Conservation In Agriculture

IRRIGATION DITCH LINER AND METHOD FOR MAKING SAME,
For primary bibliographic entry see Field 4A.
W75-03863

MEANS FOR ROTATABLY SUPPORTING AN OVERHEAD IRRIGATION PIPE,
Lindsay Mfg. Co., Nebr. (assignee)
A. L. Zimmerer, B. J. Zimmerer, and P. B. Zimmerer.
US Patent No 3,851,659, 3 p, 5 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 929, No 1, p 117, December 3, 1974.

Descriptors: *Patents, *Irrigation systems, *Water distribution(Applied), *Water management(Applied), Distribution systems, Pipes.

A self-propelled irrigation system has a water distribution pipe movable along a predetermined path and a means for supplying water to the pipe. Spaced apart, self-propelled towers along the length of the pipe support it above the ground and propel the pipe along its predetermined path. At least some of the towers have a sleeve through which the pipe freely rotatably extends to permit the towers to traverse irregular ground without imposing twist stress in the pipe. At least some of the towers are rigidly connected to the pipe so as to prevent rotational movement of the towers with respect to the pipe. (Sinha-OEIS)
W75-03867

TRICKLE IRRIGATION SYSTEM,
J. R. Nye.
U. S. Patent No 3,843,056, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1500, October 22, 1974.

Descriptors: *Patents, *Irrigation systems, *Irrigation practices, Equipment, Conservation, Land management, Water management(Applied), Crop production.
Identifiers: *Trickle irrigation.

The irrigation system includes a water supply source and a field of discharge pipes for dispensing water over the ground about growing crops. A pump is interconnected between the water supply source and the discharge pipe field. A first switch connects an electrical power source to the pump for activating and deactivating the pump. A second switch which includes means responsive to the rate of water flow through the pump or system will cause the pump to be deactivated when the water flow drops below a selected minimal flow rate. Also included is a means which isolates or deactivates the second or flow responsive switch for a short period of time when the first switch is initially shifted into its 'on' position to start the pump. This allows the irrigation system to be primed and air-purged without deactivation of the pump. The control unit for the irrigation system is contained within a compact housing which is adapted to rest upon the ground. A warning means, such as a light indicator, serves to note when the pump is deactivated through the operation of the second or flow responsive switch. (Sinha-OEIS)
W75-03877

INFLUENCE OF TOBACCO PLANT CANOPY ON PERCOLATION,
North Carolina State Univ., Raleigh.
D. L. Terry.
Agron J 65(5): 794-796, Illus. 1973.
Identifiers: Leaching, Lysimeters, Nicotiana-tabacum, *Percolation, Tension, *Tobacco, Loam, Sands, Soils, Plant canopy.

The relationship between percolation at various positions in Lakeland sand and Norfolk loamy sand soils under tobacco (Nicotiana tabacum L.) culture and the growth and development of the plant canopy was studied. A procedure is described for making direct measurements of percolation at various positions at a depth of 30 cm in a soil with respect to plant location as follows: (A) through a ridge directly below a plant; (B) through a ridge half way between 2 plants; (C) through a fallow ridge; and (D) through a fallow level area. During the 1st 15-20 days of the season percolation was similar at all positions studied and amounted to 40-60% of an average rainfall. From about 40 days after transplanting to the end of the growing season percolation at position A was about 40-100% of the rainfall while that at B and C was near zero. Percolation at D was intermediate averaging around 1/2 that of A. The large amount of percolation at A after canopy development was explained as the result of water being intercepted by the leaves and channeled to the base of the stalk. Percolation and possible leaching below 30 cm in a tobacco field are significant during the early part of the season (15-20 days from transplanting or later); however, after canopy development (40-49 days from transplanting or earlier) they are probably not significant except in a small soil volume directly below the plants.--Copyright 1974 Biological Abstracts, Inc.
W75-03931

APPRAISAL OF IRRIGATION PROJECTS AND RELATED POLICIES AND INVESTMENTS,
Ministry of the Presidency, Mexico City.
L. M. Bassoco, R. D. Norton, and J. S. Silos.
Water Resources Research, Vol 10, No 6, p 1071-1079, December 1974. 2 fig, 4 tab, 14 ref.

Descriptors: *Irrigation, *Projects, *Linear programming, *Investment, *Irrigation districts, *Mexico, Optimization, Decision making, Economics, Evaluation, Agriculture, Simulation analysis, Mathematical models, Systems analysis, Water policy.
Identifiers: Public policy, Interdependence.

Seven examples of analysis with linear programming models are presented to illustrate methods of treating interdependence in the appraisal of irrigation projects. The optimization

models are applied to public policy decisions in an environment where decision makers are concerned with the simultaneous use of several instruments of economic policy. Considered are the types of interdependence which affect the evaluation of irrigation investment projects and the use of linear programming for capturing this interdependence and for reflecting alternative goals in project evaluation. The kinds of interdependence analyzed are: (1) between investment projects and other policy instruments; (2) among different types of investment projects; and (3) between local and sector-level decisions on investment outlays. All three kinds are analyzed by linear programming models of irrigated agricultural producing areas, mostly with parametric programming experiments on these models. The models simulate producers' responses under different specified public policies. The applications discussed refer to irrigation districts in the central plateau and northwestern littoral of Mexico. Parametric linear programming is shown to be a useful tool for coping with this interdependence even in the absence of full project cost information. (Bell-Cornell)
W75-03933

PRICING IRRIGATION WATER IN IRAN,
Utah State Univ., Logan. Dept. of Economics.
B. D. Gardner, Y. Madhi, S. Partovi, H. Morteza, and S. Mehdi.
Water Resources Research, Vol 10, No 6, p 1080-1084, December 1974. 2 fig, 3 equ, 1 ref.

Descriptors: *Irrigation water, *Pricing, *Water supply, Water utilization, Management, Projects, Costs, Reimbursable costs, Water delivery, Operation and maintenance, Mathematical models.
Identifiers: *Iran.

Since its 1968 nationalization of water supplies, Iran has had the problem of setting prices for all water uses. Iran's institutional framework is described, and a pricing model for determining water charges is developed. A system is developed for pricing irrigation water delivered fo farmers from large multipurpose projects that are managed by water authorities directed to cover costs but make no profits. An irrigation project is divided into zones, and a single price is proposed for each zone. Operation and maintenance costs are set as a lower limit on price, and a certain fraction of ability to pay is set as an upper limit. Zones are ranked by assigned reimbursable costs, and a system is proposed that would produce water revenues in aggregate equal to total project reimbursable costs. For those zones where water is priced above reimbursable cost the price is set at that level where the price minus reimbursable costs, as a percentage of the difference between the upper limit and reimbursable cost, is the same for all zones. For those zones where the price is below reimbursable cost, the recommended price is at the upper limit. (Bell-Cornell)
W75-03936

EFFECTS OF LOW WATER POTENTIALS ON TRANSPIRATION AND PHOTOSYNTHESIS IN MITCHELL GRASS (ASTREBLA LAPPACEA),
Queensland Univ., Brisbane (Australia). Dept. of Botany.
For primary bibliographic entry see Field 2D.
W75-03938

WATER UTILIZATION AND AGRICULTURAL DEVELOPMENT IN WESTERN UTTAR PRADESH,
Indian Inst. of Management, Ahmedabad.
V. K. Gupta, P. S. George, and V. R. Gaikwad.
Available from the National Technical Information Service, Springfield, Va. 22161, as AICS-4, $10.60 in paper copy, $2.25 in microfiche. India Atomic Energy Commission, Argo-Industrial Complex Study Group, Ehabha Atomic Research Center. 1971. 271 p, 5 fig, 111 tab.

Descriptors: *Agriculture, *Irrigation, *Irrigation programs, *Irrigation districts, Irrigation water, Irrigation wells, Crop production, *Water utilization.
Identifiers: *Agro-information, *India, Farmers.

The purpose was to understand the parameters related to the cropping pattern, the use of irrigation facilities, and the participation of farmers in different organizations involved in agricultural development. Information important to the understanding of these aspects was acquired by questionnaires administered to farmers in three regions, each having a different percentage irrigated crop area. Of particular interest was the degree of utilization of the State tube-well organization by the farmers in the various regions. The state tube-well system was found to be a secondary source of irrigation water to private tube-wells. Although they were higher in cost, private tube-wells were preferred because of greater mechanical reliability, and assured and timely irrigation. Forty percent of the sample farmers reported they wanted more irrigation facilities. Farmers were found to depend maily on institutionalized sources for agro-information, and failed to mention Agricultural Development Officers from the agricultural department as an information source. (Mastic-Arizona)
W75-03950

SOME SOCIO-AGRICULTURAL CHANGES AS A RESULT OF INTRODUCTION OF IRRIGATION IN A DESERT REGION,
Central Arid Zone Research Inst., Jodhpur (India).
L. P. Bharara, S. P. Malhotra, and F. C. Patwa.
Annals of Arid Zone, Vol. 13, No 1, p 1-10. March, 1974. 5 tab, 8 ref.

Descriptors: *Irrigation, *Crop production, *Social change, *Land use, *Deserts, *Arid climates, Land development, Farming equipment, Labor, Labor mobility, Arid lands, Water distribution, Adoption of practices, Cultivated lands, Farm management, Fertilizers.
Identifiers: *India(Rajasthan Canal Project.)

The introduction of irrigation in the Rajasthan Canal-desert region caused changes in such socio-agricultural areas as occupational structure, land use, land distribution patterns, size of land holding, area sown, fallow land, agricultural inputs, and labor employment. The result of these changes was the appearance of farming communities. Labor shifted from handicraft and carpentry work to cultivation and agricultural labor. Although land holding per household decreased, the percent of area sown increased as a result of irrigation. Many in the landless class gradually have become landowners creating an increase in the number of agricultural labor jobs available. Crop farming became entirely mechanized in order to compete for higher commercialized production. (Mastic-Arizona)
W75-03951

EFFECT OF SOIL TEMPERATURE ON DIRECTION OF CORN ROOT GROWTH,
Ontario Ministry of the Environment, Toronto.
J. J. Onderdonk, and J. W. Ketcheson.
Plant Soil. Vol 39, No 1, p 177-186. Illus. 1973.
Identifiers: *Corn(Field), Growth notes, Mulch, Nutrients, Root growth(Corn), *Soil temperature, Soil moisture, Absorption.

More precise effects of soil temperature on the direction of corn root growth were determined by growing seedlings in soil for short periods in growth cabinets controlled to give a range of soil temperature conditions. The angle of growth (relative to the horizontal) was found to be minimum (10) deg. at constant 17C. Above or below this temperature (10-30C), a more vertical direction occurred. Cyclic temperatures also influenced direction, with the maximum of the cycle apparently determining the angle. The duration of the maximum temperature period in a cycle necessary to initiate a direction effect was not determined, however. The significance of these findings in the field is that modifications of soil temperatures by mulches, etc. probably influence the distribution of roots in the rooting zone of soils. This in turn means that plant behavior such as moisture and nutrient uptake can be better explained or managed for maximum performance.--Copyright 1974, Biological Abstracts, Inc.
W75-03954

TWO-DIMENSIONAL DISPLACEMENT INTO OR FROM WATER-FILLED DITCHES,
Arizona Univ., Tucson, Dept. of Soils, Water, and Engineering.
For primary bibliographic entry see Field 4A.
W75-03957

DISTRIBUTION OF HUMUS AND AVALABLE NUTRIENTS IN SOIL UNDER SOWN PASTURES IN AN ARID ENVIRONMENT,
Central Arid Zone Research Inst., Jodhpur, (India).
R. P. Dhir, and K. E. Gajbhiye.
Annals of Arid Zone, Vol. 12, No. 3 and 4, p 179-182, September/December, 1973. 1 fig, 1 tab.

Descriptors: *Humus, *Arid lands, *Fertility, *Soil tests, Pastures, Nutrients, Organic matter, Grasses, Soils, Root development.
Identifiers: *India (Jodhpur.)

As a part of a continuing study on fertility status of soils under grass, samples were taken at horizontal distances of 12.5, 25, 50, and 75 cm. from clumps of grass with 1.5 m row spacing and 12.5 and 50 cm. for 1.0 m row spacing. At each horizontal location samples were taken at depth levels of 0-20, 20-40, and 40-60 cm. Analysis of the samples for humus with row spacings of 1.5 m shows content at the 12.5 cm. distance and 0-20 cm depth to be 0.32%, decreasing to 0.26% at 75 cm. distance. The same decreasing pattern of humus content can be seen at the 20-40 and 40-60 cm depths although it is less conspicuous. This effect is even more evident in distribution of nutrients such as phosphorus and potash where content is as much as 41% and 31% higher near the plants than at the midpoint between two rows. It appears that in spite of higher nutrient uptake near the plants, organic residues are responsible for maintaining higher availability of nutrients in the vicinity of the grass clumps. (Mastic-Arizona)
W75-03958

AGRONOMIC SURVEY OF JOJOBA IN CALIFORNIA,
California Univ., Riverside. Dept. of Plant Sciences.
D. M. Yermanos.
Economic Botany, Vol. 28, No. 2, April-June, 1974. p 160-174, 1 tab, 10 fig, 12 ref.

Descriptors: *Crop production, *Semiarid climates, *Plant morphology, *Seeds, *Drought resistance, Market value, Harvesting, Chemical properties, Cultivation, Plant growth, Protiens, Amino acid, Irrigation, *California.
Identifiers: *Jojoba, Sperm whale oil, Wax.

Two possibilities are considered for the commercial production of jojoba seed: (1) harvesting the existing natural populations, and (2) establishing new cultivated stands of jojoba. The most important use suggested for jojoba is to replace sperm whale oil with the liquid wax extracted from its seed. Renewed attention is being given to this possibility since the sperm whale has been placed on the endangered species list, and the importation of this oil has been banned in the United States. Jojoba could become a viable crop for semi-arid lands if action is taken soon to plant for jojoba production. Jojoba has good marketing potential. Large seed production could be based on wild

stands for a few years while jojoba plantations are established to eventually take over all production. Action should be taken before synthetic substitutes are developed which would eliminate the potential market. (Mastic-Arizona)
W75-03960

DETERIORATION OF CONCRETE DITCH LINERS IN SALINE-ALKALI SOIL,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 8F.
W75-03966

RELATION OF SOYBEAN LEAF WATER POTENTIAL TO SOIL WATER POTENTIAL,
Kansas Agricultural Experiment Station, Manhattan. Evapotranspiration Lab.
R. A. Brady, W. L. Powers, L. R. Stone, and S. M. Goltz.
Agronomy Journal, Vol 66, No 6, November-December, 1974. p 795-798, 1 tab, 5 fig, 12 ref.

Descriptors: *Soil-water-plant relationships, *Soybeans, *Soil moisture, *Evaporation, *Irrigation efficiency, Soil moisture meters, Leaves, Microclimatology, Soil water.
Identifiers: *Soil water potential, Leaf water potential, Irrigation scheduling.

A study was made to determine if a relationship exists between soil water potential and soybean leaf water potential for the purpose of aiding irrigation scheduling. Leaf water potentials were measured in a pressure chamber, soil water potentials were estimated using moisture release curves, and volumetric soil moisture measurements were made with a neutron probe. Daily atmospheric evaporative demand caused an average decrease of 9 to 10 bars for leaf water potentials. Soybeam leaf water potential was responsive to changes in soil water potential during the podding as well as the vegetative stage. Although leaf water potential was not in a 1:1 ratio with soil water potential, the maximum values of the leaf water potential in early morning make an estimation of the soil water potential possible. Differences in leaf water potential between irrigated and nonirrigated soybeans were closely related to differences in soil water potential of irrigated and nonirrigated soil. (Mastic Arizona)
W75-03989

USEFULNESS OF ERTS-1 AND SUPPORTING AIRCRAFT DATA FOR MONITORING PLANT DEVELOPMENT AND RANGE CONDITIONS IN CALIFORNIA'S ANNUAL GRASSLAND,
California Univ., Berkeley. School of Forestry and Conservation.
For primary bibliographic entry see Field 4A.
W75-03990

EFFECT OF SOIL MOISTURE REGIMES, PHOSPHORUS AND NITROGEN ON N AND P UPTAKE BY BARLEY (HORDEUM VULGARE L.),
Haryana Agricultural Univ., Hissar (India).
H. C. Sharma, and R. M. Singh.
Indian J Agric Sci 43(1): 58-61, 1973.
Identifiers: *Barley, Hordeum-vulgare, *Nitrogen, *Phosphorus, *Soil moisture, Absorption, Fertilizers.

N and P uptake by 'NP 21' barley (Hordeum vulgare L.) was studied under varying soil-moisture regimes, levels of P and N on a clay-loam soil in 1966-68 at Udaipur. Barley irrigated at 25% available soil moisture removed 53.5% N and 51.4% P more than the unirrigated crop. Application of 40 kg N/ha increased the N and P uptake by 25.5 and 19.7% over the control, whereas application of 17.5 kg P/ha increased N and P uptake by 7.8 and 5.1%, respectively.--Copyright 1974, Biological Abstracts, Inc.
W75-03991

EFFECTS OF CCC ON DROUGHT RESISTANCE OF TRITICUM AESTIVUM L AND ZEA MAYS L,
Oxford Univ. (England). Dept. of Agricultural Science.
G. A. Robertson, and H. Greenway.
Ann Bot. Vol 37, No 152, p 929-934. 1973, Illus.
Identifiers: *Ammonium chloride, *Chloride compounds, *Drought resistance(Plants), Growth rates, Leaf, Regulators, Roots, *Transpiration, Triticum-aestivum, *Wheat, *Corn(Field).

Application of CCC ((2 chloroethyl)-trimethyl ammonium chloride) to wheat and maize reduced transpiration in both soil and solution cultures. This reduction in transpiration was a result of CCC reducing leaf area and increasing the root/shoot ratio. CCC-treated plants did not increase tolerance to internal water deficits induced by osmotic shocks or desiccation. CCC did increase the drought resistance of young wheat and maize plants, but only by delaying the onset of severe internal water deficits, i.e. by drought avoidance.--Copyright 1974, Biological Abstracts, Inc.
W75-04011

EFFECT OF A KILLED SOD MULCH ON NITRATE MOVEMENT AND CORN YIELD,
Kentucky Univ., Lexington.
G. W. Thomas, R. L. Blevins, R. E. Phillips, and M. A. McMahon.
Agron J. Vol 65, No 5, p 736-739. 1973, Illus.
Identifiers: *Corn(Field), Evaporation, *Mulch, *Nitrates, Nitrogen, Poa-pratensis, Sod mulch, Soils, Loam, Soil moisture, Bluegrass sod, Fertilizers.

Corn (Zea mays L.) was planted in a Maury silt loam soil under conventional tillage and in a chemically-killed bluegrass (Poa pratensis L.) sod in 1970 and 1971 in order to determine the behavior of nitrate and the yield of corn under both cultural systems. Nitrate under both cultural treatments was sampled before and after June rainfall periods in both years. A large fraction of the nitrate was lost from the top 90 cm of soil under the killed-sod plots, whereas, no nitrate was lost from the conventionally-tilled plots. The loss of nitrate under the killed sod was attributed to 2 factors: lower evaporation from the mulched soil; and deep penetration of water and nitrate through larger pores in the wetter, mulched soil. Corn yields where N was applied tended to be higher on the killed-sod plots in a dry year (1970) and about the same in a wet year (1971). However, the no N treatment on the mulched plots had a much lower yield than did the conventionally-tilled no N treatment in the wet year of 1971. Higher N rates may be required when corn is grown in a killed sod mulch as compared to conventionally-tilled corn.--Copyright 1974, Biological Abstracts, Inc.
W75-04013

NITRATE AND CHLORIDE ACCUMULATION AND DISTRIBUTION IN FERTILIZED TILE-DRAINED SOILS,
Minnesota Univ., St. Paul. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-04022

USE OF BLACK POLYETHYLENE MULCH TO REDUCE FLOODING EFFECTS ON TOMATO YIELDS,
Department of Agriculture, Harrow (Ontario). Research Station.
E. F. Bolton, and J. W. Aylesworth.
Can J Plant Sci. Vol 53, No 4, p 857-861. 1973, Illus.
Identifiers: *Flooding reduction, Lycopersicon-esculentum, *Mulch, Oxygen diffusion, Roots, Soil temperature, *Tomato, Crop production.

Processing tomatoes (Lycopersicon esculentum Mill.) grown expermentally under black polyethylene mulch in the field on Brookston clay soil produced 18.3 tons/ha more tomatoes than when grown without mulch during the 1966-71 period. Although this yield increase occurred each year it was most pronounced during seasons when soil flooding inflicted varying degrees of injury on the tomato crop. Soil temperature measurements in 1970 and 1971 indicated that a higher temperature regime existed under the black polyethylene, a factor associated with high yield. O2 diffusion rates were equivalent under both polyethylene and unmulched soil during periods of flooding. Greater root volume was apparently the main effect of black polyethylene mulch in producing high yields under flooded conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-04030

THE DEVELOPMENT OF SUPPLEMENTAL WATER: RESOURCE FLEXIBILITY AND FARM MANAGEMENT OPTIONS,
Utah State Univ., Logan. Dept. of Economics.
R. Willis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 224, $3.75 in paper copy, $2.25 in microfiche. Agricultural Economics Series 1974-2, September 1974. 43 p, 6 tab, 23 ref. OWRT C-4361(9052)(1).

Descriptors: *Farm management, *Supplemental irrigation, Investment, *Benefits, *Investment, *Project post-evaluation, Management, *Alternative water use, *Utah.
Identifiers: *Bureau of Reclamation, Projects evaluation, Supplemental water, *Management options.

The purpose has been to identify, measure, and assess the impact of pecuniary and technological external (management options) benefits that have been realized by primary beneficiaries following Bureau of Reclamation project water deliveries. Two categories, direct and indirect water and land related management options were used to evaluate the magnitude of change correlated to management options. Six Bureau of Reclamation projects and two time periods were used in the evaluation process. Results confirm the hypothesis that management options do exist. An average of about 15% of irrigated acres have been shifted to less intensive cropping practices. Each of these shifted acres required about twice as much irrigation water as previously grown crops. Net gains on irrigated acres were $14.82, $11.81, $2.39, $3.62, $13.95, and $58.78, respectively, for Emery, Vernal, Silt, Florida, Mann Creek, and Minidoka. Indirect gains have occurred in sales of storage water (about $300,000) and water values (about $200 per acre or more) that have been capitalized into land prices. These management options have had a positive impact upon individual farm family well-being. In view of the difficulties and problems encountered in project feasibility criterion and funding process, there is a need for pecuniary and technological benefit measurements. Measurement and inclusion of these benefits could be a significant input into public investment decisions.
W75-04031

EVALUATION OF IRRIGATION SYSTEMS IN THE SNAKE RIVER FAN, JEFFERSON COUNTY, IDAHO,
Idaho Univ., Moscow. Dept of Agricultural Engineering.
G. D. Galinato.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 237, $6.25 in paper copy, $2.25 in microfiche. Master's Thesis, May 1974. 140 p, 30 fig, 10 tab, 37 ref OWRT B-028-IDA(1) and B-033-IDA(1).

Descriptors: *Irrigation efficiency, *Irrigation systems, *Furrows, *Border irrigation, *Furrow irrigation, Drainage, Drainage systems, Deep percolation, *Surface runoff, Ponding, Infiltration, Soil moisture, Data processing, *Idaho.
Identifiers: *Snake River(Ida)

Representative fields in the Snake River Fan, Jefferson County, Idaho, were selected to measure and evaluate the water application efficiencies of two irrigation systems presently employed. Within these fields, specific furrows and border strips were chosen for description and analysis in evaluating the performance of these irrigation systems. Results of water application efficiency tests showed an average efficiency of 24 percent for border irrigation and 51 percent for furrow irrigation. Since there was no surface runoff, the water that was lost went to deep percolation. The dominant reasons for low water application efficiencies were long durations of irrigation for high intake rate soils and long irrigation runs. Water application efficiencies should be improved by redesigning the present systems, particularly by adding drainage systems to prevent ponding of excess water, and by proper attention and judgement by the irrigator during irrigation. (Mastic-Arizona)
W75-04032

A FIELD STUDY OF THE HEAT AND DROUGHT TOLERANCE OF GRAIN SORGHUM (SORGHUM BICOLOR (L.) MOENCH) AS AN APPROACH TO GENETIC IMPROVEMENT,
Nebraska Univ., Lincoln. Dept. of Agronomy.
For primary bibliographic entry see Field 2I.
W75-04044

FLUE-CURED TOBACCO YIELD AND OXYGEN CONTENT OF SOIL IN LYSIMETERS FLOODED FOR VARIOUS PERIODS,
Agricultural Research Service, Florence, S.C. Coastal Plains Soil and Water Conservation Research Center.
R. B. Campbell.
Agron J. Vol 65, No 5, p 783-786. 1973, Illus.
Identifiers: Alkaloids, Flooded crops, *Lysimeters, Nicotiana-Tabacum, Oxygen depletion(Soil), Soils, Sugars, *Tobacco, Crop production.

Tobacco (Nicotiana tabacum L. cv. 'Coker 298') plants grown in lysimeters were flooded for 0, 12, 24, 48, 96 and 120 hr to define more clearly O2-depletion rates in soil and effects of flooding on growth. The O2 content of air entrapped in soil pores was monitored with membrane-covered galvanic-type probes before, during and after a 96-hr flooding. O2 decreased from 16 to less than 4% in the soil atmosphere within 24 hr after flooding. Upon drainage, O2 increased within 48 hr to the original concentration. Growth and yield differences between the control and 12- and 24-hr flooding treatments were not significant. Flooding for longer than 48 hr significantly reduced yield to less than 40% of that of the unflooded plants. Plants were more susceptible to flood damage at the 12-leaf stage of development than at the 17-leaf stage. Reducing sugars increased from 11.8 to 14.8% and total alkaloids decreased from 1.26 to 0.76% in tobacco leaves flooded for 24 hr.--Copyright 1974, Biological Abstracts, Inc.
W75-04111

CROPPING PATTERNS INVOLVING RICE AND THEIR MANAGEMENT,
Rothamsted Experimental Station, Harpenden (England). Dept. of Chemistry.
P. K. R. Nair, Ambika Singh, and S. C. Modgal.
Indian J Agric Sci. Vol 43, No 1, p 70-76. 1973, Illus.
Identifiers: *Crop management, Oryza-sativa, Puddline soil, *Rice, Soils, Transplanting, Cropping patterns, Farm management.

The feasibility of including rice (Oryza sativa L.) in intensive cropping patterns was explored, and the merits of 2 soil-management systems for rice (direct seeding in unpuddled soil and transplanting in puddled soil) in such patterns was evaluated from a field experiment conducted during 1969-71. For the agronomic, economic and management aspects, it was found more desirable to avoid the puddling soil, and consequently transplanting. However, transplanting reduced the effective total crop duration of the cropping pattern by 20 days.--Copyright 1974, Biological Abstracts, Inc.
W75-04127

STUDIES OF TILLAGE-FERTILITY ON PEARL MILLET IN SANDY ARID PLAINS OF RAJASTHAN,
Central Arid Zone Research Institute, Jodhpur (India).
S. D. Singh, R. C. Singh, D. L. Vyas, D. K. Misra, and N. S. Bhati.
Annals of Arid Zone, Vol 12, No 3 and 4, September/December, 1973. p 145-154, 2 fig, 7 tab, 8 refs.

Descriptors: *Cultivation, *Fertilization, *Crop production, *Arid lands, *Plant growth, Fertilizers, Nitrogen, Farm wastes, Dry farming, Rainfall, Emerging vegetation stage, Germination.
Identifiers: Pearl millet.

This study was undertaken to determine the best method of tillage in relation to nitrogen levels for pearl millet grown under natural rainfall conditions in the sandy arid soils of Rajasthan. Five methods of tillage were tried in addition ot fertilizer treatments with farm manure and ammonium sulfate. Tillage methods consisted of plough-plant, 1-ploughing by country plough, 2-ploughing by country plough, 1-harrowing, and 1-harrowing plus 1-ploughing by country plough. No significant differences in seedling emergence was observed due to any of the treatments, but germination on the plough-planted plot was slightly lower. Soil in the plough-planted plot was found to be more porous than in the other methods. Application of ammonium sulfate gave better yields than the organic source on an equal nitrogen basis. The minimum rate of nitrogen advocated for dryland farming was 10 kg. per hectare. (Mastic-Arizona)
W75-04129

PRELIMINARY STUDY ON MOVEMENT OF AVAILABLE WATER IN SANDY LOAM SOILS UNDER DRY FARMING CONDITIONS,
Gujarat Soil Conservation Research, Demonstration and Training Centre, Vasad (India).
R. Dayal, A. Singh, and N. H. Saraf.
Annals of Arid Zone, Vol 12, No 3 and 4, September-December, 1973. p 172-178, 5 tab, 2 fig.

Descriptors: *Rainfall, *Root zone, *Plant growth, *Moisture availability, *Water utilization, *Dry land farming, Soil water movement, Evapotranspiration, Crops, Loam, Evaporation, Soil surface, Semi arid climates, Reclamation(Soil), Tobacco.
Identifiers: Vasad(Gujarat).

Planting during the early stages of rainfall provides better moisture availability and utilization during crop growth. Late planting has shown that there is a deficit of moisture in the effective root zone at the later crop growth stages which causes low yields. Availability of water from the major root depth (0-90 cm.) can only be insured with early planting. The evapotranspiration ration increases with late planting showing that loss of conserved moisture by evaporation from the soil surface increases with the delay in planting. Planting in July in the semi-arid area of Vasad would take advantage of rain water availability. (Mastic-Arizona)
W75-04133

IRRIGATION'S IMPACT ON SOCIETY.
Arizona Univ., Tucson. Dept. of Anthropology.
University of Arizona Press, Tucson. 1974. 181 p, 34 fig, 285 ref. University of Arizona, Anthropological Papers, no. 25. T. E. Downing and M. Gibson, eds.

Descriptors: *Irrigation systems, *Social impact, *History, *Archaeology, Agriculture, Irrigation design, Canals, Flow, Flood irrigation, Salinity, Conveyance structures, Fallowing, Water management(Applied), Southwest US, Mexico, Deserts, Spatial distribution.
Identifiers: *Irrigated agriculture, Peru, Iran, Mesopotamia, Middle East.

These papers were prepared for a 1972 symposium on the relationship of irrigation to society, with the emphasis on the problem of relating the complexity of social organization to the complexity of water-control problems. Despite the diversity of disciplines represented by the participants, certain themes emerge: Notions of cycles, the discovery of relevant elements of the physical irrigation system, comparable water-control solutions by unrelated cultures, a tendency toward contralization spawned by scarcity, and finally a recognition of the need for anthropologists/archaeologists to delve more deeply into the fields of the geographer/hydrologist. Individual papers cover in considerable detail such topics as historic patterns of Mesopotamian irrigation agriculture, organizational preadaptation to irrigation, irrigation and steelement patterns, conservation and diversion, irrigation development and population pressure, the State's use of irrigation in changing peasant societies; and others that are addressed particularly to Peru's coastal deserts; a case of irrigation, conflict, and politics in Mexico; and a water-control system practiced by prehistoric peoples of the American southwest. The papers proceed from a consideration of natural factors, including population, to view irrigation as yet another means for adapting to a specific environment. (Paylore-Arizona)
W75-04138

CORN ROOT-CONFIGURATION RESPONSE TO SOIL TEMPERATURE AND MATRIC SUCTION,
Agricultural Research Service, Pendleton, Oreg. Columbia Plateau Conservation Research Center.
R. R. Allmaras, and W. W. Nelson.
Agron J. Vol 65 No 5, p 725-730. 1973, Illus.
Identifiers: *Corn(Field), Matric suction, Moisture, Mulch, Residues, *Roots, *Soil temperature, Straw, Tillage.

Soil temperature and water variables imposed on the roots of corn (Zea mays L.) in field plots influenced root development. Responses were measured in separate portions of the root system where adventitious roots initiate and subsequent root elongation and branching occurs. These portions of the corn root system are separated far enough to permit specific field management for each portion. Temperature and water variables were produced by combinations of straw-mulch strips and interrow tillage. Initiation of adventitious roots in the 0- to 10-cm soil depth was dominantly influenced by soil temperature in the row. In soil depths below 10 cm, a functional relation between root configuration and the interrow-minus-row soil temperature, and matric suction described the elongation and branching responses subsequent to root initiation. In the year of lower soil temperature and higher moisture (measurements were made in 2 growing seasons), higher interrow temperatures stimulated branching and elongation, but in the year of higher soil temperature and moderate moisture conditions, responses to temperature were negligible. Higher interrow moisture, stimulated branching and elongation in both years as long as the average matric suction was greater than about 85 mb. These explicit descriptions of corn-root-configuration response show the importance of soil temperature management in the row and water management in the interrow. This approach permits more extensive use of the row-interrow concept for design of minimum tillage and residue management systems.--Copyright 1974, Biological Abstracts, Inc.
W75-04288

PERFORMANCE OF SULFURCOATED UREA UNDER INTERMITTENTLY FLOODED RICE CULTURE IN PERU,
North Carolina State Univ., Raleigh. Coleander National Rice Program Peru.
P. A. Sanchez, A. Gavidiao, G. E. Ramirez, R. Vergara, and F. Minguillo.
Soil Sci Soc Am Proc. Vol 37, No 5, p 789-792. 1973, Illus.
Identifiers: *Fertilizers, Flooded crops, Grains, Growth rates, Crop management, Nitrogen, Oryza-Sativa, Performance, *Peru, *Rice, Sulfur, *Urea(Sulfurcoated), Vegetation, Crop production, Absorption.

Short-statured, high yielding rice (Oryza sativa L.) varieties grown extensively in northern Peru require extremely high rates of conventional N sources to achieve maximum yields. The recovery of applied N is extremely low due to the use of intermittent flooding. This water management system results in heavy N losses even with properly timed split applications. In search of simpler and more efficient methods of N management, 8 field experiments were conducted in the region to evaluate S-coated urea (SCU), an experimental, slow-release N source supplied by the Tennessee Valley Authority. Rice yields were increased an average of 59% more by pretransplant-incorporated SCU than by urea or (NH4)2SO4 applied in the same manner. SCU produced an average of 20% higher grain yield response than topdressed applications of urea or (NH4)2SO4. SCU applications increased panicle production, N uptake at harvest, and the apparent recovery of added N. Beneficial effects of SCU were more pronounced in sites where check yields were low, especially less than about 4.8 ton/ha. In sites with high N supplying capacity, SCU produced excessive vegetative growth which resulted in yield reductions at high N rates. Regardless of an assumed 48%-higher unit N cost in SCU, the overall benefits of pretransplant-incorporated applications of SCU were favorable since there was a decrease of 40% in the optimum rate of N and the need for precise timing of application was eliminated.--Copyright 1974, Biological Abstracts, Inc.
W75-04313

EFFECT OF LEVEL TERRACES ON SOIL MOISTURE CONTENT AND UTILIZATION BY CORN,
Iowa State Univ., Ames.
E. L. Miller, and W. D. Shrader.
Agron J. Vol 65, No 4, p 600-603. 1973, Illus.
Identifiers: *Corn(Field), Nitrogen, Phosphorus, *Soil moisture, *Terraces, Soil density, Crop production, *Fertilizers, *Iowa.

Field experiments were conducted to determine the effect of sod-stabilized backslope level terraces on soil moisture content and the utilization of moisture by corn (Zea mays L.). Plots were located in the terrace interval and in terrace channel positions up-slope from 9 different terraces, on a watershed, in the Ida-Monona soil association area of southwestern Iowa. Periodic measurement of soil moisture in the root zone, daily observation of weather variables, and corn development and yield measurements were made for each plot and were used to evaluate soil moisture content and utilization by corn. Soil moisture amounts in the rooting zone were greater in terrace channels than in terrace interval positions on all sample dates, with differences ranging 1.98-6.27 surface cm and averaging 5 cm in the surface 1.83 m of soil. Significant yield differences between positions occurred, and moisture-stress intensity was a significant factor in explaining yield variations. Other factors that were significant in explaining the variation in yield were plant density and plant N and P contents. A yield-response curve was developed, which characterized the relationship between corn yield and moisture stress intensity.--Copyright 1974, Biological Abstracts, Inc.
W75-04315

EFFECT OF TRACTOR TRAFFIC, SURFACE MULCH AND SEEDBED CONFIGURATION ON SOIL PROPERTIES,
Agricultural Research Service, Big Spring, Tex.
P. T. Koshi, and D. W. Fryrear.
Soil Sci Soc Am Proc. Vol 37, No 5, p 759-762. 1973, Illus.
Identifiers: Bulk, Conductivity, Gossypium-Hirsutum, Hydraulics, *Mulch, Organic matter, Porosity, *Seedbed configuration, *Soil properties, Surface, *Tractor traffic, *Texas(Southern High Plains), *Cotton, *Sandy soils, Soil density, Soil compaction.

The effects of 3 seedbed configurations, 4 mulch rates, and tractor traffic confinement on soil properties that affect soil-water relations of a sandy soil were tested with cotton as a test crop. The lack of water limits crop production on dryland sandy soils in the Southern High Plains. Undisturbed soil cores were taken from the 0-7.5, 7.5-15-, and 22.5- to 30-cm depths in the trafficked and nontrafficked interrows and crop rows of the flat, ridge and furrow treatments. Surface mulch rates of 0, 5.6, 11.2 and 22.4 tons/ha of cotton-bur mulch were applied annually after seedbed preparation to each split plot. Tractor traffic was confined to the same path each year using cotton (Gossypium hirsutum L.) as a test crop. Mulching at rates more than 11.2 tons/ha reduced the bulk density, increased hydraulic conductivity, air porosity, total porosity, and organic matter content even in the trafficked interrows. Hydraulic conductivity of the crop rows increased 8-fold with heavy mulch applications. Hydraulic conductivity increased 3-fold, bulk density was reduced, and air porosity increased as a result of controlling tractor traffic even without mulch.--Copyright 1974, Biological Abstracts, Inc.
W75-04316

EFFECT OF MOISTURE REGIMES AND GREEN MANURING ON FERROUS IRON CONCENTRATION IN SOIL AND GROWTH AND YIELD OF PADDY,
Illinois Univ., Urbana.
I. K. Jaggi, and M. B. Russel
J Indian Soc Soil Sci. Vol 21, No 1, p 71-76. 1973, Illus.
Identifiers: *Ferrous iron, Flooding, Growth rates, Moisture content, Organic matter, Paddy, Soil moisture, *Crop production, *Farm wastes, Fertilizers, *India, *Clay loam.

In the 1970 kharif season, a field experiment was conducted on a clay loam soil of Jabalpur, Madhya Pradesh, India, to determine the state of oxidation of paddy soil and the yield of paddy under 2 water levels and 2 levels of added organic matter. Water level was maintained 5 cm above and 10 cm below the soil surface in 3.6 m x 3.6 m plots. Split treatments of no added organic matter and of 18000 kg/ha (dry weight) green Ipomoea were applied to each water level treatment. The concentration of ferrous Fe in the 0-5 cm surface soil receiving organic matter and surface flooding attained its maximum limit of 200 ppm after 6 weeks of flooding and then declined to 1000 ppm. These concentrations were 10-20 times higher than those measured in the other 3 treatments. Average paddy yields were 69, 54, 68 and 64 quintals/ha for the flooded plots without and with organic matter, respectively. None of the treatments significantly influenced the weight of roots per unit volume of soil at depths of 0-10, 10-17.5 and 17.5-25 cm.--Copyright 1974, Biological Abstracts, Inc.
W75-04318

ISOLATED SOIL COLUMNS FOR PLANT RESEARCH: PROCEDURE AND UNIFORMITY TRIAL,
Agricultural Research Service, Logan, Utah.
W. Keller, A. T. Bleak, and A. C. Hull, Jr.
Agron J. Vol 65, No 5, p 720-722. 1973, Illus.
Identifiers: Hordeum-Vulgare, Lysimeters, *Precipitation(Atmospheric), Procedures, *Soil columns, *Barley, Uniformity trials, *Crop production.

Isolated soil columns offer one means of studying the influence on yield and other plant characteristics of different amounts of precipitation while other environmental factors are unaltered. These columns may be regarded as an inexpensive substitute for lysimeters. This study describes the establishment of 67 columns 1.22 m2 in a single row in 1967 and 79 and 88 columns in adjacent rows in 1969. The 1st year after establishment, a uniform crop of barley (Hordeum vulgare L.) was grown on the isolated columns as well as on 2 opposite sides. Coefficients of variation for total yield of barley ranged 8.17-11.42%. A brief description is given of catchments to increase precipitation on the plots by 50% or to reduce it by 33%. These catchments are being used in studies with perennial forage species.--Copyright 1974, Biological Abstracts, Inc.
W75-04321

EFFECT OF STORED SOIL MOISTURE RESERVE THROUGH CONSERVATION PRACTICES AND SUPPLEMENTAL IRRIGATION ON WHEAT YIELD UNDER DRYLAND FARMING CONDITION,
Indian Agricultural Research Inst., New Delhi (India).
C. R. Hazra, S. B. Ray, and T. D. Biswas.
J Indian Soc Soil Sci. Vol 21, No 1, p 9-22, 1973, Illus.
Identifiers: Bulk, Density, *Dryland farming, Farming, *Irrigation(Supplemental), Mulch, *Soil moisture, Straw, *Wheat yield, *Mulches, Infiltration, Moisture conservation(Soils), *India.

The surface configuration treatments for better infiltration of rain water during the kharif (rainy) season were effective in checking runoff and causing higher water infiltration. Moisture conservation was greatly increased with the application of mulches on the soil surface. The mulches (polyethylene sheet and wheat straw) reduced evaporation from the soil, improving the soil moisture status at the sowing time of wheat in the rabi (dry) season; that consequently increased seedling emergence. Soil bulk density decreased while organic C content of the soil and infiltration of water into soil increased under both the mulches (polyethylene and straw). Surface configuration treatments did not have much effect on the yield of wheat while mulches significantly improved the yield. Supplemental irrigation treatments improved grain yield. Positive interaction effect was observed between mulches and supplemental irrigations on grain yield during the dry growing season.--Copyright 1974, Biological Abstracts, Inc.
W75-04346

EFFECT OF NITRATE AND SEDIMENT CONSTRAINTS ON ECONOMICALLY OPTIMAL CLAY PRODUCTION,
Illinois Univ., Urbana. Agricultural Experimental Station.
For primary bibliographic entry see Field 4D
W75-04349

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

METHODOLOGIES FOR OPERATING RESERVOIRS FOR SHORT-TERM FLOOD CONTROL.
Cornell Univ., Ithaca, N.Y. Dept. of Operations Research.
J. R. Fergusson.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-239 108, $9.50 in paper copy, $2.25 in microfiche. Technical Report No 85, Cornell University Water Resources and Marine Sciences Center, Ithaca, New York, September 1974. 334 p, 22 fig, 8 tab, 83 ref. OWRT C-5240(No 4230)(1). 14-31-0001-4230.

Descriptors: *Reservoir releases, *Flood control, *Methodology, *Linear programming, *Optimization, *Scheduling, Reservoir operation, Damages, Costs, Water resources, River systems, Management, Constraints, Mathematical models, Systems analysis.

The task of scheduling releases from reservoirs in a river system during a flood so as to minimize total damage is examined from the perspective of mathematical modelling. The problem is formulated using separable programming, involving the minimization of piecewise-linear damage functions which are generally nonconvex and possibly discontinuous, subject to linear constraints. Some analytic properties of this model are given, including solution charact_rizations for two simple reservoir system structures. Due to the difficulty of extending these results, it is concluded that numerical solution techniques are required. These are developed in detail in a general setting, so that they apply to arbitrary separable programming problems with linear constraints. Initially, cost function continuity is assumed; this is later relaxed to assume discontiunities. The resulting methods are thus applicable to most separable programming problems arising in practice, including the short term flood control reservoir operating problems. Benders' decomposition techniques are also developed for problems in which a subset of the cost functions are convex. Based on a limited amount of computation experience, it is tentatively concluded that lower convex approximation is the best of the above methods when cost functions are nearly convex, while the one based on monotonicity is preferable when they are nearly concave. (Bell-Cornell)
W75-03855

SOME POLITICAL AND ECONOMIC ASPECTS OF MANAGING CALIFORNIA WATER DISTRICTS,
California Univ., Los Angeles. Inst. of Government and Public Affairs.
For primary bibliographic entry see Field 6B.
W75-03856

IRRIGATION DITCH LINER AND METHOD FOR MAKING SAME,
H. Nienstadt.
US Patent No 3,854,292, 3 p, 8 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 945, December 17, 1974.

Descriptors: *Patents, *Irrigation ditches, *Water distributions(Applied), Ditches, Resins, Plastics, *Linings, Protective coatings.
Identifiers: Glass fiber reinforced plastic, Polyester, *Channel liners, Prefabricated liners.

Liner sections are prefabricated with glass fiber reinforced plastic resin, preferably polyester. The glass fiber is in the form of a mat having fibers in random orientation, and more or less felted together. Different types of polyester may be used in accordance with the temperature and ground conditions, and the characteristics may be tailored throughout the length of the ditch or channel to have different characteristics at different portions. In particular, flexible or semi-flexible sections are provided every so often to take up for thermal expansion and contraction and for use in areas where the ground is likely to shift somewhat. Furthermore, in areas which are likely to be dry from time to time, fire resistant or retardant polyester or other resins may be used. Each prefabricated section, which may be many feet in length, and from approximately 1/8 inch thickness on up, has at the opposite ends thereof a section of glass fiber mat, for example on the order of 4 to 6 inches, which is not covered with resin. Liquid resin is coated on the previously uncoated fiber at the end of each section during installation, and the mats from one prefabricated section to another are overlapped. When the fresh resin sets up, a continuous channel liner is provided. (Sinha-OEIS)
W75-03863

EVALUATION OF INTERREGIONAL INPUT-OUTPUT MODELS FOR POTENTIAL USE IN THE MCCLELLAN-KERR ARKANSAS RIVER MULTIPLE PURPOSE PROJECT IMPACT STUDY,
Catholic Univ. of America, Washington, D.C. Inst. of Social and Behavioral Research.
U. Kim.
IWR Contract Report 74-6, submitted to U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., Aug 1974. 99 p, 11 map, 4 tab, 80 ref. DACW 31-72-C-0059.

Descriptors: *Evaluation, *Input-output analysis, *Multiple-purpose projects, *Model studies, Industries, Economics, *Data collections, *Regional analysis, Measurement, Surveys, Investment, Bibliographies, Equations, Systems analysis.
Identifiers: *Impact studies, *Arkansas River Project, Trade, Long-range impact, Impact assessment, Interregional.

A number of operational multi-regional and single region input-output models are evaluated, and an empirically feasible, theoretically sound model is recommended for impact analysis of the Arkansas River project. First, some theoretical aspects of input-output (I/O) analysis are surveyed. A national model is explained through its structural, balance, and solutions equations. Discussed are a regional and an interregional model, Moses' model, Leontief's intranational model, a 'gravity' model, and linear programming and dynamic models. Next, four empirical works of interregional I/O studies are investigated, including the Harvard Study. The use is suggested of a modified revision of the Harvard University Multi-region Input-Output Model completed for the Economic Development Administration. To measure the project's impact on both industrial and regional interdependencies and to comprehend feedback effects, the construction is proposed of an interregional I/O model closed on national boundary. The proposed model is particularly effective in measuring both the direct and indirect impact a given change in demand would have upon the various industrial sectors in a region; it would measure impact on neighboring regions as well as on its own. The remainder of the report is devoted to a data collection plan for the interregional I/O model. (Bell-Cornell)
W75-03923

DESIGN OF A CONDUIT SYSTEM WITH DIVERGING BRANCHES,
North Carolina State Univ., Raleigh. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 8A.
W75-03930

EVALUATING MULTIRESERVOIR OPERATING RULES,
Ecole Polytechnique, Montreal (Quebec).
J. M. Mejia, P. Egli, and A. Leclerc.
Water Resources Research, Vol 10, No 6, p 1090-1098, December 1974. 8 fig, 1 tab, 16 equ, 4 ref.

Descriptors: *Reservoir operation, *Recreation, *Flow augmentation, *River systems, *Evaluation, Optimization, Simulation analysis, Linear programming, Hydrologic data, River basins, Hydrologic systems, Assessment, Multiple purpose, Water allocation(Policy), Summer, Lakes, Estimating, Constraints, Reservoir storage, Drawdown, Equations, Mathematical models, Systems analysis, Flow, Forecasting.
Identifiers: *Operating rules, Decision rules, Historical data, North River System(Canada), Effectiveness, Socioeconomic effects.

Decision rules for operating a multiobjective multireservoir system are evaluated. The effectiveness of alternative operating rules in meeting specified objectives is assessed for the North River system, located near Montreal, Quebec. The North River is regulated by an existing system of reservoirs for recreational and flow augmentation purposes. These objectives are translated into a set of criteria that makes the problem amenable to mathematical optimization, the emphasis then being on the utilization of hydrologic information and the incorporation of optimization procedures in four progressively more complex operating rules. The socioeconomic effects of the operating rules are estimated separately for each of the two uses, thereby establishing a basis for a subjective final evaluation. The rules range from the so-called standard policy to a policy incorporating multiple-period flow forecasting and sequential linear programming for determining the optimal allocation of the available water in space and time. Historical data are used to simulate the operation of the system under the different rules, and an assessment of the policies is made on the basis of multiobjective criteria. For the conditions of the North River reservoir system, the operation problem can be constrained and formulated so as to justify the incorporation of relatively simple optimization procedures in alternative operating rules. (Bell-Cornell)
W75-03932

CHANCE-CONSTRAINED DYNAMIC PROGRAMING AND THE OPTIMIZATION OF WATER RESOURCE SYSTEMS,
New South Wales Univ., Kensington (Australia).
A. J. Askew.
Water Resources Research, Vol 10, No 6, p 1099-1106, December 1974. 3 fig, 2 tab, 20 equ, 6 ref.

Descriptors: Water resources, *Dynamic programming, *Stochastic processes, *Probability, *Constraints, *Reservoir operation, *Reservoir releases, Optimization, Evaluation, Estimating, Economic efficiency, Annual, Costs, Benefits, Algorithms, Equations, Mathematical models, Systems analysis.
Identifiers: System failure, Chance-constrained programming, Operating policy, Benefit maximization.

To limit the probability of failure of a water resource system when it is operated in accordance with its optimum operating policy, such policy must be derived subject to relevant chance constraints. Using a stochastic dynamic program, certain of these constraints can be handled similarly to deterministic constraints, whereas others can be applied indirectly by imposing a penalty for failure, the optimum value of which can be found by an interative search. This search and a precise evaluation of the response of the system may be achieved within the dynamic program by means of minor additions to its basic algorithm. Application of this procedure to four single reservoir systems releasing water to meet a single demand domonstrates its suitability for deriving optimum operating policies for water resource systems and for estimating their response to given inputs and contraints. The object is usually benefit maximization (net), implying, among other things, that long-term economic efficiency is the only criterion on which to judge the significance of system failure. However, if the target release from a reservoir cannot be met, the socio-political implications of this failure may far outweigh any economic evaluation of the gravity of the situation. (Bell-Cornell)
W75-03934

OPTIMIZATION OF REAL TIME OPERATION OF A MULTIPLE-RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.

L. Becker, and W. W-G. Yeh.
Water Resources Research, Vol 10, No 6, p 1107-1112, December 1974. 2 fig, 2 tab, 16 ref.

Descriptors: Water resources, *Reservoir operation, *Reservoir releases, *Linear programming, *Dynamic programming, Methodology, *Optimization, Reservoir storage, Inflow, Hydroelectric plants, Streamflow, Constraints, Algorithms, Computers, California, Water supply, Mathematical models, Systems analysis.
Identifiers: Real time, Operating rules, Policy period.

Presented is an optimization procedure for real time multiple-reservoir operation. The methodology is used to determine optimal operating rules for an existing multiple-reservoir and hydroelectric facility associated with the Shasta and Trinity subsystems of the California Central Valley Project. The problem is to derive the optimum release policy over the specified release periods, which will result in a set of ending storages in the final policy period that is known to be adequate for future system operation. The optimization criterion for each period is to operate so as to minimize the potential energy loss resulting from releases of stored water for various uses. The methodology uses a form of dynamic programming for the selection of an optimal reservoir storage policy path through the specified number of policy periods and a linear programming routine for period by period optimization. The policy periods, in case of real time operation, correspond to the number of time periods for which a streamflow prediction model is reasonably reliable. The method results in relatively easy computer implementation and high flexibility in that changes in constraints are simply made and additional reservoirs easily added. The method is of considerable value for determining release policies in real time operation of an existing system. (Bell-Cornell)
W75-03935

PROTECTING CREEKSHEDS: DEVELOPMENT AND EVALUATION OF A METHOD TO MANAGE SMALL, URBANIZING WATERSHEDS THROUGH LOCAL GOVERNMENT ACTIONS,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03947

TWO-DIMENSIONAL DISPLACEMENT INTO OR FROM WATER-FILLED DITCHES,
Arizona Univ., Tucson, Dept. of Soils, Water, and Engineering.
S. Miyamoto, and A. W. Warrack.
Soil Science Society of America, Proceedings, Vol. 38, No. 5, September-October, 1974. p 723-727, 1 tab, 5 fig, 11 ref.

Descriptors: *Ditches, *Saturated flow, *Spoil banks, *Drainage water, *Flow characteristics, Salts, Leaching, Fertilizers, Drainage engineering.

Piston-type displacement of solutes for steady-state saturated flow into or from water filled ditches is analyzed mathematically and by a sand tank method. The displacement front into the drains advances much faster near the drains than in the region midway between them. A spoil bank may be useful in reducing the amount of water needed to leach salts or in minimizing the loss of water applied fertilizers into drains. The displacement front for water moving from ditches into a field advances in an ellipsoidal pattern. Data obtained from the sand tank model agreed with the predicted fronts. (Mastic-Arizona)
W75-03957

VEGETATION MANAGEMENT FOR INCREASED WATER YIELD IN ARIZONA,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 3B.
W75-03961

DETERIORATION OF CONCRETE DITCH LINERS IN SALINE-ALKALI SOIL,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 8F.
W75-03966

HYDROLOGIC ANALYSIS OF THE MOJAVE RIVER, CALIFORNIA, USING A MATHEMATICAL MODEL,
Geological Survey, Menlo Park, Calif.
T. J. Durbin, and W. F. Hardt.
Water-Resources Investigations 17-74, November 1974. 50 p, 18 fig, 7 tab, 42 ref.

Descriptors: *Mathematical models, *Rivers, *California, *Water conveyance, Surface-groundwater relationships, *Water importing, Water loss, Infiltration, Analog models, Artificial recharge, Open channel flow.
Identifiers: *Mojave River(Calif), *Barstow(Calif).

A mathematical model predicts the effects of using the normally dry Mojave River, California, as a natural conduit system to convey imported water about 60 miles downstream to Barstow. The imported water would be used to replenish aquifers now being overpumped. From 1930 to 1972 only 18 floods at The Forks (headwaters of the Mojave River basin) produced flow at Barstow. The mathematical model simulates the flow characteristics down the initially dry channel and evaluates the potential of the channel to move water to Barstow. Results of simulation by modeling indicate that the channel of the Mojave River can be used efficiently to convey imported water to Barstow only when the absorption capacity of the channel has been reduced by an antecedent flood. An electric analog model was also utilized to predict water-level effects from potential recharge to the underground west of Barstow. (Knapp-USGS)
W75-03967

CREST-STAGE GAGING STATIONS IN OREGON--A COMPILATION OF PEAK DATA COLLECTED FROM OCTOBER 1952 TO SEPTEMBER 1974,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 7C.
W75-03969

WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN THE NORTHERN GREAT PLAINS COAL REGION OF EASTERN MONTANA, 1974-75.
Geological Survey, Helena, Mont.
For primary bibliographic entry see Field 7C.
W75-03977

WATER-RESOURCES DATA COLLECTED IN THE DEVILS HOLE AREA, NEVADA, 1973-74,
Geological Survey, Las Vegas, Nev
For primary bibliographic entry see Field 7C.
W75-03978

QUALITY AND AVAILABILITY OF WATER IN WESTERNMOST TEXAS,
Geological Survey, El Paso, Tex.
For primary bibliographic entry see Field 2K.
W75-03979

FLOOD-HAZARD STUDY--100-YEAR FLOOD STAGE FOR BALDWIN LAKE, SAN BERNARDINO COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2H.
W75-03981

USE OF WATER IN GEORGIA, 1970, WITH PROJECTIONS TO 1990,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 6D.
W75-03983

USEFULNESS OF ERTS-1 AND SUPPORTING AIRCRAFT DATA FOR MONITORING PLANT DEVELOPMENT AND RANGE CONDITIONS IN CALIFORNIA'S ANNUAL GRASSLAND,
California Univ., Berkeley. School of Forestry and Conservation.
D. M. Carneggie, S. D. Degloria, and R. N. Colwell.
Final Report to U.S. Department of the Interior, Bureau of Land Management, March 31, 1974. 53 p, 12 fig, 2 tab, 8 ref.

Descriptors: *Grasslands, *Remote sensing, *Aerial photography, *Range management, *Climatic data, *Spectrophotometry, Grazing, Forages, Crop production, Plant growth, Range grasses, Phenology, Reflectance, *California.
Identifiers: *Earth Resources Technology Satellite(ERTS-1) Wildfire.

The purpose was to determine if ERTS-1 imagery and supporting aircraft photography can: monitor growth and development in the annual grasslands of California, determine the relative amount of forage produced for a given area between years, and provide inputs for a model predicting forage condition and production using ground, spectroradiometric, and climatic data. The results showed a close correspondence between spectral reflectance ratios and green biomass. Changes in ground spectral reflectance data also correspond with observed changes in growth stage and condition of the forage species. Relative differences in forage production were also indicated by ERTS spectral radiance data. Repetitive sequences of ERTS color composite images can provide the means for monitoring change in condition and comparison of condition of different range areas. Anticipated benefits from ERTS monitoring includes: better planning for movement of grazing animals, estimating length of green feed periods for ranges enabling planning for alternative feed sources, determination of dry forage fire hazards, and assessing range conditions as a result of climatic conditions, whether drought or forage abundance. (Mastic-Arizona)
W75-03990

THE ULTRASONIC METHOD OF RIVER GAUGING,
Department of the Environment, Reading (England). Water Data Unit.
R. W. Herschy.
Water Services, Vol 78, No 940, p 198-200, June, 1974. 3 fig.

Descriptors: *Flow, *River flow, Rivers, Gaging Networks, Gaging stations, Ultrasonics.
Identifiers: River gauging, *Ultrasonic methods Great Britain.

The ultrasonic method of river gauging was designed to more accurately measure river flow in areas, where existing methods of river gauging are unsuitable, such as rivers influenced by navigation and locks. The ultrasonic method measures the velocity of flow at a certain depth by simultaneously transmitting sound pulses through the water from transducers on both sides of the river. The average velocity of the water at the depth of the transducers is directly related to the difference between the time of travel of the pulses crosing the river in an upstream direction and those travelling downstream. By incorporating an area factor in the electronic processor and relating the average velocity at the depth of the transducers to the average velocity of flow of the whole cross section, an output of discharge can be determined. Studies were done at River Pang at Pangbourne and at the River Thames at Sutton Courtenay and

the calibration and accuracy f the system were determined. (OrriFIRL)
W75-04026

AMBIENT CURRENT EFFECTS ON VERTICAL SELECTIVE WITHDRAWAL IN A TWO LAYER SYSTEM,
Oregon State Univ., Corvallis. Ocean Engineering Programs.
L. S. Slotta, and R. J. Charbeneau.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 234, $3.25 in paper copy, $2.25 in microfiche. Completion Report, Oregon Water Resources Research Institute, Corvallis, January 1975. 15 p, 7 fig, 1 tab, 17 ref. OWRT A-025-ORE(1).

Descriptors: *Withdrawal, *Gravity waves, Flow, Reservoir releases.
Identifiers: Interfacial gravity waves, Separating height, *Ambient current effects, *Two layer systems, *Selective withdrawal.

The study examined the way in which the selectivity of flow withdrawal into a vertically suspended, upper strata point sink is affected by an ambient current in a two layer system. The results show that an ambient current will influence the selectivity of a withdrawal flow, though the magnitude of the influence is small and is partially masked by the generation of interfacial gravity waves. If such waves can be excluded, then an ambient current would be expected to enhance the phenomenon of selective withdrawal. The generation of interfacial waves may be a more important consequence of an ambient current than its influence on the degree of selectivity; especially as the interfacial waves relate to the subsequent structure of the flow field. The results also show that within a range of separating heights of the intake from the interface, the degree of selectivity is a quasi-linear function of the separating height. Of special interest is the observation that the defined degree of selectivity approaches unity slowly after passing a critical value of the separating height. The influence of the density difference across the interfacial region is negligible when the intake is close to the density-interface, but increases in importance as the separating height is increased.
W75-04049

SPECIAL FLOOD HAZARD INFORMATION REPORT: YOCKANOOKANY RIVER, DYE DITCH AND MUNSON CREEK, KOSCIUSKO, ATTALA COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.
Prepared for Mississippi Research and Development Center, May, 1972, 14 p, 4 fig, 3 tab, 9 plates.

Descriptors: *Yockanookany River(Miss), *Dye Ditch(Miss), *Munson Creek(Miss), Kosciusko(Miss), Attala County(Miss).
Identifiers: *Floods, *Flooding, *Flood control, *Flood protection, *Flood plains, Channel improvement, Mississippi.

Yockanookany River, approximately 55 miles long and 9 miles wide, and two of its tributaries, Munson Creek and Dye Ditch, have a total drainage area of 453.5 square miles. Munson Creek enters the river about a mile east of Kosciusko, a diverse agricultural center of 7,000 with a few industries. Dye Ditch flows from the west into the river about one mile south of the city. Timber and agricultural land in the river's flat wide flood plain is slowly beginning to be developed. Little development exists on Munson Creek's flood plain. Along Dye Ditch are a few residences, several commercial and light industrial firms. Flood producing frontal type storms lasting 2 to 4 days are most numerous in winter and spring. Summer thunderstorms with high intensities over small areas cause flash flooding. All three streams are spanned 19 times by bridges and culverts which impede flood flow. Except for earlier canalization projects which contributed silt and debris to overgrown banks, no flood damage reduction project exists and the bankfull stage of 10 feet has been exceeded a number of times. Largest flood, March 29, 1951, crested at 18.72 feet. Most recent flood, May 16, 1968, resulted from flash flooding following 4.2 inches of rain in less than 2 hours and did not cause high flood stages on the river. An Intermediate Regional Flood would be 3 to 4 feet higher than the 1951 flood inundating an estimated 5,500 acres, including residential and commercial sections, roads, and public and private utilities. A Greater Probable Flood (with an average frequency of occurrence of once in 500 years although it may occur in any year) probably inundating about 6,000 acres, would be 6 feet above the 1951 flood. (Salzman-North Carolina)
W75-04204

FLOOD PLAIN INFORMATION: JORDAN RIVER COMPLEX II, MIDVALE-DRAPER, UTAH.
Army Engineer District, Sacramento, Calif.
Prepared for the Utah Division of Water Resources and Salt Lake County, March 1974. 38 p, 17 fig, 8 tab, 28 plates.

Descriptors: *Flood plains, *Flood damage, *Flood forecasting, Flood profiles, Flood data, Obstruction to flow, Land use, Planning, Urbanization, Flood plain zoning, Utah, Dams, Cloudbursts.
Identifiers: *Jordan River(Utah), *Midvale(Utah), Dry Creek(Utah), Willow Creek(Utah), Corner Canyon Creek(Utah), Flood plain management, Standard Project Flood, Intermediate Regional Flood, Wasatch Range, Utah Lake.

This report can serve as a basis to guide land development toward optimum uses commensurate with flood hazard. The 3 creeks, which rise at high elevations in the Wasatch Range and flow westerly to the valley floor and their termini at Jordan River, are intermittent streams and normally flow only during snowmelt season. Although there are a number of urban centers in the study area, Midvale being the largest, the area is not extensively urbanized. Due to the conversion of agricultural land to urban-suburban uses as families migrate from Provo and Salt Lake City to smaller towns, agricultural activities are expected to continue at slightly reduced levels. Floodflows are produced by early season cloudburst storms over tributary drainages and by snowmelt from high temperatures in late May and early June which cause floods with a slow rate of rise and extended out-of-bank period. The most severe flood was of this type in May 1952; a flood this size would have a frequency of occurrence of about once in 50 years. An Intermediate Regional Flood (IRF) on the Jordan River at Jordan Narrows would produce a peak discharge of 1800 cfs and a Standard Project Flood (SPF) at the same point would produce 2200 cfs. In the study area, there are 50 obstructive bridges, culverts, diversion weirs and other stream crossings. There are no flood control structures per se affecting the study reach. However, Utah Lake affords some incidental reduction of flood flows, there is a flood detention dam on Dry Creek, and an ordinance providing for floodway zones is being developed. (Diefendorf-North Carolina)
W75-04205

FLOOD PLAIN INFORMATION: CHOCTAWHATCHEE RIVER, PEA RIVER, DOUBLE BRIDGES CREEK, CITY OF GENEVA, ALABAMA.
Army Engineer District, Mobile, Ala.
June 1973. 28 p, 16 fig, 8 tab, 17 plates.

Descriptors: *Flood forecasting, *Flood control, *Floodplain zoning, *Flood profiles, *Historic floods, *Levees, Flood stages, Flood data, Obstruction to flow, Land use, Planning, Alabama.
Identifiers: *Choctawhatchee River, *Pea River, *Double Bridges Creek, *Geneva(Ala), 'Lincoln Flood', 'Hoover Flood', Standard Project Flood, Intermediate Regional Flood, Floodplain management, Subdivision regulations.

A flood in 1861, called the 'Lincoln Flood', nearly destroyed Geneva and forced it to move from the junction of the Choctawhatchee and Pea Rivers to higher ground, where in 1929 the town was again completely inundated. A levee was built around the town in the 1930's that has protected it up to the present. However, the low-lying unprotected portion of Geneva and the surrounding forest and croplands are subject to flooding from the 3 streams in the study area with water out of banks for several days along the rivers. Flood producing storms occur in all seasons but are more likely to occur in winter and spring. Flood flow is measured by four gaging stations and obstructed by four bridges. The highest flood of record on all three streams known as the 'Hoover Flood' was caused by excessive rainfall in March, 1929. Its elevation was 109.7 ft., m.s.l.d. making it on the order of a Standard Project Flood (SPF). An SPF would crest at 109.8 ft. m.d.l.d. with a peak discharge of 127,000 cfs. and might flood 7,600 acres. An Intermediate Regional Flood (IRF) would be 102.6 ft. with a peak discharge of 77,100 cfs and flood 6,800 acres. To decrease hazards of large floods, drainage pipes, flap valves, and pumping stations are employed to enable the levee to function properly. Geneva has official Land Subdivision Regulations for floodplain development. (Diefendorf-North Carolina)
W75-04212

SENSITIVITY ANALYSIS OF THE OPTIMUM DESIGN FLOOD EVALUATED BY AN OPTIMIZATION PROCEDURE,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
E. Mosonyi, W. Kiefer, and W. Buck.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 249-258. 7 fig, 4 ref.

Descriptors: *Flood control, *Flood damage, *Cost-benefit analysis, *Optimization, Flood protection, Cost analysis, Damages, Probability, Levees, Flood profiles, Land use, Flood plains, Design flood.
Identifiers: *Sensitivity analysis, *Black Forest.

The influence of various parameters on the optimum degree of development of flood control measures and flood control levees respectively was investigated. An economic evaluation using cost-benefit analysis was performed for a valley in the Black Forest region. A maximized graph of the mean annual value of net benefit expectancy was used to illustrate that for the selected case the point of optimum was mainly affected by the features of the cost function. Other parameters have less influence in the range of their possible variation. (See also W75-04213) (Terstriep-ISWS)
W75-04234

THE TRIANGLE AS A TENTATIVE UNIT HYDROGRAPH,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
B. M. Reich, and D. A. Wolf.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 337-349. 8 fig, 1 tab, 24 ref.

Descriptors: *Unit hydrographs, *Hydrographs, *Hydrograph analysis, *Spillways, Streamflow, *Flood control, Storage capacity, Design flood,

*Pennsylvania, Appalachian Mountain Region, Analytical techniques.

Engineers faced with designing flood control schemes or spillways for storage reservoirs seldom have adequate streamflow records from which to obtain inflow hydrographs. This is particularly true for watersheds smaller than 120 square miles in developing countries. An analysis of 69 large flood hydrographs observed on 17 watersheds across the varied geology and landscape of Pennsylvania reaffirmed the triangle as a suitable shape for unit hydrographs. Its form is different from that of the Soil Conservation Service, popularized by the United States Bureau of Reclamation. The ratio of rise-time to baselength, which determines when the unit hydrograph peak occurs, is found to vary within specifiable limits. Ninety percent of the variation in peak rates of discharge for these 1-hour unit hydrographs from watersheds of 4 through 120 square miles can be accounted for by an equation with two predicators. Application to ungaged watersheds could tentatively be extrapolated to many Appalachian states and similar hilly regions of the world with long summer humid continental or east coast continental climates. Mean annual precipitation of the study watersheds ranged from 36 through 50 inches. (See also W75-04213) (Dawes-ISWS)
W75-04239

A DOUBLE-TRIANGLE MODEL FOR GENERATING STORM HYDROGRAPHS,
Tennessee Valley Authority, Knoxville, Tenn. Hydrologic Research and Analysis Office.
C. V. Ardis, Jr.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 350-360. 3 fig, 1 tab, 8 ref.

Descriptors: *Unit hydrographs, *Hydrograph analysis, *Flood peak, *Model studies, Hydrographs, Hydrology, Base flow, Watersheds(Basins), Analytical techniques, Recession curves, Simulation analysis, Precipitation excess, Floods, Streamflow, Duration curves, Rainfall, Tennessee, Equations, Flood control, Storm runoff, Runoff, Appalachian Mountain Region, Southeast U.S., Design flood.
Identifiers: *Double triangle hydrograph, *Ungaged watersheds.

A procedure was developed to compute storm hydrographs at gaged or ungaged sites from rainfall data and watershed characteristics. The procedure uses a unit-response-function model to represent the response of a watershed to a given storm. The watershed unit-response- function is called a double-triangle model. The assumed double-triangle shape is very flexible and allows the model to meet the response shape-characteristics of most storms on many watersheds. Four parameters define the double-triangle model and each is a specific attribute of the model. Significant response variation was found in the parameters within and among watersheds. This response variation was nonlinear and significantly related to storm and watershed characteristics. Nonlinear relationships were developed that relate the double-triangle model parameters to these characteristics. A model for predicting the flood peak directly was also presented. Eleven watersheds and 140 storms constitute the data base. The models were tested on other data and found to be successful. Examples were shown how these models can be used to provide the storm-hydrograph answers needed for regional environmental studies. (See also W75-04213) (Dawes-ISWS)
W75-04241

RUN-OFF REGULATION OF THE ST. LAWRENCE AND ITS LIABILITY,
Bedford Inst., Dartmouth (Nova Scotia).
H. J. A. Neu.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 399-400. 3 ref.

Descriptors: *River regulation, *Runoff, *Environmental effects, *St. Lawrence River, Saline water, Sea water, Freshwater, Mixing, Ecology.

A classical example of runoff regulation is the St. Lawrence system in which large quantities of water from the spring runoff are annually held back in storage lakes and returned to the river during the low discharge period of fall and winter for optimum power production. Freshwater plays a prominent role in the generation of large-scale motions in the estuary, Gulf, and adjacent waters of the Atlantic. It initiates a circulation in which large quantities of seawater are transported from the ocean into the Gulf and up the estuary, a distance of more than 1500 km. The amount of seawater pumped in from the ocean depends on the runoff and on the distance from the sea. Biologists have been inferring that changes in the biological balance and the fluctuations of certain species are related to variations in freshwater runoff. Runoff regulations have imposed large-scale modifications on the ecosystem of the Gulf and of the coastal zone. The complex interdependency existing between the ecological elements of the river and ocean environments makes exact predictions of consequences quite difficult, particularly in the biological field. An assessment of these effects not only qualitatively but also quantitatively, emerges as one of the most urgent problems facing modern science. (See also W75-04213) (Humphreys-ISWS)
W75-04243

RELATIONSHIP BETWEEN LIMNOLOGICAL CONDITIONS OF RESERVOIRS AND WATERSHED FEATURES - A SURVEY,
Ministry of Public Works, Madrid (Spain). Section of Sedimentation and Natural Pollution.
For primary bibliographic entry see Field 2H.
W75-04244

A SET OF REGIME EQUATIONS FOR INDIRECTLY ESTIMATING STREAM FLOW CHARACTERISTICS,
Ohio River Basin Commission, Cincinnati.
For primary bibliographic entry see Field 2E.
W75-04245

THE APPROXIMATE PROBABILITY DENSITY FUNCTION OF RANGE AND ADJUSTED RANGE,
National Energy Authority, Bangkok (Thailand).
For primary bibliographic entry see Field 6A.
W75-04246

WATER QUALITY ASPECTS OF THE 1973 OPENING OF THE MISSISSIPPI RIVER DIVERSION SPILLWAY AT BONNET CARRE, LOUISIANA, U.S.A.,
Army Engineer District, New Orleans, La.
For primary bibliographic entry see Field 5B.
W75-04256

WATER RESOURCES APPRAISAL FOR HYDROELECTRIC LICENSING, THE CLARION RIVER BASIN, PENNSYLVANIA.
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 6G.
W75-04274

CRE: A METHOD FOR SOLVING PROBABILITY PROBLEMS RELATED TO HYDROLOGIC TIME SERIES,
Idrotecneco, San Lorenzo in Campo, (Italy).
For primary bibliographic entry see Field 2E.
W75-04310

THE MEASUREMENT OF IMPACTS IN SMALL WATERSHEDS FOR FLOOD CONTROL,
New South Wales Inst. of Technology, Kensington (Australia). Dept. of Economics.
P. A. R. Maxwell, and R. M. North.
Water Resources Bulletin, Vol 10, No 6, p 1277-1287, December 1974. 1 fig, 4 tab, 9 ref.

Descriptors: *Economic impact, *Economic justification, *Cost-benefit analysis, Cost-benefit theory, *Benefits, *Flood control, Land use, Watersheds(Basins), Watershed Protect. and Flood Prev. Act, Measurement, Land appraisals, *Small watersheds, Evaluation.

An analogue method of ex post evaluation was proposed as a method of measuring the effectiveness of small watershed projects in obtaining flood control and economic benefits. Two watersheds were compared on a 'with versus without' project basis by both direct and indirect measurement of economic benefits. Direct measurements indicated that small watershed flood control projects did not generate the expected economic benefits. Indirect meaaurements of the same watersheds using land value enhancement as a surrogate suggested that the expected economic benefits were reflected in differential land values. It was concluded that the economic efficiency of small watershed projects should be measured ex ante and ex post on a 'with versus without' project basis rather than on a 'before versus after' basis either with direct or surrogate variables. (Terstriep-ISWS)
W75-04341

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE.
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W75-04344

RESERVOIR OPERATION THROUGH OBJECTIVE TRADE-OFFS,
Iowa Univ., Iowa City. Inst of Hydraulic Research.
T. E. Croley, II.
Water Resources Bulletin, Vol 10, No 6, p 1123-1132, December 1974. 4 fig, 31 ref.

Descriptors: *Optimum development plans, *Multiple-purpose projects, *Assessments, Planning, *Reservoir operation, Water resources development, Flood control, Value engineering, Recreation, Analytical techniques, Decision making, Management, Design, *Comprehensive planning.
Identifiers: *Multi-objective design, Objective trade-offs, *Impact evaluation design.

Water resources project developments have progressed from strictly engineering designs through economic-engineering designs to the present, all-inclusive, impact evaluation designs. The introduction of human factor objectives complicates the problem because they are noncommensurate with other objectives and they are difficult to identify quantitatively. Some of the problems that now arise concern the proper methods for consideration of several different sometimes subjectively identified, objectives in reservoir planning. The classical systems analysis approach to decision making for multiple objective problems was outlined and the inherent difficulties associated with multiple objectives and subjective estimates were identified. Techniques being used in reservoir design and operation were reviewed and discussed. An alternate technique for con

sidering noncommensurate, subjectively identified, objectives, which relates the objectives in terms of real trade-off costs and eliminates the need for a priori estimates of objective worth, was presented. The method was illustrated with three examples, including a reservoir operation problem and a cooling tower design problem. (Singh-ISWS)
W75-04345

4B. Groundwater Management

INTEGRATED SYSTEM IDENTIFICATION AND OPTIMIZATION FOR CONJUNCTIVE USE OF GROUND AND SURFACE WATER, PHASE II,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
Y. Y. Haimes.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 891, $5.25 in paper copy, $2.25 in microfiche. Completion Report 45IX, Ohio Water Resources Center, Columbus, (SED-WRG-74-1), September 1974. 106 p, 8 fig, 15 tab, 20 ref, 2 append. OWRT B-050-OHIO(1).

Descriptors: *Groundwater management, Surface waters, *Conjunctive use, *Aquifers, Drawdown, *Transmissivity, Recharge, *Optimization, Planning, *Water management(Applied), *Ohio, Model studies, *Storage, Pumping.
Identifiers: Fairfield Aquifer(Ohio), Miami Conservancy District(Ohio), Algebraic technological functions, Parameter identification, Hierarchical modeling.

The groundwater parameter identification model developed in Phase I has been further modified and improved as part of Phase II work. A hierarchical management model was developed and tested. The coupling of a complex multicell aquifer system was studied via an extension of the algebraic technological function approach. Functions were developed to relate the infiltration from a stream into an aquifer due to pumpage at a well. A new approach was proposed to incorporate time varying boundary conditions in a groundwater system. A predictive model was developed to demonstrate the usefulness of these response oriented models, where the decision variables include pumpage, artificial recharge, and imported water. A model for the planning and management of a groundwater system was developed, incorporating a tax-quota system. The research results were applied to the area of the lower Great Miami River with data provided by the Miami Conservancy Dist. (MCD), Dayton, Ohio. (See also W75-03201)
W75-03853

THE OBSERVATION-WELL NETWORK OF THE U.S. GEOLOGICAL SURVEY IN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W75-03971

POSSIBLE DEVELOPMENT OF WATER FROM MADISON GROUP AND ASSOCIATED ROCK IN POWDER RIVER BASIN, MONTANA-WYOMING,
Geological Survey, Denver, Colo.
F. A. Swenson.
Report for the Northern Great Plains Resources Program, July 1, 1974. 6 p, 4 plate.

Descriptors: *Groundwater, *Water supply, Montana, *Industrial water, Hydrogeology, Basic data collections, Aquifers, Water yield, Water quality, *Wyoming.
Identifiers: *Powder River basin(Mont).

The potential for developing large groundwater supplies for industrial use in the Powder River basin of Wyoming and Montana is summarized. Records of many oil tests and several water wells indicate that the Madison Group and the underlying carbonate rocks are hydrologically connected and transmit water as a unit. Also, in many localities, the overlying Tensleep and Minnelusa sandstones are also connected with the Madison. These rocks underlie the entire basin and are exposed on the flanks of the surrounding mountains. The Madison rocks, and to a considerable extent the underlying carbonates, are fractured and cavernous. Large quantities of water have been derived from these rocks in the Midwest, Wyoming area since 1917. The Madison and underlying carbonates contain water of moderate-to-good quality that is probably suitable for industrial use. It contains too high a percentage of sodium for irrigation use. (Knapp-USGS)
W75-03972

GEOHYDROLOGIC MAP OF SOUTHERN CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-03973

HYDROLOGIC DATA FOR 1973, BROWARD COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 3B.
W75-03976

WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN THE NORTHERN GREAT PLAINS COAL REGION OF EASTERN MONTANA, 1974-75.
Geological Survey, Helena, Mont.
For primary bibliographic entry see Field 7C.
W75-03977

WATER-RESOURCES DATA COLLECTED IN THE DEVILS HOLE AREA, NEVADA, 1973-74,
Geological Survey, Las Vegas, Nev.
For primary bibliographic entry see Field 7C.
W75-03978

QUALITY AND AVAILABILITY OF WATER IN WESTERNMOST TEXAS,
Geological Survey, El Paso, Tex.
For primary bibliographic entry see Field 2K.
W75-03979

SPECIAL TECHNIQUES FOR DETERMINING CHEMICAL PROPERTIES OF GEOTHERMAL WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W75-03980

USE OF WATER IN GEORGIA, 1970, WITH PROJECTIONS TO 1990,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 6D.
W75-03983

GEOLOGY AND GROUND-WATER RESOURCES OF GORDON, WHITFIELD, AND MURRAY COUNTIES, GEORGIA,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 2F.
W75-03984

GEOHYDROLOGY OF NEMAHA COUNTY, NORTHEASTERN KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 2F.
W75-03986

GEOLOGY AND GROUND-WATER RESOURCES OF MONTGOMERY COUNTY, SOUTHEASTERN KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 2F.
W75-03987

SOLID WASTE AND WATER QUALITY, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5B.
W75-04016

SOLID WASTE DISPOSAL BY LAND BURIAL IN SOUTHERN INDIANA,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 5B.
W75-04035

WATER RESOURCES EVALUATION OF THE SOUTHERN HIGH PLAINS OF NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
R. R. Lansford, W. Brutsaert, B. J. Creel, A. Flores, and W. Loo.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 230, $4.25 in paper copy, $2.25 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Report 044, July 1974. 59 p, 8 fig, 22 tab, 54 ref. OWRT B-037-NMEX(1).

Descriptors: *New Mexico, *Water demand, *Water resources development, Management, *Economic prediction, Natural resources, Water requirements, Resource allocation, Groundwater, Water quality, Water utilization, Human population, Employment, Linear programming, *Evaluation, Water management(Applied), *Model studies.
Identifiers: *High Plains(N Mex), *Socioeconomic models, Input-output coefficients, Hydrogeology, Groundwater appropriation.

An interdisciplinary approach to the solution of the water resource problems of the Southern High Plains in New Mexico was made possible by the integration of hydrology and geology with economics. Research procedures developed to carry out this study were closely coordinated by the investigators to achieve the primary objective of evaluation of the social and economic impacts of alternative water-use policies. A linear programming model was developed to represent the Southern High Plains economy. Inputs into the model were obtained from separate studies covering the hydrological, agricultural, municipal, and industrial areas. Three sets of alternatives were considered: (1) growth without a water constraint; (2) growth, decreasing pumpage 10 percent after 1966; (3) growth, increasing pumpage 10 percent after 1966. Without a water constraint, both production and depletions are expected to exhibit the largest increase (54.5 percent and 66.9 percent, respectively). When a 10 percent decrease in pumpage constraint is imposed in the year 2020, the value of production is reduced by $19.02 million; employment by 2931 employees; and water depletions decreased about 62 percent. When a 10 percent increase in pumpage constraint is imposed, the value of production is decreased $47.09 million below that expected when compared to a 10 percent decrease in pumpage, and water depletions are reduced only slightly (31,900 acre-feet). (Hain-New Mexico State)
W75-04042

THE ATMOSPHERIC FORMATION OF SECONDARY AEROSOLS DURING VENTILATED UNDERGROUND NUCLEAR TESTS,
For primary bibliographic entry see Field 5B.
W75-04069

UTILIZATION OF MINERAL AND THERMAL SPRINGS IN IRAQ: PRELIMINARY REPORT.
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
Scientific Research Foundation, Ministry of Higher Education and Scientific Research, Baghdad, Iraq. Technical Bulletin 58, March, 1974. 165 p, 10 fig, 15 tab, 4 ref.

Descriptors: *Springs, *Spring water, *Hydrogeology, *Thermal springs, *Potable water, Bacteria, Mineral water, Climatology, Climatic data, Climatic zones, Meteorological data, Seepage, Artesian wells.
Identifiers: *Iraq.

A preliminary survey of springs in Iraq was conducted to determine the development potential of this previously neglected resource. In all, 166 springs were located, mapped and classified into four categories: ordinary, mineral, thermal, and drinking water. The classification was based on hydrogeological, hydrochemical, bacteriological, and balneological characteristics of the springs. Of the springs surveyed, seven of the most promising have been considered; and three of these have specific recommendations for immediate development. A need exists for additional information on some of the located springs as well as plans for their development. A more complete survey to locate additional springs is also suggested. (Mastic-Arizona)
W75-04140

METHODS FOR ESTIMATING TRANSPORT MODEL PARAMETERS FOR REGIONAL GROUNDWATER SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 2F.
W75-04271

IDENTIFICATION OF A DISTRIBUTED PARAMETER SYSTEM IN HYDROLOGY,
California Univ., Berkeley. Operations Research Center.
For primary bibliographic entry see Field 2F.
W75-04280

SECOND-ORDER THEORY OF FLOW IN THREE-DIMENSIONAL DEFORMING MEDIA,
Centro di Ricerca IBM di Venezia (Italy).
For primary bibliographic entry see Field 2F.
W75-04308

THE SHAPE OF THE INTERFACE IN STEADY FLOW IN A STRATIFIED AQUIFER,
Technion - Israel Inst. of Tech., Haifa (Israel). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-04329

RISE AND DECLINE OF THE WATER TABLE INDUCED BY VERTICAL RECHARGE,
California Univ., Davis.
For primary bibliographic entry see Field 2F.
W75-04333

GROUNDWATER STORAGE-RIVERFLOW RELATIONS IN A CHALK CATCHMENT,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 2A.
W75-04339

MODELS OF DISPERSION IN A GRANULAR MEDIUM,
California Univ., Davis.
For primary bibliographic entry see Field 2F.
W75-04340

4C. Effects On Water Of Man'S Non-Water Activities

THE BIOCHEMICAL OXYGEN DEMAND OF FINELY DIVIDED LOGGING DEBRIS IN STREAM WATER,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 5C.
W75-03913

SHALLOW GROUND WATER IN SELECTED AREAS IN THE FORT UNION COAL REGION.
Geological Survey, Helena, Mont.
For primary bibliographic entry see Field 5B.
W75-03974

DETERMINING LAND USE CHANGES IN WATERSHEDS BY AERIAL PHOTOGRAPHIC MEASUREMENTS,
Clemson Univ., S. C. Dept. of Civil Engineering.
M. E. Nettles, and D. B. Stafford.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 192, $4.25 paper copy $2.25 microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 47, June 1974. 55 p, 8 fig, 3 tab, 28 ref. Partial Completion Report. OWRT A-024-SC(4). 14-01-0001-4041.

Descriptors: *Urbanization, *Land use, *Aerial photography, *Remote sensing, *Photogrammetry, Hydrology, *South Carolina, Agricultural watersheds, Watersheds(Basins).
Identifiers: *Reedy River(SC), *North Tyger River(SC), Urban watersheds.

Techniques are described for using aerial photographs to investigate land use changes in watersheds. Land use changes in two watersheds in western South Carolina were examined. The North Tyger River watershed near Spartanburg, South Carolina, has experienced significant changes in agricultural land use over the past 26 years. The Reedy River watershed, within which most of the city of Greenville, South Carolina, is located, has experienced rapid urbanization over the past 27 years. Six sets of existing aerial photographs taken at approximately five-year intervals were used to delineate, classify, code, and measure the areas of various land use classes in the two watersheds. The land use classes employed were those that had different runoff characteristics. The area occupied by each land use class was measured on scaled photographic enlargements by using a planimeter. Significant changes in land use were observed in the two watersheds over the study period. The results indicate that the use of aerial photographs to obtain data on the historical distribution of land use in watersheds represents a satisfactory approach that could be used more widely.
W75-04051

MORE STREAMFLOW AFTER A BARK BEETLE EPIDEMIC,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
N. Bethlahmy.
Journal of Hydrology, Vol 23, No 3/4, p 185-189, 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Forest watersheds, Epidemics, Bark, Water beetles, *Streamflow, Water yield, Water injury, *Water loss, Water shortage, *Watersheds(Basins), *Plant diseases, *Colorado.
Identifiers: *Beetle-infested watersheds, Continental Divide(Colo), White River watershed(Colo), Elk River watershed(Colo), Yampa River watershed(Colo).

A bark beetle epidemic near the Continental Divide in Colorado destroyed the timber in two large drainages but bypassed a third drainage. The base period for this analysis was from 1911 to 1940, when the beetle population was at an epidemic level. The epidemic started in 1941 in the White River drainage, gradually advanced north and east into the Yampa River watershed, but failed to become established in the Elk River watershed where tree mortality was minor. The control was in the Elk watershed. Analysis of data revealed that major increases in streamflow occurred after the epidemic. Average annual increases in streamflow for the White and Yampa Rivers were shown for the 24-year period 1941-1965. The smallest increases occurred during the first 5-year period, when the beetle population was multiplying to epidemic proportions; the largest increases occurred 15 years later in the 1956-1960 period. (Roberts-ISWS)
W75-04342

4D. Watershed Protection

PROTECTING CREEKSHEDS: DEVELOPMENT AND EVALUATION OF A METHOD TO MANAGE SMALL, URBANIZING WATERSHEDS THROUGH LOCAL GOVERNMENT ACTIONS,
Huron River Watershed Council, Ann Arbor, Mich.
E. W. Say, and A. J. Dines.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 139, $7.50 in paper copy, $2.25 in microfiche. Completion Report, December 1974. 223 p. OWRT C-5278 (4219)(1).

Descriptors: Information exchange, *Planning, *Small watersheds, *Water management(Applied), *Local governments, *Urbanization, *Land use, Runoff, Open channels, Drainage systems, Michigan, Social aspects, Competing uses, Governments, Legal aspects, Zoning, Multiple use, Sediment control, Storm runoff, Wildlife conservation, Streamflow, Nonstructural alternatives, Erosion control.
Identifiers: Citizen participation, Creek corridor, Development control, Townships, Open space.

The research focused on small, urbanizing watersheds and the impacts of land use decisions on the benefits provided by the stream. The primary objective was to develop and test one method hypothesized as being effective in stimulating interest in local water resources management through land use controls among local units of government and property owners. Three small watersheds were chosen and local officials, property owners and agencies in each were involved in an intensive information exchange and dissemination effort using a number of modes of communication. Information about the streams was sought in three phases (creek benefits, creek problems, alternative management techniques) and the data provided permitted the development (and subsequent community evaluation of) of a specialized creekshed protection program. The participants regarded the information supplied as useful and appropriate. The elements of the protection programs (avoiding soil erosion/sedimentation, regulating the change in runoff characteristics and protecting the creek corridor) were viewed as most likely to be implemented in the creeksheds experiencing the greatest urbanization pressure. The approach developed is simple, can be done within the existing institutional framework and uses information generally available. Local governmental units in urbanizing areas can protect water courses through land use regulations and controls. (See also W75-03745)
W75-03947

PROTECTING CREEKSHEDS, ANALYSIS AND ACTION,
Huron River Watershed Council, Ann Arbor, Mich.

E. W. Say, and A. J. Dines.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 140, $3.75 in paper copy, $2.25 in microfiche. (1974). 24 p, 16 fig, 2 tab, 26 ref. OWRT C-5278(No 4219)(1).

Descriptors: *Small watersheds, *Water management(Applied), Cities, Urbanization, Land use, *Information exchange, Planning, Local governments, *Social participation.
Identifiers: *Creeksheds, *Citizen participation.

This booklet was written to provide basic information about creeksheds for those in urbanizing areas; why they are important, how they are adversely affected by urbanization and what can be done to protect creek benefits and avoid problems. It presents only the most essential information relating to small watersheds and their management. It is intended as a non-technical publication for those with an interest in protecting creeks but without experience in water resource problems. It is hoped that the booklet will serve as a source book for information and as a guide for action. The experience on which it is based is from the Great Lakes region and from Southeast Michigan in particular. However, the conditions, issues, and problems found in many other parts of the country are very similar. The management approaches suggested here for creeksheds protection and improvement will therefore have many applications elsewhere.(See also W75-03947)
W75-03948

VEGETATION MANAGEMENT FOR INCREASED WATER YIELD IN ARIZONA,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 3B.
W75-03961

THE NONLINEAR RAINFALL RESPONSE OF WATERSHEDS WITH TIME DEPENDENT STORAGE AND CONVEYANCE PROPERTIES,
Cincinnati Univ., Ohio. Dept. of Engineering Analysis.
For primary bibliographic entry see Field 2A.
W75-04240

THE MEASUREMENT OF IMPACTS IN SMALL
WATERSHEDS FOR FLOOD CONTROL,
New South Wales Inst. of Technology, Kensington (Australia). Dept. of Economics.
For primary bibliographic entry see Field 4A.
W75-04341

MORE STREAMFLOW AFTER A BARK BEETLE EPIDEMIC,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-04342

THE UNIT HYDROGRAPH: A SATISFACTORY MODEL OF WATERSHED RESPONSE,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W75-04344

EFFECT OF NITRATE AND SEDIMENT CONSTRAINTS ON ECONOMICALLY OPTIMAL DAIRY PRODUCTION,
Illinois Univ., Urbana. Agricultural Experimental Station.
S. Onishi, and E. R. Swanson.
Journal of Environmental Quality, Vol 3, No 3, p 234-238, July-September, 1974. 2 fig, 1 tab, 12 ref. OWRT B-049-ILL(6). 14-31-0001-3272.

Descriptors: *Nitrates, *Sediments, *Soil conservation, Linear programming, *Optimization, *Crop production, Erosion, Watershed management, Root zone, *Leachate, Clays.
Identifiers: Optimal crop production, Conservation village, Nitrogen application rate.

Crop systems and practices that are economically optimal in a 485.6-ha watershed with a planned reservoir were ascertained under conditions of differing constraints on water quality in the reservoir. Linear programming was the technique employed. Consideration was taken of two requirements related to sedimentation and three requirements related to NO3-N concentration in the leachate below the root zone. Six combinations of restrictions on the choice of optimal crop systems were fulfilled. For all sediment introduced into the reservoir a system of charges reduced erosion, irrespective of the limit put on NO3-N concentration in the leachate below the root zone. Relaxation of the limit of NO3-N from 10 mg/liter to no limit doubled the net income above nonland costs. (Leibowitz-FIRL)
W75-04349

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

APPARATUS FOR DETERMINING ORGANIC CARBON CONTENT OF POLLUTED LIQUIDS,
A. Cohen.
US Patent No 3,854,881, 4 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 1137, December 17, 1974.

Descriptors: *Patents, Water pollution control, Pollution abatement, *Waste water treatment, Oxydation, Equipment, Measurement, Carbon, Carbon dioxide, *Pollutant identification.
Identifiers: *Acidification, *Organic carbon, *Infrared analyzers.

A sample stream, from the aqueous liquid source to be monitored, is continuously fed into a mixing chamber together with sufficient acid to react with and remove as carbon dioxide all of the inorganic carbon content of the sample, i.e. the carbonates in the sample. The acidified sample is scrubbed to remove all carbon dioxide produced by the carbonate-acid reaction, and the carbonate-free sample is metered into a reaction chamber. The reaction chamber has an inlet through which the sample and air for oxidizing the organic carbon are introduced; an outlet for the exit of gaseous and vapor products formed from the sample; and a granular packing material inside that is heated by electric resistor elements placed outside the chamber. The packing material is chemically inert, such as crushed quartz, and is heated to a temperature at which the organic carbon in the sample is oxidized to carbon dioxide by the air atmosphere in the chamber. Carbonaceous matter in the sample is quickly oxidized by the hot air atmosphere so that the effluent therefrom is a mixture of water vapor and other gaseous products including carbon dioxide. The amount of carbon dioxide corresponds to the amount of organic carbon originally present in the sample. The water vapor portion of the reaction chamber effluent is removed by a conventional gas-liquid separator before delivery to an infrared analyzer for measurement of the carbon dioxide component. (Sinha-OEIS)
W75-03861

CONTROL METHODS FOR WASTE WATERS AND SOLUTIONS OF SPECIFIC SUBSTANCES (METODI DI CONTROLLO DI ACQUE DI SCARICO E SOLUZIONI DI SOSTANZE SPECIFICHE),
Stazione Sperimentale per la Cellulosa, Carta e Fibre Tessili Vegetali ed Artificiali, Milano (Italy).
For primary bibliographic entry see Field 5B.
W75-03885

ULTRAVIOLET SPECTROPHOTOMETRIC METHOD FOR THE DETERMINATION OF LIGNIN IN EFFLUENTS (UF-SPEKTROFOTOMETRICHESKII METOD OPREDELENIYA LIGNINA V STOCKNYKH VODAKH),
Vsesoyuznyi Nauchnyi-Issledovatelskii Institut Bumagi, Arkhangelsk (USSR).
A. A. Sokolova, L. A. Semakova, and D. P. Moseeva.
Bumazhnaya Promyshlennost', No 8, p 21-22, August, 1974. 1 fig, 3 tab, 3 ref.

Descriptors: *Pulp wastes, *Lignins, *Pollutant identification, *Sprectoscopy, *Ultraviolet radiation, Analytical techniques, Laboratory tests, Chemical analysis, Organic wastes, Wastes, Water pollution sources, Industrial wastes, Water quality control, Softwood, Coagulation, Separation techniques, Potassium compounds, Iron compounds, Polyelectrolytes, Flocculation, Monitoring.
Identifiers: Potassium alum, Aluminum sulfate, Aluminum compounds, Polyacrylamide, Black liquors(Spent kraft pulping liquors).

The suitability of the UV spectroscopic method for the determination of the effectiveness of lignin removal from pulp mill effluents was investigated. The experiments were conducted on a model solution, i.e., a 1:200 dilution of black liquor from laboratory cooks of sprucewood. Samples of the solution were coagulated with potassium alum, aluminum sulfate, ferric chloride, ferric sulfate, or ferrous sulfate. Determinations were made of oxidizability, COD, and lignin content of the filtrates, the latter by measurements of absorption at 280 nm and using a calibration curve. The best effect, i.e., the removal of 71% lignin, was obtained with 75 mg/liter of potassium alum. Aluminum sulfate gave 68.4% removal. Other coagulants gave lower degrees of purification. About 30% lignin remains in the form of low molecular weight degradation products. The results of additional experiments in which the coagulants were used simultaneously with polyacrylamide as a flocculant (20-200 mg/liter) showed that polyacrylamide does not interfere with the spectrometric determination of lignin. (Stapinski-IPC)
W75-03897

THE DETERMINATION OF MERCURY IN WATER SAMPLES FROM THE ENVIRONMENT BY NEUTRON ACTIVATION ANALYSIS,
Reactor Centrum Nederland, Petten.
H. A. Van der Sloot, and H. A. Das.
Analytica Chimica Acta, Vol 73, No 2, p 235-244, December, 1974. 6 fig, 2 tab, 13 ref.

Descriptors: *Mercury, *Neutron activation analysis, *Water analysis, Surface waters, Analytical techniques, Chemical analysis, Suspended solids, Metals, Water pollution sources, Water pollution, *Pollutant identification, Organic compounds, Inorganic compounds, Heavy metals.

A sensitive method for the determination of Hg in sea and surface waters is described. A distinction is made between inorganic, organic, and particulate Hg. In the determination of inorganic Hg, the element is isolated by reduction and volatilization, followed by absorption on a charcoal column. The total Hg content of the water with and without suspended solids is determined by absorption from the solution onto a column of charcoal. In all cases, the Hg on the absorber is determined by thermal neutron activation analysis. The limit of detection is 1 nanogram/liter. (Witt-IPC)
W75-03908

DIRECT ANALYSIS OF WATER SAMPLES FOR ORGANIC POLLUTANTS WITH GAS CHROMATOGRAPHY/MASS SPECTROMETRY,
Environmental Protection Agency, Cincinnati, Ohio.
L. E. Harris, W. L. Budde, and J. W. Eichelberger.
Analytical Chemistry, Vol 46, No 13, p 1912-1917, November, 1974. 4 fig, 2 tab, 9 ref.

Descriptors: *Organic compounds, *Water analysis, *Gas chromatography, *Mass spectrometry, *Pollutant identification, Analytical techniques, Water pollution sources, Waste identification, Water properties, Organic wastes, Chemicals, Chemical wastes.

A direct aqueous injection gas chromatography/mass spectrometry (GC/MS) procedure was explored as a supplement to conventional solvent extraction for the analysis of organic pollutants in water and waste water samples. Studies were made of the effects of relatively large pressures of water vapor on the well established electron impact fragmentation patterns, quadrupole GC/MS system performance, interaction background subtraction, and detection limits. Relatively large pressures of water vapor in the mass spectrometer had no significant effect on the impact fragmentation patterns of organic compounds or the performance of the GC/MS system. The detection limits attained by conventional data acquisition were 1-50 ppm. With real time data acquisition from subsets of the ions used in conventional mass spectrometry, the sensitivity was 50 ppb. (Witt-IPC)
W75-03910

A HIGHLY SENSITIVE TECHNIQUE FOR THE LIQUID CHROMATOGRAPHIC ANALYSIS OF PHENOLS AND OTHER ENVIRONMENTAL POLLUTANTS,
Canada Centre for Inland Waters, Burlington (Ontario).
A. A. Wolkoff, and R. H. Larose.
Journal of Chromatography, Vol 99, p 731-743, November 6, 1974. 7 fig, 4 tab, 33 ref.

Descriptors: *Phenols, *Water analysis, *Chromatography, *Pollutant identification, Analytical techniques, Organic compounds, Aromatic compounds, Water pollution sources, Water properties, Fluorescence, Spectroscopy.
Identifiers: Cerium compounds.

A highly sensitive technique is described for the analysis of phenols and other environmental pollutants in water by liquid chromatography. The system utilizes a reaction detector whereby cerium(IV) sulfate is reacted with phenols in the column effluent, and the cerium(III) thus produced is detected by fluorescence spectroscopy. The detector shows good linearity in the region 10-230 ppb of phenol. When combined with suitable concentration techniques, the lower limit of detection of phenols in environmental samples is about 0.4 ppb. (Witt-IPC)
W75-03911

MONITOR FOR THE QUALITY OF AUSTRALIA'S WATER RESOURCES,
Commonwealth Scientific and Industrial Research Organization, Clayton (Australia). Div. of Chemical Physics.
G. F. Box.
Australian Science and Technology, Vol 12, No 3, p 14-15, October-November, 1974. 2 fig.

Descriptors: *Electrical conductance, *Monitoring, *Water quality, *Dissolved solids, Surface waters, Measurement, Instrumentation, Logging(Recording), Salinity, Water pollution, *Australia, *Pollutant identification.

A compact rugged instrument has been designed to record at 12-hourly intervals the total dissolved solids content of surface waters in the range 100 to 10,000 ppm with accuracy of the order of plus or minus 5% of the full range. The conductivity of the solution under test is measured by an inductive sensing head, and the resulting signal is evaluated by a successive-approximation measuring circuit. The instrument is battery-powered and capable of operating unattended for at least three months. It may be produced either in a totally-immersed self-contained form, or as a land-based recording unit connected by cable to the immersed sensing head; in the latter case it can be interfaced to a wide range or recording equipment currently used in Australia. (Levick-CSIRO)
W75-03939

THE PROCESSING AND STORAGE OF WATER-QUALITY DATA IN THE NATIONAL WATER DATA STORAGE AND RETRIEVAL SYSTEM,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03970

DETECTION OF WATER POLLUTANTS BY A CO2 LASER,
Technische Universitaet, Munich (West Germany). Physikdepartment.
G. Kraus, M. Maier, and N. Kaiser.
Optics Communications, Vol 11, No 2, p 175-177, June, 1974. 1 fig, 5 ref.

Descriptors: *Water pollution, *Lasers, *Infrared radiation, *Absorption, *Spectroscopy, Industrial pollution, Sewage, Lakes, Rivers, Carbon dioxide, Sulfates, Ions.
Identifiers: Inorganic anions, Absorption bands, Vibrational and rotational absorption bands.

The concentration of SO4 ions in the sewage of a textile plant was measured by the infra-red absorption of a cw CO2 laser. The detection sensitivity was determined at about 50 mg/liter. Infra-red absorption spectroscopy is an effective technique in the detection of small concentrations of organic and inorganic molecules. The molecules' vibrational and rotational absorption bands are the identifying factors. Spectroscopic techniques have lately been used for the quantitative measurement of air pollutants' concentration. In dealing with water pollution, many common inorganic anions exhibit characteristic absorption bands in the wavelength region between 6 and 11 micrometers. The major difficulties in measuring the concentration of pollutants dissolved in water are: that pure water has a high absorption in the infra-red region; and that the concentration of the pollutants is generally very small, ranging from 1 mg/liter or less in clean lakes and rivers to about 1000 mg/liter in the sewage of industrial plants. These concentrations are not measurable with conventional infra-red light sources and spectrometers where detection of several g/liter is achieved. A cw CO2 laser in conjunction with a sensitive two-beam method resolves the difficulty. (Leibowitz-FIRL)
W75-04012

DETERMINATION OF PARTS PER BILLION SULFIDE IN WATER WITH THE SULFIDE-SELECTIVE ELECTRODE,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
E. Baumann.
Analytical Chemistry, Vol 46, No 9, p 1345-1347, August, 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Sulfides, *Water pollution, *Electrodes, Chemical wastes, Heavy metals, Potentiometric levels, *Pollutant identification.
Identifiers: *Sulfide-selective electrode, Sodium salicylate, Dithizone extraction, Ascorbic acid, Alkaline EDTA.

The sulfide-selective electrode is helpful in the routine determination of total sulfide in water due to the simplicity of measurement and absence of interferences. A procedure developed by Orion Research Incorporated, with a sulfide antitoxicant buffer of sodium salicylate, ascorbic acid, and sodium hydroxide, determines sulfide contents as low as 0.1 ppm. This sensitivity was extended to 30 ppb by the removal of heavy metals from the sodium salicylate by dithizone extraction. A preconcentration step was incorporated in the process, extending the determination to a lower ppb range. The sulfide was separated as ZnS, coprecipitated with Zn(OH)2, and dissolved in alkaline EDTA-ascorbic acid solution for potentiometric measurement with the sulfide-selective electrode. Higher concentrations of sulfide were determined without the preconcentration step. (Leibowitz-FIRL)
W75-04021

THE COMPARATIVE MARINE GEOCHEMISTRIES OF LEAD 210 AND RADIUM 226,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W75-04029

CHARACTERIZATION AND DEWATERABILITY OF WATER TREATMENT PLANT RESIDUES,
Missouri Univ., Columbia. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04039

ACCUMULATION OF MERCURY BY FISH AND TURTLES OF THE LITTLE PINEY RIVER,
Missouri Univ., Rolla. Dept. of Chemistry.
G. L. Bertrand.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 253, $3.25 in paper copy, $2.25 in microfiche. Missouri Water Resources Research Center, Columbia. Completion Report, (1974). 5 p, 1 fig. OWRT A-067-MO(1).

Descriptors: *Mercury, Fish, *Turtles, Aquatic animals, *Trout, *Missouri, Fungicides, Analytical techniques, *Pollutant identification, Water pollution effects.
Identifiers: *Atomic absorption.

Trout that had been continuously frozen since they were taken from Missouri streams in the 1946-50 period were analysed for mercury. These analyses (flameless atomic absorption) were compared with those of the same species collected recently from the same streams. The older fish had a much higher mercury content (about 3 ppm mercury). Mercury content of trout and turtles caught in 1974 ranged from 0.2 to 0.4 ppm. Two explanations are suggested for the higher mercury content of the older fish; (a) Fungicides, containing mercury, formerly added as seed treatments are no longer used, and (b) most of the older fish were raised under natural conditions, while most current catches are now raised in hatcheries and regularly released in the streams.
W75-04040

NUCLEAR METEOROLOGY,
Hydrometeorological Service of the USSR Moscow.
For primary bibliographic entry see Field 5B.
W75-04054

VERTICAL DISTRIBUTION OF RADIOACTIVE AEROSOLS IN THE TROPOSPHERE OVER THE EUROPEAN USSR IN 1964-1967.
For primary bibliographic entry see Field 5B.
W75-04055

DISTRIBUTION OF FISSION PRODUCTS OVER OCEANS IN THE TROPICAL ZONE AND THEIR RELATION TO ATMOSPHERIC PROCESSES,
For primary bibliographic entry see Field 5B.
W75-04056

DETERMINATION OF RADIOISOTOPE FALLOUT FROM ITS CONTENT IN CHRONOLOGICAL LAYERS OF HIGH-ALTITUDE GLACIERS,
E. N. Davydov, K. P. Makhon'ko, M. A. Tsevelev, and Z. S. Shulepko.
In: Nuclear Meteorology, Proceedings of the All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 29-36, 1 fig, 5 tab, 12 ref.

Descriptors: Meteorology, Nuclear energy, *Nuclear explosions, *Fallout, *Glaciers, *Ice, *Firn, *Snow, Measurement, Strontium, Cesium, Cerium, Manganese, Ruthenium, Lead, Migration, Movement, Radioisotopes.

The contents of Sr-90, Cs-137, Ce-144, Mn-54, Ru-106, and Pb-210 are determined in chronological layers of neve and ice in high-altitude glaciers of the Caucasus and Tyan-Shan. The annual fallout of Cs-137 determined by means of a cuvette-type collector is found to agree satisfactorily with the fallout determined from the Cs-137 content in the chronological layers of the glacier in the period 1963-1967. A similar comparison for Sr-90 in the period 1956-1967 showed that the proportion of Sr-90 contained in the chronological layers of these glaciers is about 10% of the atmospheric fallout of the isotope, which corresponds roughly to the proportion of Sr existing in indissoluble form. About 90% of Sr-90 and roughly 40% of Pb-210, falling on the glacier surface from the atmosphere, are eliminated together with the melted snow, while Cs-137 hardly migrates at all. The time variation in the fallout of different isotopes, determined from their content in chronological layers of the glaciers, led to the following value for the half-removal period of isotopes of fission products from the atmosphere: T(Sub 1/2) approx. 11 months. The figure for Mn-54 is T(Sub 1/2) approx. 28 months. (See also W75-04054) (Houser-ORNL)
W75-04057

RADIOACTIVE ISOTOPES OF EUROPIUM PRODUCED BY NUCLEAR BLASTS,
S. V. Iokhel'son, I. M. Nazarov, F. Y. Rovinskii, V. P. Chirkov, and E. I. Yushkan.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 37-39, 8 ref.

Descriptors: Meteorology, Nuclear energy, *Nuclear explosions, *Air pollution, *Fallout, Transport, *Radioisotopes, Water pollution, Soil contamination, Mosses, Analytical techniques, Radiochemical analysis, Evaluation, Density, *Nevada.
Identifiers: Nevada Test Site, Lake Rits(USSR), *Europium.

Nuclear blasts lead to the appearance of different radioisotopes of europium: europium-155 (T(sub 1/2) = 1.7 years), europium-156 (T(sub 1/2) = 15.4 days), which are fission fragments, and europium-152 (T(sub 1/2) = 12 years), europium-154 (T(sub 1/2) = 16 years) - products of activation reactions. According to data in the literature, these isotopes were detected in the epicentral region of nuclear tests conducted in Nevada. On the other hand, they have not been detected in the composition of radioactive global contamination of the earth's surface. To determine the contribution of long-lived europium radioisotopes to the global contamination of a locality, a sample of moss gathered in the Caucasus (in the vicinity of Lake Rits) was analyzed by the methods of radiochemistry and gamma-spectrometry. In the sample, in addition to other fragmentation products, the presence of europium-155 was detected and identified reliably for the first time. It was also established reliably that no europium-152 and 154 is present. The density of the global contamination of dry land by europium-155 and its contribution to the gamma-radiation dose were evaluated. (See also W75-04054) (Houser-ORNL)
W75-04058

RATE OF ATMOSPHERIC FALLOUT OF CESIUM-137 AND STRONTIUM-90 AEROSOLS,
A. S. Zykova, E. L. Telushkina, V. P. Rublevskii, G. P. Efremova, and G. A. Kuznetsova.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 57-60, 3 tab, 3 ref.

Descriptors: *Fallout, *Cesium, *Strontium, *Meteorology, *Nuclear energy, Data collections, Aerosols, Air pollution, *Radioisotopes, Measurement.

Data are given on the fallout density of Cs-137 and Sr-90 aerosols in Moscow for the period 1962 to 1968 and on the concentration of these isotopes in the ground layer of atmospheric air. The ratio of Cs-137 and Sr-90 aerosols in radioactive precipitation in these years was always larger than the analogous ratio between these isotopes in air. This leads one to suppose that the fallout rate of aerosols carrying Cs-137 is somewhat larger than the fallout rate of aerosols carrying Sr-90. An assessment of the fallout rate of these aerosols established that, on the average, for the period 1962 to 1968 the fallout rate of Cs-137 aerosols was 1.7 plus or minus 0.4 cm/sec, and of Sr-90 aerosols 1.5 plus or minus 0.4 cm/sec, i.e., the fallout rate of Cs-137 aerosols is larger by 14% than the fallout rate of Sr-90 aerosols. (See also W75-04054) (Houser-ORNL)
W75-04061

STATE OF STRONTIUM-90, CESIUM-137, AND CERIUM-144 IN RADIOACTIVE FALLOUT,
For primary bibliographic entry see Field 5B.
W75-04071

SOME FEATURES OF ATMOSPHERE CLEANSING BY GROUND CONDENSATION,
B. I. Styro, and N. P. Dargene.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 173-181, 3 fig, 1 tab, 6 ref.

Descriptors: *Meteorology, *Radioactivity, *Measurement, *Air pollution, *Dew, Sampling, Polonium, Lead, Bismuth, Radioisotopes, Assay, Fallout, Aerosols, Condensation, Electrochemistry, Research and Development.
Identifiers: *Specific radioactivity.

Simultaneous measurements were conducted of the radioactivity of air and dew samples formed on the upper and lower surfaces of a polyethylene film spread on closely cut grass. The dew samples were collected in two ways: (1) several identical films were spread simultaneously on the grass surface, the sample from the first film being taken immediately after the formation of the dew with subsequent sampling at hourly intervals throughout the night; (2) a single polyethylene film on the selected area was changed hourly and the radioactivity of the dew formed on it determined. The dew samples collected by the two methods were called 'old' and 'new' dew, respectively. The short-lived alpha-radioactivity of the dew due to a decay of 84Po218, 82Pb214, and 83Bi214 was determined. For old dew they lie in the range (0.1-24.5) times 10(-11) curie/mliter, and for the new dew in the range (0.1-26) times 10(-11) curie/mliter. The parameter of radioactivity removal from the air during the fall of dew is (0.02-1) times 10(-4) sec(-1) for old dew and (0.3-1) times 10(-4) sec (-1) for new dew. A parabolic relationship was obtained between the specific radioactivity of new dew and the specific radioactivity of the air, which points to the growth in washout intensity with increasing air radioactivity. The specific radioactivity and the coefficient of nonradioactive removal of radioactive substances by old dew was studied as a function of the amount of fallen dew. It was concluded that atmospheric cleansing occurs mainly: (1) through direct condensation of water vapor on radioactive aerosols; (2) under the influence of electric interactions between the aerosol particles and the dewdrops. (See also W75-04054) (Houser-ORNL)
W75-04078

ACCOUNTING FOR SOME NONSTEADY PROCESSES IN RECORDING NATURAL AIR RADIOACTIVITY,
V. N. Bakulin, and V. P. Matulyavichyus.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 187-193, 2 fig, 5 ref.

Descriptors: *Meteorology, *Radon, *Measurement, *Filters, *Measuring instruments, Air pollution, Equilibrium, Research and development, Radiation, Radioactivity, Theoretical analysis.

The accumulation of radon disintegration products is studied theoretically for recorders with fixed and mobile filters, for constant and linearly increasing concentration of these products in air, taking into account the relation between their concentrations. Neglecting the equilibrium in the radon series can lead to an error several times greater when determining the concentration of radon and its disintegration products in air from measurements of the activity of recorder filters. A formula is proposed for determining constant concentrations of Rn and its disintegration products in air by various suction methods in relation to the degree of equilibrium in the radon series. The optimum filtration time for a recorder with a mobile filter is at most 1.5-2 hrs; longer times do not practically increase the sensitivity of the setup, but increase the recorder's time constant and render more difficult determination of the actual time variation in the concentration of radioactive substances. A method is suggested for determining the relationship between radon disintegration products measured by two counters, one positioned in the path of the recorder film. Very reliable data can thus be obtained for an alpha-recorder, at minimum spacing between the counters. (See also W75-04054) (Houser-ORNL)
W75-04080

LONG-LIVED ALPHA-RADIOACTIVITY IN FALLOUT AT VILNIUS AND AT VARIOUS ATLANTIC LATITUDES,
B. I. Styro, N. K. Shpirkauskaite, V. N. Gasyunas, and V. M. Kuptsov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 201-207, 2 fig, 2 tab, 8 ref.

Descriptors: Meteorology, Nuclear energy, *Radioactivity, *Radioisotopes, *Uranium, *Thorium, *Plutonium, *Fallout, Rain, Precipitation(Atmospheric), Measurement, Analytical techniques, Turbulence, Cyclones, Wind, Latitudinal studies, *Atlantic Ocean, Water pollution.
Identifiers: Alpha radiation.

The isotope composition of long-lived alpha-radiation in atmospheric precipitation at Vilnius and at different latitudes over the Atlantic is investigated. Relevant data were obtained for each 10 deg latitudinal strip between 60 deg N and 70 deg S over the Atlantic from Oct 16, 1966, till March 1, 1967, and from Oct. 21, 1967, till Jan. 26, 1968. The fallout density of long-lived alpha-radioactivity is described by the geographical distribution with maxima at 50 - 40 deg and 20 - 30 deg N and S and with minima at 40 - 30 deg N and S. The U238, Th232, and Pu239 contents in atmospheric

precipitation were measured using an alpha-spectrometer with ion chamber, and their ratios were calculated. For Vilnius, the U238 values are 0.41 to 7.33 times 10(-5) g/g, the Th232 values are 0.014 to 7.27 times 10(-5) g/g, and the Pu239 values are 0.04 to 3.10 times 10(-11) g/g; over the Atlantic the values are 0.18 to 9.5 times 10(-5), 0 to (0.52-1.8) times 10(-5) and 0.06 to 7.37 times 10(-10) g per gram of ash residue, respectively. (See also W75-04054) (Houser-ORNL)
W75-04083

SEASONAL BERYLLIUM-7 VARIATIONS IN GROUND LEVEL AIR,
L. I. Gedenov, Z. G. Gritchenko, and V. M. Flegontov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 208-212, 2 fig, 1 tab, 17 ref.

Descriptors: *Meteorology, *Fallout, *Beryllium, *Rain, *Air pollution, Measurement, Seasonal, Summer, Density, Fluctuations, Microenvironment, Sampling, Correlation analysis, Systems analysis, Date collections.
Identifiers: *Troposphere, *Stratosphere.

The content of cosmogonic Be7 in ground level air and atmospheric precipitation was determined in 1960-1968 in the environs of Leningrad from the gamma-radiation with the aid of a scintillation and a Ge(Li) drift gamma-spectrometer. In periods when the atmosphere was cleansed of short-lived radionuclides of artificial origin, Be7 was determined in daily samples of atmospheric aerosols filtered from the air. Be7 in ground level air sometimes varied tenfold from day to day. A great amount of experimental material was collected in the seven years of observations and an average curve was plotted of the mean-monthly variation of Be7 concentration in ground level air. It was thus possible to distinguish a constant and a variable component in the variation of Be7 concentration. Be7, continuously being formed in the troposphere, is apparently the constant component, with superimposed periodic components due to seasonal Be7 penetration from the stratosphere, attaining great values in summer. A statistical analysis of the variable component showed that it is well described by a Gauss function of type P(t) approx. e(-t sq/2 sigma sq), where t is the number of days elapsed from the peak Be7 concentration in the ground level air, and sigma = 60 plus or minus 2 days is the parameter of the Gaussian distribution. Be7 concentration in ground level air is highest every June, (9 + 1) times 10(-14) curie/m cu, and lowest in December (3.5 plus or minus 1) times 10(-14) curie/m cu. There is a 3-to-2 ratio of the overall number of Be7 atoms in ground level air arriving from the stratosphere to those arriving from the troposphere. A constant average of (4.6 plus or minus 0.2) times 10(-5) atom of Be7 is deposited annually per square centimeter of ground in the Leningrad area. (See also W75-04054) (Houser-ORNL)
W75-04084

CONCENTRATION OF SODIUM RADIOISOTOPES IN THE GROUND LAYER OF THE ATMOSPHERE AND IN PRECIPITATION,
R. Y. Yasyulenis, V. Y. Luyanas, and B. I. Styro.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 213-215, 1 fig, 1 tab, 7 ref.

Descriptors: *Meteorology, *Sodium, *Fallout, *Rain, Precipitation(Atmospheric), Measurement, Argon, Air pollution, Atmosphere, Correlation analysis, *Radioisotopes.
Identifiers: Cosmic radiation, Cosmogonic radioisotopes.

Measurements of sodium isotope concentrations in rainwater are examined. The sodium was extracted with KU-2 cationite, Na22 was measured from the positronic radiation, and Na24 from beta-gamma coincidences. The ratios of Na22 and Na24 concentrations in the same rainwater sample were 70 and 120. The measured ratios are compared with theoretical evaluations of the concentration ratios in the air. (See also W75-04054) (Houser-ORNL)
W75-04085

CONCENTRATION OF PHOSPHORUS RADIOISOTOPES IN THE GROUND LAYERS OF THE ATMOSPHERE AND IN PRECIPITATION,
D. A. Shopauskene, and V. P. Shvedov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 216-219, 1 fig, 2 tab, 8 ref.

Descriptors: *Meteorology, *Fallout, *Phosphorus, *Measurement, *Air pollution, Sampling, Argon, Precipitation(Atmospheric), Rain, Radioisotopes, Correlation analysis.
Identifiers: Cosmic radiation, Interaction, Torrential rain.

Results of systematic measurements of P32 and P33 concentrations are reported. The measurements were carried out in 1967-1969 in the areas of Vilnius, Lithuania, and Cornesti (Moldavian SSR). The maximum values reached 13.8 times 10(-15) curie/m cu for P32 and 3.6 times 10(-15) curie/m cu for P33; the minima did not exceed 0.4 and 0.15 times 10(-15) curie/m cu, respectively, in air samples taken from the ground layer of the atmosphere. The average P32 concentration in atmospheric precipitation was 0.47 times 10(-12) curie/liter at Vilnius; in samples taken from torrential rains at Cornesti the P32 concentration reached 10.9 times 10(-15) curie/liter. (See also W75-04054) (Houser-ORNL)
W75-04086

RADIUM-226 IN ATMOSPHERIC PRECIPITATION, AND THE POSSIBILITIES FOR LEAD-210, BISMUTH-210 AND POLONIUM-210 TO PENETRATE THE ATMOSPHERE FROM THE EARTH'S SURFACE,
V. D. Vilenskii.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 220-223, 2 tab, 9 ref.

Descriptors: *Meteorology, *Radioisotopes, *Radium, *Lead, *Bismuth, *Polonium, *Fallout, *Air pollution, Measurement, Precipitation(Atmospheric), Rain, Atmosphere.

The intensity of atmospheric Ra226 and Pb210 fallout in the Moscow area in 1967-1969 was determined. It varied between 0.08 and 1.8 micron curie/km2. day for Ra226 (mean-annual value 0.18 mcurie/km2.year) and between 1 and 18.6 micron curie/km2.day for Pb210 (mean-annual value 2.1 mcurie/km2.year). The ratio of Ra226 to Pb210 concentrations in atmospheric precipitation varied between 0.024 and 0.222, the mean-annual value being 0.086. Assuming Ra226 penetrates the atmosphere from the earth's surface along with dust, the proportions of Pb210, Bi210 and Po210 penetrating the atmosphere with the dust have been evaluated along with the overall concentration of these radioisotopes in atmospheric precipitation. The natural radioactivity of atmospheric dust is shown to possibly influence the proportion of isotopes used for evaluating the rate of atmospheric scavenging. (See also W75-04054) (Houser-ORNL)
W75-04087

POLONIUM-210 IN THE ATMOSPHERE AND ITS RATIO TO LEAD-210,
S. S. Shalaveyus, and B. I. Styro.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 224-231, 3 fig, 1 tab, 8 ref.

Descriptors: *Meteorology, *Polonium, *Lead, *Atmosphere, *Air pollution, Precipitation(Atmospheric), Rain, Scavengers, Sampling, Analytical techniques.

The Pb210 and Po210 concentrations in atmospheric air and precipitation were measured in the environs of Vilnius. Po210 was determined from its alpha-activity after being separated from the other alpha-radiating elements by spontaneous precipation on copper. The purity of Po210 separation was checked with the aid of A-2 nuclear emulsions. EDE-10P anionite was used to separate Pb210. The chemical yield was determined from the carrier, and the purity from the Bi210 accumulation curve. In 1966-1968, the Po210 concentration in atmospheric air was 3.5 to 71.4.10-16 curie/m3. The Po210/Pb210 ratio in that period fluctuated between 0.07 and 0.22; the higher values indicate that air in which Pb210 and Po210 has accumulated for a long time was sometimes released into the ground layer. In 1967-1968, the Po210 concentration in precipitation varied between 0.2 and 1.9.10-12 curie/liter, and the Po210/Pb210 ratio varied between 0.1 and 0.37. An inverse correlation was found between the Po210 concentration in precipitation and that in the atmosphere. The average residence time of Po210 and Pb210 in the atmosphere was about 32 days. (See also W75-04054) (Houser-ORNL)
W75-04088

TIME FLUCTUATIONS OF LEAD-210 CONCENTRATION IN THE GROUND LAYER OF THE ATMOSPHERE,
S. G. Malakhov, V. A. Trufakin, and Z. S. Shulepko.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 232-238, 5 tab, 12 ref.

Descriptors: *Meteorology, *Air pollution, *Atmosphere, *Lead, *Troposphere, Measurement, Environmental effects, Fluctuations, Seasonal, Stability, Arctic, Anarctic, Land, Oceans.

Data on the mean-annual Pb210 concentration in the ground layer of the atmosphere are given for various points in the world. This concentration varies between 10-14 and 10-15 curie/m3 deep inland, 1 and 2.10-15 curie/m3 over the oceans in the northern hemisphere, and equals 10-15 curie/m3 in the polar areas of both hemispheres. Measurements in the Antarctic have revealed seasonal variations with a maximum in summer. Short-term (2-3 day) fluctuations are studied and assessed from measurements around Kirov. Cold-air advection from the Arctic usually reduces considerably the Pb210 concentration. (See also W75-04054) (Houser-ORNL)
W75-04089

FILTERING AEROSOLS WITH NATURAL ATMOSPHERIC RADIOACTIVITY THROUGH FIBROUS MATERIALS,
B. I. Ogorodnikov, V. I. Skitovich, and E. A. Sitalo.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 245-254, 7 fig, 1 tab, 16 ref.

Descriptors: *Meteorology, *Filters, *Atmosphere, *Radioactivity, *Radon, Separation techniques, Filters, Particle size, Efficiencies, Evaluation, Fibers, *Aerosols.
Identifiers: *Fibrous materials.

It has been proved experimentally that, at a filtration rate of about 150 cm/sec, FPP-15 and FPA-1 materials have approximately the same efficiency but the former is more effective at a rate of about 10 cm/sec owing to the presence of electrostatic charges on its fibers. FP material is suitable for use in the upper atmosphere, as its efficiency in trapping aerosols of all sizes increases. For in

stance, the efficiency of FPA-15 material in trapping aerosols of about 0.035 micron particle radius at filtration rates of 1 to 65 cm/sec is approximately 10 to 12 times as high at 27 km as at ground level. Study of radioactivity distribution over the layers of the filtering material has shown that particles of that size account for 40 to 60% of the radioactivity of radon daughter products in the ground layer of the atmosphere. EP filtering was studied experimentally with air containing coarse aerosols (1 to 15 micron) and with practically pure air containing a large amount of free atomic Ra daughter products. The 'free' products filter with very high efficiency with a high diffusion coefficient, even at rates of 300 cm/sec. (See also W75-04054) (Houser-ORNL)
W75-04091

DEVELOPMENT OF A METHOD FOR DETERMINING THE SIZE DISTRIBUTION OF RADIOACTIVE AEROSOLS WITH THE AID OF FILTERING MATERIALS,
B. I. Ogorodnikov, E. A. Sitalo, V. I. Skitovich, and I. E. Konstantinov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 255-258, 2 fig, 2 tab, 5 ref.

Descriptors: *Meteorology, *Radioactivity, *Filters, Efficiencies, Research and development, Methodology, *Aerosols, Size, Distribution, *Radioisotopes, Zirconium, Cesium, Beryllium.
Identifiers: Fibrous materials.

The efficiency of aerosol trapping by fibrous FP filtering materials depends on the rate of filtration, the diameters of the aerosol particles and of the filter fibers, and the thickness of the filtering layer. Through the right choice of parameters, one can achieve a selective retention of aerosols of a certain size range in the successive layers of filtering materials. The filtering characteristics of FPP-3, FPP-70 and FPA-100 materials were determined in the laboratory with aerosols of 0.035 to 0.5 micron particle radius. Linear filtration rates of about 1.5-2.0 m/sec were found to be adequate for investigating the size distribution of artificial radioactive aerosols, when the aerosols are mainly trapped by inertial effect. In this case, if FPP-70--0.3 material is used in the front layer and FPP-3--1.2 in the rear, the first filter retains over 95% of the aerosol particles of 0.5 micron radius and less than 20% of the particles of about 0.035 micron radius. The latter are practically all trapped by the rear filter. Various combinations of layers of FPP-70 and FPP-3 filtering materials were tested while taking radioactive aerosol samples at filtration rates of 1.0 to 1.6 m/sec. Much of the Zr95, Cs137 and Be7 is bound to particles of 0.2 to 0.25 micron average radius. For all isotopes, at least 10% of the overall activity is carried by particles below 0.1 micron. (See also W75-04054) (Houser-ORNL)
W75-04092

PRELIMINARY DATA ON THE MEASUREMENT OF THE ATMOSPHERIC AEROSOL CHARACTERISTICS WITH A CENTRIFUGAL SPECTROMETER,
Y. N. Redkin.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 259-272, 8 fig, 14 ref.

Descriptors: *Meteorology, Measurement, *Aerosols, *Instrumentation, *Radioactivity, Research and development, Theoretical analysis, Evaluation, Efficiencies, Model studies, Centrifugation, *Spectrophotometry, *Pollutant identification.
Identifiers: *Spectrometers.

An aerosol spectrometer is described which makes it possible to obtain continuous spectra of particles for Stokes radii RS between 0.4 and 10 micro. A relationship phi = phi(RS) whose log-log plot for particles of RS greater than 10-4 cm is almost a straight line is derived from the equation of particle motion in a viscous space for a rotating system of coordinates. Here phi is the angle of particle deviation from a radius passing through the point from which the particle started moving. The spectrometer model was built as a hollow, rotating steel disk, through the axis of which aerosol is pumped. Owing to centrifugal sedimentation, part of the dust penetrates special slots to form a pencil of rays splitting more and more as the particles move away from the axis of rotation. The coarser the particle, the larger the angle of its deviation. A theoretical evaluation of the efficiency of this device showed it to depend very little on particle size at RS greater than 10-4 cm (Being 65 to 70%), as confirmed by the results of a calibration using puffball and lycopodium spores. The distribution of alpha-activity of particles of RS = 0.4.10-4 cm varies little and is almost only a hundredth of the specific overall alpha-activity measured on an FPP filter. (See also W75-04054) (Houser-ORNL)
W75-04093

MEASURING THE CONCENTRATION OF HIGHLY-DISPERSE RADIOACTIVE AEROSOLS BY THE DIFFUSION METHOD,
S. V. Kolerskii, Yu. V. Kuznetsov, S. O. Lekhtmakher, N. M. Polev, and L. S. Ruzer.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 273-278, 2 fig, 1 tab, 12 ref.

Descriptors: *Meteorology, *Measurement, *Aerosols, *Radioactivity, Methodology, *Diffusion, Dispersion, Atmosphere, Gases, Particle size.
Identifiers: Coefficient of deposition.

Described is the application of the diffusion method to the determination of the proportion of free atoms and of all the ultrahighly disperse aerosols (molecular complexes) formed through interaction of free atoms with the molecules of the various gases in the air, in the overall concentration of radioactive aerosols of emanation daughter products in the air. The coefficient of deposition of ultrahighly disperse particles in a cylindrical channel, calculated from formulas of Gormley and Kennedy, is affected by an error of 3 to 5% at most, due to the fact that the variable distribution of flow velocities in the inflow section of the channel is disregarded in the formulas. The errors of the method are discussed, and the method is shown to facilitate reliable measurements of the proportion of ultrahighly disperse radioactive aerosols of emanation daughter products, if this proportion is at least 10 to 20%. (See also W75-04054) (Houser-ORNL)
W75-04094

SEPARATE DETERMINATION OF RN, RAA, RAB, AND RAC CONCENTRATIONS IN AIR FROM THE ALPHA-ACTIVITY DECAY CURVE OF A FILTER,
V. N. Bakulin, and B. G. Starikov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 279-285, 3 fig, 1 tab, 18 ref.

Descriptors: *Meteorology, *Fallout, *Radon, *Air pollution, *Soil contamination, Filtration, Separation techniques, Troposphere, Turbulence, Polonium, Lead, Bismuth.
Identifiers: Alpha activity, Decay curve, Daughter products.

The relationships between radon and its decay products are of interest when studying turbulent agitation and contaminant washout processes in the lower troposphere. An examination of the different methods of separate determination of the concentrations of radon daughter products shows that only some of them yield satisfactory results at low atmospheric concentrations of radon. An analytical analog has been developed of the graphical method of separate determination of Po218, Pb214 and Bi214 concentrations from the curve of filter alpha-activity decay; the analog is as accurate as the least squares method for three unknowns, but the calculations are incomparably simpler. A comparison of these methods for known proportions of the radon decay products proved the adequacy of the proposed method. The existence of standard proportions between the short-lived radon decay products under natural conditions was demonstrated; they make it possible to determine the concentration of each of them from the alpha-decay curve within 11 to 60 min from the end of filtration. (See also W75-04054) (Houser-ORNL)
W75-04095

NEW METHODS OF MEASURING RN220 (THORON) EXHALATION AND SOME RESULTS,
B. I. Styro, T. N. Nedvetskaite, and E. E. Sen'ko.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 286-292, 4 fig, 4 tab, 10 ref.

Descriptors: *Meteorology, *Measurement, Methodology, *Radon, *Thoron, Research and development, *Instrumentation, Ion exchange, Absorption, Sites, Data collections.
Identifiers: Exhalation, Pearson collector, Ion chamber.

Two new methods are proposed for the measurement of Rn220 exhalation. One uses a Pearson collector combined with a decay chamber for radioactive emanations. In the other, the Pearson collector is replaced by an accumulation chamber connected to three auxiliary decay chambers through which the air flows in from the surrounding space with already decaying Rn220. At the same time, these chambers serve for equalizing the pressure in the accumulator. After passing through the decay chamber, the Rn220 and Rn222 daughter products formed there were trapped on an LFS-1 filter which, after 6 hours of Rn222 daughter products decay, was brought into contact with an A-2 nuclear emulsion. The setups were calibrated with Tb232 salt which was in equilibrium with the decay products. Since the calibration coefficient at low sampling rates fluctuated between 2 and 5%, the air penetrating the decay chamber was ionized by corona discharge and nuclear emulsions helped considerably in raising the lower sensitivity limit of Rn220 exhalation measurement (10 to the minus 17 to 10 to the minus 18 curie/sq cm.sec depending on sampling duration). The error of Rn220 exhalation measurement by these two methods does not exceed 20%. Data are provided on the diurnal variation in Rn220 exhalation and mean exhalation values for various states of the earth's surface. (See also W75-04054) (Houser-ORNL)
W75-04096

A SIMPLE TWO-DIMENSIONAL ANALYZER OF BETA-GAMMA COINCIDENCES IN THE STUDY OF RADIOACTIVE FALLOUT SAMPLES,
E. F. Kovnatskii, E. I. Roslyi, and A. N. Silant'ev.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 293-296, 2 fig, 4 ref.

Descriptors: *Radiation, *Measurement, *Environment, *Instrumentation, Design criteria, Data collections, *Spectrophotometry, Pollutant identification.
Identifiers: *Spectrometer.

A two-dimensional analyzer of beta-gamma coincidences, based on two commercial AI-100 analyzers is described. The setup facilitates the recording of coincidence spectra during the measurement, on a punch tape on which are recorded, at the end of the measurement, the beta and gamma spectra picked up by a single-crystal spectrometer. A functional circuit of the setup and a diagram of the control unit are given. (See also W75-04054) (Houser-ORNL)

W75-04097

SPECTROMETRIC METHOD OF MEASURING THE CONCENTRATION OF NATURAL RADIOACTIVE AEROSOLS,
V. G. Labushkin, V. I. Popov, and L. S. Ruzer.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 297-309, 5 fig, 2 tab, 27 ref.

Descriptors: *Meteorology, *Radioactivity, Measurement, *Assay, *Aerosols, Radioisotopes, Radon, Thoron, Instrumentation, Environment, Methodology, *Spectrophotometry, *Pollutant identification.
Identifiers: Spectrometers.

Discussed is a spectrometric method of determining the concentration of natural atmospheric radioactive aerosols formed by radon and thoron decay daughter products. The determination of radon daughter product concentrations is accompanied by measurement of the alpha(minus) and beta(minus) activity of the disperse phase of aerosols deposited on a fine-fibered LFS-1 (AFA--RSP-10,20) filter by means of scintillation spectrometric detection units. For a simultaneous measurement of the concentration of daughter products of both radon and thoron, one can use a spectrometric unit for the detection of alpha(minus) radiation, composed of 0.3 to 0.4 mm thick CsI(Tl) crystal of 63 mm diameter and a FEU-52 photomultiplier. The adoption of these spectroscopic methods considerably reduces the error and, in addition, facilitates determination of the self-absorption of alpha(minus) radiation in the aerosol sample and the dust content of the air. Also reported is an investigation of the spectrometric unit for the detection of alpha(minus) radiation from a wide-area (over 100-cm sq) aerosol sample. The unit consists of CsI (Tl) crystal and a FEU-49 photomultiplier. The topography of the photocathode sensitivity was plotted with the aid of a Pu-239 spectrometric point source. The apparatus used for measuring the concentration of natural radioactive aerosols by spectrometric methods is described. (See also W75-04054) (Houser-ORNL)
W75-04098

ISOTOPE ANALYSIS OF RADIOACTIVE FALLOUT AND AEROSOL SAMPLES BY BETA-SPECTROMETRY,
A. N. Silant'ev, T. V. Polyakova, F. A. Rabotnova, and I. G. Shkuratova.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 310-314, 2 fig, 2 ref.

Descriptors: *Radioisotopes, *Measurement, *Instrumentation, *Design criteria, Radium, Praseodymium, Yttrium, Strontium, Analytical techniques, Methodology, *Spectrophotometry, *Pollutant identification.

Discussed is a method for determining the content of radium-106, praseodymium-144, yttrium-90, and strontium-89 isotopes by beta-spectrometric analysis, involving the use of a scintillation beta-spectrometer with a plastic 20-mm-thick scintillator of 70-mm diameter. Only beta radiation of energies above 630 keV is taken into account when processing spectra. The measured spectra in the range of 630 keV to 3.5 MeV are subdivided into intervals so that a system of equations holds. (See also W75-04054) (Houser-ORNL)
W75-04099

RAPID SYSTEM OF AUTOMATIC PUNCH-TAPE OUTPUT OF INFORMATION FROM THE AI-100-1 ANALYZER,
N. F. Mazurin, V. P. Solov'ev, and V. N. Churkin.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 315-318, 2 fig, 1 ref.

Descriptors: *Radioisotopes, *Measurement, *Instrumentation, *Design criteria, Methodology, Remote sensing, Automation, Data collections, Data transmission, Geophysics.
Identifiers: *Multichannel analyzer, Gamma-spectrum.

Described is the SAPAR-1m system of automatic punch-tape output of information from a 'Raduga' (AI-100 -- 1) multichannel amplitude analyzer of pulses in the code of the 'Minsk-2' or 'Minsk-22' computer. The block diagram of the system includes an AU-100 -- 1 analyzer, a code-conversion and puncher-control circuit, and a PL-80 tape puncher. In contrast to earlier setups, the code-conversion and puncher-control circuit is transistorized, and thus faster and more reliable The top speed of the SAPAR-1m entirely depends on the top speed of the puncher; with the PL-800 puncher, it attains 12 channels per second. Automatic punching of measurement data, combined with machine processing of amplitude spectra on the 'Minsk-22' computer, has almost completely eliminated manual operations from gamma-spectrum processing. (See also W75-04054) (Houser-ORNL)
W75-04100

GRAPHOANALYTICAL METHOD FOR DETERMINING CESIUM-137 CONCENTRATION IN SOIL SAMPLES FROM THE GAMMA SPECTRUM,
V. N. Churkin.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 319-334, 6 fig, 3 tab, 12 ref.

Descriptors: *Soil contamination, *Cesium, *Measurement, *Radiation, Analytical techniques, Design criteria, Remote sensing, Aircraft, *Spectrophotometry, *Pollutant identification.
Identifiers: Gamma spectrum.

The high-energy part of the amplitude distribution of pulses in the region of the Cs137 photopeak of 680-740 keV is shown to be fairly well approximated by a Gaussian curve, if the Cs137 photopeak in the gamma spectrum of the soil samples is separated from the right-hand base of the curve 'parallel to the level of the natural background.' This facilitates graphoanalytical determination of the Cs137 photopeak area along with calculation of the concentration of this isotope in the soil. Components due to interfering radiation of natural and artificial isotopes need not be taken into account. The threshold sensitivity for a 50% statistical error of measurement is 2 times 10(-13) curie/g. The method is five to eight times as efficient as known methods. It is assumed that it also applies to measurements in situ, e.g., when Cs137 concentration in the soil cover is investigated from aboard aircraft or automobiles. (See also W75-04054) (Houser-ORNL)
W75-04101

RADIOCHEMICAL METHOD OF DETERMINING LOW STRONTIUM-90 CONCENTRATION LEVELS IN ENVIRONMENTAL SAMPLES,
V. B. Chunichev.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 335-339, 8 ref.

Descriptors: Analytical techniques, Measurement, *Assay, *Strontium, *Sea water, *Radiochemical analysis, Sampling, Environment, Efficiencies, *Pollutant identification.

A radiochemical method for determining Sr90 in 10 liters of seawater is described in detail. It involves a low-background radiometric setup (background of 4 to 6 counts per hour), intended for measuring the beta-radiation of the daughter Y90. The method significantly facilitated the taking and preliminary processing of seawater samples, reduced the consumption of reagents such as soda and hydrochloric acid, eliminated the use of ammonium chloride, and increased the relative yield of strontium. Analysis of the carbonate concentrate became three times as efficient as analysis of the concentrate from a 100-liter sample. Sr90 can be determined in 2-liter seawater samples without a flame photometer. The method was also used to study the sea bottom, at Sr90 concentration levels of 10(-12) curie. (See also W75-04054) (Houser-ORNL)
W75-04102

FALLOUT AND ACCUMULATION OF RADIOACTIVE DECAY PRODUCTS IN 1966-1968 IN THE VICINITY OF LENINGRAD,
For primary bibliographic entry see Field 5B.
W75-04103

PENETRATION OF RADIOACTIVE FISSION PRODUCTS FROM 1964-1967 NUCLEAR TESTS INTO THE GROUND LAYER OF THE ATMOSPHERE IN THE LENINGRAD AREA,
For primary bibliographic entry see Field 5B.
W75-04104

STUDY OF THE RESISTANCE OF FIBROUS FILTERING MATERIALS IN RAREFIED AIR,
I. V. Petryanov, B. I. Ogorodnikov, and L. A. Zimina.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 353-357, 2 fig, 2 tab, 7 ref.

Descriptors: Research and development, *Filters, *Filtration, *Porous media, Compaction, *Resistance, *Flow resistance, Equations, Mathematics, Viscosity, Viscous flow, Gases, Air.
Identifiers: Filter fibers.

The resistance of fibrous FP filtering materials in a flow of rarefied air is studied. The material resistance Delta p was found to decrease with increasing length Lambda of the mean free path of the gas molecules, because the gas flow glides along the filter fibers, and at normal atmospheric pressure the resistance of almost all FP materials is already lower than its maximum. For FPP-5, LFS-2, and FPP-15 materials, which consist of ultrafine fibers, the loss of resistance is 10-20%. Higher compaction Beta leads to a slight additional drop in resistance from the maximum for the given compaction. The resistance of FP materials under gliding flow conditions can be computed. (See also W75-04054) (Houser-ORNL)
W75-04105

VERTICAL DISTRIBUTION OF THE CONCENTRATION OF RADON DECAY PRODUCTS IN THE 0-300-M LAYER,
For primary bibliographic entry see Field 5B.
W75-04106

NATURAL SNOWFLAKE RADIOACTIVITY DUE TO SHORT-LIVED RADON DECAY PRODUCTS,
A. S. Avramenko, and K. P. Makhon'ko.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 361-371, 8 tab, 10 ref.

Descriptors: *Meteorology, *Snow, *Radiation, *Assay, *Measurement, *Radon, Sampling, Mass, Precipitation(Atmospheric), Aerosols, Clouds, Coagulation.
Identifiers: *Snowflakes, Specific radioactivity

Discussed is snowflake radioactivity due to short-lived products of radon decay. Nuclear photoplatex of the A-2 type were used as indicator. Of the 3106 snowflakes measured, 1270 were radioactive. The frequency of the specific radioactivity of snow flakes has two maxima, at C = 0 and

at C = 16 to 32 times 10(3) alpha-tracks per gram, and one minimum at C = 4 to 8 times 10(3) alpha-tracks per gram. The number of nonradioactive snowflakes and the specific snowflake radioactivity decreases with increased snowflake mass. A scheme for the radioactivation of snowflakes in order to examine the patterns obtained is also discussed. The coagulation constant of radioactive aerosols with the cloud element is assessed from experimental data on the number of nonradioactive snowflakes. (See also W75-04054) (Houser-ORNL)
W75-04107

TRACE ELEMENTS AND NATUR RADIOACTIVITY IN CLOUD WATER AND ATMOSPHERIC PRECIPITATION IN THE CENTRAL CAUCASUS MOUNTAINS,
E. P. Makhon'ko, A. S. Avramenko, and K. P. Makhon'ko.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 372-379, 5 tab, 14 ref.

Descriptors: *Meteorology, *Radioisotopes, Measurement, *Atmosphere, *Precipitation(Atmospheric), *Clouds, *Trace elements, Climatology, Fallout, Sampling, Air, Water chemistry, Aerosols, Particle size.

Total concentrations of short-lived radon decay products in precipitation, cloud water and air were measured in summer on the Terskol peak of the Central Caucasus, along with the concentrations of Fe, Pb, Mn, Ni, and Mg. The precipitation samples were taken in polyethylene vessels, the cloud-water samples were taken with the aid of a battery of four parallel cyclones, while the atmospheric aerosol samples were taken by means of a filtering setup with an FPP-15-1.5 filter. The admixture concentrations obtained are similar in the precipitation and the cloud water, as are the corresponding coefficients of admixture concentration (concentration ratios of water to air), i.e., the contamination of precipitation takes place mainly in the cloud. The assessed 'lifetime' of the trace elements in the atmospheric layer subjected to precipitation washout (1.4 days), concentration coefficient (6 times 10 to the 5th power), and rate of 'wet precipitation' (1.2 km/day) correspond approximately to the values for natural radioactivity (2 times 10 to the 5th power and 0.8 km/day), and with literature data for macroelements and nuclear explosion products. This is an indication that the aerosol carriers of these admixtures in the atmosphere have similar properties, mainly similar particle sizes. (See also W75-04054) (Houser-ORNL)
W75-04108

AN AUTOMATED METHOD FOR THE DETERMINATION OF FORMALDEHYDE IN SEWAGE AND SEWAGE EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
C. C. Musselwhite, and K. W. Petts.
Water Pollution Control, Vol 73, No 4, p 443-448, 1974. 4 fig, 7 tab, 3 ref.

Descriptors: *Sewage, *Analytical techniques, *Monitoring, *Water quality control, Boating, Water pollution sources, Boats, Boating regulations, *Automation, *Pollutant identification, Analytical techniques.
Identifiers: *Formaldehyde, Technicon Auto analyzer.

The discharge of sewage from pleasure boats has been cited as an increasing source of pollution. Control of this discharge requires the mandatory use of chemical toilets which will be discharged for treatment ashore, probably to be treated in combination with other sewage. Since some of the chemical additives to the toilets contain a high proportion to formaldehyde, which is toxic to some fish at levels above 50 mg/liter, it is necessary to know the formaldehyde content of this treated sewage before it is discharged to water. A procedure is described for using a Technicon Auto Analyzer to quickly and accurately monitor the formaldehyde level. The mehtof utilizes the reaction of formaldehyde with acetylacetone in the presence of an excess of an ammonium slat to form a yellow compound, diacetyldihydrolutidine, whichis measured colorimetrically. The methods outlined will give reproducible results in the range of 0.10 to 25.0 mg/liter of free and combined formaldehyde and in the range of 0.05 to 10.0 mg/liter of distilled formaldehyde. It is proposed that the automated processes should be used for the routine monitoring of total formaldehyde present in sewage and sewage effluents. (Orr-FIRL)
W75-04112

NEW SPECTROPHOTOMETRIC METHOD FOR THE ESTIMATION OF HEXAVALENT CHROMIUM IN WATER,
Indian Defence Research and Development Establishment, Gwalior.
R. Prasad, and S. Ramanujam.
Research and Industry, Vol 19, No 1, p 26-29, March, 1974. 1 fig, 7 tab, 6 ref.

Descriptors: *Spectrophotometry, *Chromium, *Toxicity, Water pollution, Water quality standards, Metals, Water quality control, *Pollutant identification, Analytical techniques, Potable water.
Identifiers: *Hexavalent chromium, O-tolidine hydrochloride-tartaric acid reagent, Analar potassium dichromate, Sodium fluoride, Beer's Law.

The blue color developed with O-tolidine hydrochloride-tartaric acid reagent in the presence of aqueous sodium fluoride, is the basis for a quantitative method for the spectrophotometric evaluation of hexavalent chromium in drinking water at 600 millimicrons. Hexavalent chromium is a toxic inorganic element in potable water. The maximum amount permissible is 0.05 ppm. The standard hexavalent chromium solution consists of the dissolving of 0.1414 g Analar potassium dichromate in distilled water, making the volume up to 100 ml. Twenty ml of this solution were made up to 1000 ml to create the standard solution consisting of one microgram hexavalent chromium per ml. O-tolidine hydrochloride tartaric acid was prepared by dissolving 0.5 g freshly prepared pure O-tolidine hydrochloride and 0.5 g pure tartaric acid in distilled water, making a volume of 100 ml. One g pure sodium fluoride dissolved in water made up to 100 ml and kept separately. The null balance method in a one centimeter cell of Unicam SP 500 series 2 ultraviolet and visible spectrophotometer in the visible range utilizing tungsten lamp was used to determine the optical density measurements. The hexavalent chromium solution was treated with one ml of O-tolidine hydrochloride-tartaric acid reagent and one ml of sodium fluoride solution, making up to 10 ml with distilled water. The blue color was stable for about one hour. The solution was measured in the spectrophotometer for 26 to 30 minutes at wavelengths ranging from 400 to 650 millimicrons. (Leibowitz-FIRL)
W75-04113

DICHROMATE RELUX CHEMICAL OXYGEN DEMAND: A PROPOSED METHOD FOR CHLORIDE CORRECTION IN HIGHLY SALINE WASTES,
Jacobs Engineering Co., Pasadena, Calif.
F. J. Baumann.
Analytical Chemistry, Vol 46, No 9, p 1336-1338, August, 1974. 1 fig, 3 tab, 4 ref.

Descriptors: Water pollution control, Salinity, *Chlorides, Waste water treatment, *Oxidation, *Chemical oxygen demand, *Saline water, *Pollutant identification.
Identifiers: *Dichromate reflux method, Mercuric sulfate, Chloride oxidation, Saline wastes.

Chloride interferes with methods which attempt to determine chemical oxygen demand by strong wet oxidative means in saline wastes. Mild oxidizing conditions inhibit chloride oxidation, but only at the expense of inefficient oxidation of organic matter. In the determination of COD the dichromate reflux method uses acid concentrations and heating times which oxidize about 85-95 percent of the organic matter present, while oxidizing the chloride ion 100 percent as well. The chloride interference can be greatly inhibited through the addition of mercuric sulfate to form unionized mercuric chloride. The complexing method using a weight ratio of HgSO4:Cl at 10:1, yields reproducible results at chloride concentrations up to 5,000 mg/liter. Chloride interference problems occur in wastes of low to moderate COD with chloride concentrations approaching that of seawater. True values for oxygen consumed from dichromate are determined in highly saline wastes and seawater by the employment of the chlorine-recovery method, without the requirement of prior chloride determination or dependence on an excess of mercury which does not achieve complete sequestration of chloride. (Leibowitz-FIRL)
W75-04124

EVALUATION OF EDDHA AS AN EXTRACTION AND ANALYTICAL REAGENT FOR ASSESSING THE IRON STATUS OF SOILS,
Nevada Agricultural Experiment Station, Reno.
For primary bibliographic entry see Field 2G.
W75-04144

SYMPOSIUM ON POPULATION EXPOSURES,
Health Physics Society, East Weymouth, Mass.
For primary bibliographic entry see Field 5C.
W75-04152

DATA NEEDS FOR THE ASSESSMENT OF POPULATION DOSE FROM BACKGROUND RADIATION,
Health and Safety Lab. (AEC), New York.
W. M. Lowder, J. H. Harley, and J. E. McLaughlin.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tenn., p 23-29, 3 tab, 9 ref.

Descriptors: *Human population, *Radioactivity, *Public health, *Basic data collection, *Background radiation, Measurement, Analytical techniques, Assessment, Assay, Safety, Evaluation, Radon, Gamma rays.
Identifiers: *Dose.

In the course of preparation of two National Council on Radiation Protection and Measurement (NCRP) reports on the dose to the U.S. population from background radiation and on techniques of measurement, several significant sources of uncertainty that are relevant to all studies of human population exposure to this background have been identified. These include (1) the extremely limited data on gamma radiation and airborne radon levels in the indor environment and their dependences on the properties and radionuclide contents of building materials; (2) possible inadequacies in the models used to relate radiation or radionuclide measurements to human organ dose; and (3) possible uncertainties in the dose contributions of cosmic ray charged particles (ca 10 percent). In addition, the need for considerably more detailed information on the time variations of the various components of background radiation is relevant to the quantitative assessment of small additions to the overall radiation exposure produced by man-made radionuclides in the environment. These considerations become more critical when realistic population dose estimates are desired for a limited geographic region, particularly a highly urbanized area. In most such situations, reasonably extensive measurement programs would be required. Existing information on typical radionuclide dis-

tributions, radiation fields, and component doses such as is contained in forthcoming NCRP reports would provide useful guidance in the design of such programs. (See also W75-04152) (Houser-ORNL)
W75-04156

THE USE OF AN AUTOMATED POPULATION DATA BASE IN POPULATION EXPOSURE CALCULATIONS,
Office of Radiation Programs, Silver Spring, Md. Electromaganetic Radiation Analysis Branch.
T. W. Athey, R. A. Tell, and D. E. James.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tenn., p 29-36, 4 tab, 3 ref.

Descriptors: *Human population, *Radioactivity, *Measurement, *Computer programs, Geography, Census, Fuels, Mathematics, Assessment.
Identifiers: *Population exposure, Radioactivity release, Dose calculations, Fuel cycle, Nonionizing radiation, Fuel reprocessing.

The assessment of potential hazard to the population from a source in the environment often requires a knowledge of the specific geographic population distribution around the source. A computer program package and data base, developed primarily for marketing purposes in the U.S. Department of Commerce, were adapted for use in a number of population exposure problems in the ionizing and nonionizing radiation areas. The data base consists of the U.S. Census Bureau Master Enumeration District List with coordinates. For each of the 250,000 census enumeration districts (CEDs), the total population and housing units, the state and county code, and the latitude and longitude of the population centroid are given. The average population in a CED is 800, and this is approximately the limit of resolution of the data base. The programs generate the total population within selected distances and angular sectors from a reference point designated by its geographic coordinates. Alternately, the programs can be used as subroutines to make available to another program the distance and bearing of each CED, in a selected region, from a reference point. The potential applications to the population exposure problem are many and examples briefly discussed include single-source discharge from facilities in the nuclear fuel cycle and exposure from nonionizing radiation sources such as radio, television, radar, and microwave transmitters. An an example of the use of this population distribution system, the population exposure from AM radio standard broadcast station is discussed in detail. (See also W75-04152) (Houser-ORNL)
W75-04157

THE USE OF ENVIRONMENTAL MONITORING DATA IN DETERMINING BACKGROUND RADIATION DOSES,
Health Physics Society, East Weymouth, Mass.
S. M. Garry, W. H. Wilkie, B. B. Hobbs, H. J. Monroe, and R. G. Wallace.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tenn., p 37-44, 3 tab, 13 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, *Measurement, *Assessment, Background radiation, Monitoring, Environment, Air pollution, Water pollution, Soil contamination, Food chains, Path of pollutants, Gamma rays.
Identifiers: *Doses, *Population exposure, Cosmic radiation.

Comparison of background radiation doses reported in the literature with doses calculated from preoperational environmental monitoring data indicates in general, that monitoring data can be used to estimate doses to individuals from background radiation. These procedures for estimating doses provide a basis for assessing any significant increase in dose that may result from the operation of a nuclear power plant. Doses to individuals from background radiation are estimated from preoperational environmental monitoring data for a nuclear power plant. Food categories, consumption rates, and dose commitment factors are listed; and the calculation of doses to individuals from radioactivity in the environment is described. Sample collection and laboratory procedures are described briefly. Models of ingestion, air submersion, inhalation, and ground concentration pathways are used to calculate the doses from 16 radionuclides. Ingestion doses are estimated from measured radionuclide concentrations in 10 food categories that represent the major portion of the human diet. Doses from air submersion and inhalation pathways are estimated from measurements of radionuclide concentrations in air. Doses received from terrestrial radioactivity are calculated from measurements of radionuclide concentrations in soil. Thermoluminescent dosimeters are used to estimate the total external background gamma doses, including doses received from cosmic radiation. (See also W75-04152) (Houser-ORNL)
W75-04158

ENVIRONMENTAL RADIATION MEASUREMENTS USING IN SITU AND CORE SAMPLING TECHNIQUES,
Oak Ridge National Lab., Tenn.
H. W. Dickson, G. D. Kerr, P. T. Perdue, and S. A. Abdullah.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, 1974, Knoxville, Tennessee, p 45-52, 2 fig, 3 tab, 7 ref.

Descriptors: *Environment, *Radioactivity, *Measurement, *Assessment, Analytical techniques, Sampling, Cores, Instrumentation, Gamma rays, Cesium, Computer program, Soils, Soil contamination, Distribution.
Identifiers: *In-situ measurements, *Dose rate.

Dose rates from natural radionuclides and 137Cs in soils of the Oak Ridge area have been determined from in situ and core sample measurements. In situ gammaray measurements were made with a spectrometer consisting of a 4096 channel analyzer and a 55 cm3 Ge(Li) detector designed for this purpose. This equipment was transported in a mobile laboratory constructed in a large van that had a gasoline generator to provide electrical power at remote sites. A tape of spectral data and a soil core sample from each site were returned to ORNL for further analysis. Information on soil composition, density, and moisture content, and on the distribution of cesium in the soil was obtained from the core samples. Measurements of radionuclide concentrations in soil samples were made with a 4 x 4 inch NaI detector that was in a graded shield and shielded counting room. In situ spectra were analyzed by a computer program which identified and assigned energies to peaks, integrated the areas under the peaks, and calculated radionuclide concentrations based on a uniform distribution in the soil. The assumption of a uniform distribution was adequate only for natural radionuclides, but simple corrections can be made to the computer calculations for man-made radionuclides distributed on the surface or exponentially in the soil. For 137Cs, a correction was used based on an exponential function fitted to the distribution measured in core samples. At typical sites in Oak Ridge, the dose rate determined from these measurements was about 5 urad/hr. (See also W75-04152) (Houser-ORNL)
W75-04159

ENTRAINMENT OF STRATOSPHERIC TRITIUM: ANOTHER RADIOLOGICAL ANOMALY OF THE ROCKY MOUNTAIN WEST,
NUS Corp., Rockville, Md.
S. T. Bard.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 73-79, 3 fig, 2 ref.

Descriptors: Nuclear powerplants, *Radioactivity, *Monitoring, Surveys, *Tritium, Nuclear explosions, *Air pollution, Water pollution, Meteorology, Migration, *Rocky Mountain region, *Waste vapor.
Identifiers: *Surveillance program, Fort St. Vrain(Colo), Maximum permissible concentration.

A pre-operational radiological surveillance program for the Fort St. Vrain Nuclear Generating Station has detected a source of population exposure unique to the Colorado front range. It was found that tritium concentrations in atmospheric water vapor could fluctuate by three orders of magnitude over a twenty-four hour period and may attain MPC levels for short intervals of time following a high yield thermonuclear atmospheric test. The results also substantiate the work of other investigators who have suggested that orographically induced atmospheric waves can significantly alter the height of the tropopause in the lee of the mountains and allow for the rapid transport of stratospheric air to the ground suface. (See alsoW75-04152) (Houser-ORNL)
W75-04162

AS LOW AS PRACTICABLE: A CRITICAL APPRAISAL OF POPULATION HEALTH RISKS FROM POWER PLANT EFFLUENTS,
Brookhaven National Lab., Upton, N.Y.
A. P. Hull.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 161-172, 1 fig, 1 tab, 37 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, *Water pollution, *Air pollution, *Liquid wastes, *Public health, Food chains, Population, Assessment, Risks, Human population, Environmental effects, Mortality, Safety, Evaluation, Model studies.

A public controversy about the risks from radioactivity in effluents from nuclear power plants arose in the late 1960's as their utilization was growing toward large-scale commercial basis. Several scientific critics alleged variously that the existing plants had occasioned excess infant mortality in their vicinities, and that the growth of nuclear power would produce large increases in the cancer death rate in the general population. The controversy occasioned by these allegations led the Federal Radiation Council to instigate the Biological Effects of Ionizing Radiation (BEIR) Committee review of the effects of exposure to low levels of ionizing radiation. It also appeared to underlie the AEC's 10 CFR 50 Appendix I proposals for numerical limits for nuclear power plant effluents. These proposals are intended to limit the exposure of any nearby individual to 5 mR/yr, and thereby would assure that the total population would be exposed to less than about 400 person-rems per year per 1,000 Mw(e) installed capacity. This critical review indicates that the critics' allegations were either without substance or irrelevant. Using BEIR estimates of the risks from radiation and recent years effluent release data, the population health risk from power reactor effluent radiation exposures appears to be generally smaller than that from fossil-fueled plant effluents. The BEIR estimates are based on the linear no-threshold hypothesis. Growing evidence suggests that this hypothesis is excessively conservative, when applied to low dose levels such as those occasioned by routine nuclear power plant effluents. Insofar as this is so, the benefits of the Appendix I proposals to reduce population exposures appear to be correspondingly exaggerated. (See also W75-04152) (Houser-ORNL)
W75-04163

DETERMINATION OF GAMMA-RAY EXPOSURE IN THE VICINITY OF A BOILING WATER POWER REACTOR,
Atomic Energy Commission, New York, New York. Health and Safety Laboratory.
C. V. Gogolak, and K. M. Miller.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 207-214, 3 fig, 2 tab, 17 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Noble gases, *Meteorology, *Population, *Radioactivity, *Model studies, Measurement, Data collection, Ion transport, Analytical techniques, Operations, Evaluation, Assessment, Public health.
Identifiers: Release rate, Gaussian Models, Dose.

Calculations of gamma-ray exposure due to the noble gas effluent of a boiling water power reactor have been made using a Gaussian plume exposure model. Hourly meteorological data and daily average release rate data gathered on site were used as input to the model. Simultaneous measurements were made with continuously-monitoring ionization chambers at seven locations between 1.3 and 8.0 km from the reactor stack for more than eight months of reactor operation to evaluate the model results. Having established the reliability of the calculations for determining exposure rates lower than 1 mR per year, estimates of the population exposure to a distance of 16 km from the plant were made. Problems involved in extending such calculations to population dose assessment are discussed. (See also W75-04152) (Houser-ORNL)
W75-04168

EFFECT OF STACK HEIGHT ON INDIVIDUAL AND POPULATION DOSES ATTRIBUTABLE TO GASEOUS EFFLUENTS FROM A MODEL FUEL REPROCESSING FACILITY,
Oak Ridge National Lab., Tenn.
L. R. McKay, and J. P. Witherspoon.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 223-228, 1 tab, 10 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, *Gases, particles, Waste dilution, Dispersion, Population, Public health, Toxicity, Tritium, Krypton, Assessment, Safety, Evaluation, Computer models, Computer programs.
Identifiers: Dose, Fuel reprocessing, *Population exposure, *Stack height, Comparisons.

The importance of stack height to provide sufficient atmospheric dilution for radioactive particles and gases in emissions from nuclear facilities has long been recognized. To assess the influence of stack height on radiation doses attributable to gases and particles in airborn emissions from a model fuel reprocessing facility, a plant typical in terms of source term, technology, location, and surrounding population was selected. A computer code was used to predict atmospheric and ground concentrations of radionuclides out to 55 miles and to estimate dose from both external and internal exposure modes. A stack height of 100 meters was selected as the base line case, and heights of 75, 50, and 20 meters were used to estimate the effect on maximum individual dose and on population dose within 55 miles of the model facility. When a 20-meter stack height was assumed, the maximum dose to an individual was 18 times that estimated for a 100-meter stack. The corresponding population dose out to 55 miles, however, was only 1.6 times greater for the shorter stack. The maximum dose to an individual attributable to the gases tritium and krypton-85 was reduced 20-fold in increasing stack height from 20 to 100 meters. The corresponding decrease in the particulate fraction was only about 10-fold. At 55 miles, estimates of population dose varied from 668 (20-meter stack) to 414 (100-meter stack) man-rems/year. Stack height had little effect on population dose, 95% of which was attributable to the gases tritium and krypton-85. (See also W75-04152) (Houser-ORNL)
W75-04170

C-14 GASEOUS EFFLUENT FROM PRESSURIZED WATER REACTORS,
New York State Dept. of Health, Albany. Radiological Sciences Lab.
C. Kunz, W. E. Mahoney, and T. O. Miller.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p. 229-234. 2 tab, 8 ref.

Descriptors: Industrial production, *Nuclear powerplants, *Effluents, *Gases, Carbon, *Assay, Assessment, Radioactivity, Toxicity, Public health, Analytical techniques, Gas chromatography, Oxygen, Nitrogen, Neutron absorption, Ecology.
Identifiers: *Carbon-14 gases.

Samples of decay tank gas and containment air were obtained from the three operating pressurized water reactors in New York State: the Ginna reactor in Rochester and Indian Point Unit 1 and Indian Point Unit 2 in Buchanan. These samples, taken over the past two years, were analyzed for carbon species by chromatographic separation. The 14C activity of the individual compounds was measured by gas proportional counting. In all the samples analyzed, CH4 and C2H6 contained over 80% of the 14C activity, with lesser activities observed for higher hydrocarbons and CO2. Although the fission product activity in gaseous effluents varied with fuel rod integrity, the production of 14C remained relatively constant. The results indicate that it is produced predominantly in the reactor vessel by the reaction of neutrons with nitrogen and oxygen in the primary coolant. The total yearly gaseous effluent of 14C for a 1,000 MWe pressurized water reactor is estimated to be approximately 6 Ci. (See also W75-04152) (Houser-ORNL)
W75-04171

MEASUREMENT OF ABSORBED FRACTIONS FOR PHOTON SOURCES DISTRIBUTED UNIFORMLY IN VARIOUS ORGANS OF A HETEROGENEOUS PHANTOM,
Oak Ridge National Lab., Tenn.
S. M. Garry, P. S. Stanbury, and J. W. Poston.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 251-258. 2 fig, 3 tab, 10 ref.

Descriptors: Research and development, *Model studies, *Research facilities, Mathematics, *Measurement, Absorption, Radioactivity effects, Food chains, Water, Milk, Foods, Cesium, Cobalt.
Identifiers: *Dose, Phantom.

A physical representation of the Snyder-Fisher mathematical phantom has been designed and constructed. The physical phantom contains skeletal components, lungs, and soft-tissue regions similar to the mathematical Snyder-Fisher phantom. The phantom is suitable for studies of radiation distributions involving both internally and externally applied radiation fields. The phantom and its composition are described. Dose distributions were measured within the phantom resulting from photon emitters distributed uniformly in selected organs. These distributions were used to calculate absorbed fractions for the mathematically defined phantom organs. These absorbed fractions are given and compared with the absorbed fraction estimates by Snyder, et al. In general, estimates of the absorbed fractions, obtained experimentally, fall within the range of twice the standard deviation of the calculated value. (See also W75-04152) (Houser-ORNL)
W75-04173

DECAY SCHEME DATA FOR RADIATION DOSE CALCULATIONS,
National Environmental Research Center, Las Vegas, Nev.
B. J. Mann.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 259-266. 1 fig, 1 tab, 14 ref.

Descriptors: Nuclear powerplants, Effluents, *Radioactivity, Radioactivity effects, *Human population, Toxicity, Public health, Safety, Evaluation, Radioisotopes, Research and development, Research facilities.
Identifiers: *Dose calculations, Decay schemes.

Safety and environmental impact assessments of nuclear projects include calculations of expected radiation doses to individuals and population groups under a variety of circumstances. These calculations require detailed decay data from all individual radionuclides of interest. These data include half-lives or decay constants, decay modes and branching ratios, and energies and absolute intensities of all radiation emitted. A compilation of radiation energies and absolute intensities from the decay of radionuclides produced in light water power reactors has been initiated. This is primarily based on data provided by the Lawrence Berkeley Table of Isotopes Project and, to a lesser extent, on the publications of the Oak Ridge Nuclear Data Project. This effort has encountered a number of difficulties in development of a complete file of the best values for each of the decay parameters. These Problems are discussed and data needs for dose computations are examined. It is proposed that a comprehensive, computerized decay data file be developed and maintained by a qualified group or organization. (See also W75-04152) (Houser-ORNL)
W75-04174

THE EFFECT OF DEPOSITION VELOCITIES ON ESTIMATES OF ENVIRONMENTAL TRANSPORT AND POPULATION DOSES,
Oak Ridge National Lab., Tenn.
R. E. Moore, and S. V. Kaye.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 283-288. 2 tab, 6 ref.

Descriptors: *Nuclear powerplants, Nuclear reactors, *Effluents, *Environment, Meteorology, *Ion transport, *Radioactivity, Assessment, Evaluation, Velocity, Food chains, Radioisotopes, Public health, Research and development, Sites.
Identifiers: Particles, Deposition, Population exposure, Doses.

Uncertainties in values used for deposition velocities of particulate radionuclides released to the atmosphere by nuclear facilities have led to uncertainties in estimated population doses. A computer study of 33 radionuclides, assumed to be released as particles from a liquid metal fast breeder reactor (LMFBR) fuel reprocessing plant, was designed to evaluate the sensitivity of estimated doses to selected values for deposition velocities. Deposition velocities were varied from 0.1 to 10 cm/sec, which is approximately the range found in the literature for the few measurements that have been reported. Atmospheric dispersion from a 100-meter stack was estimated for the average annual meteorological conditions of 18 reactor sites in the United States. A uniform population distribution within a 50-mile radius of the plant was assumed. Increasing the deposition velocity increases the dose through ingestion of food produced in the area and the dose through exposure to contaminated land surfaces, but decreases the inhalation and immersion doses. The deposition velocity for each radionuclide was determined to give the average of the minimum and maximum doses (for whole body and for reference organs) computed over the range of deposition velocities used in this

study. Nearly all of the values fall within the range 0.7 to 1.35 cm/sec, with most close to 1 cm/sec. The use of these values assures that doses would not be underestimated by more than 50%. The uncertainties for whole body dose range from plus or minus 4 to plus or minus 99%; the majority is greater than plus or minus 80%. Uncertainty limits for a total facility release can be assigned by weighting dose uncertainties for the specific radionuclides by their release rates to the environment. (See also W75-04152) (Houser-ORNL)
W75-04177

LOW LEVEL POPULATION EXPOSURE MEASUREMENTS USING THERMOLUMINESCENT DOSIMETERS,
Eastern Environmental Radiation Facility, Montgomery, Ala.
J. E. Partridge, J. A. Broadway, S. T. Windham, and C. R. Phillips.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 289-296. 4 fig, 2 tab, 7 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, Measurement, *Assay, Assessment, Human population, On-site data collections, On-site investigations, On-site tests, Evaluation, Standards, Instrumentation, Meteorology.
Identifiers: *Dosimetry, *Population exposure, Thermoluminescence dosimetry, Stack releases.

The Eastern Environmental Radiation Facility's (EPA) experience with calcium fluoride:manganese thermoluminescent dosimeters (TLD) is described. The information gained from earlier laboratory studies was applied to a thorough field evaluation of this type dosimeter. The objective of this field evaluation was to determine the usefulness of this TLD for making population exposure measurements in the range of proposed 10CFR50, Appendix I, limits. The results of a ten month investigation at an operating boiling water reactor site are given. Simultaneous TLD and pressurized ionization chamber measurements were made at several locations near the site boundary for the length of the study. The integrated exposure as recorded by the TLD is compared with the results obtained using ionization chambers. The TLD measurements are also compared to mathematical predictions for each site. The mathematical predictions were made using the AIREM code and plant supplied stack release and meteorological data. (See also W75-04152) (Houser-ORNL)
W75-04178

FIELD TESTING OF TSEE DOSIMETERS FOR PERSONNEL MONITORING,
Oak Ridge National Lab., Tenn.
R. B. Gammage, J. S. Cheka, and N. Saheli.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 297-304. 4 fig, 3 tab, 11 ref.

Descriptors: *Monitoring, *On-site tests, *Instrumentation, *Radioactivity, On-site data collections, Evaluation, Assessment, Research and development.
Identifiers: *Dosimeters, *Dosimetry, Personnel monitoring, Comparison, Ion chamber, Film, Thermoluminescence.

Generally successful field tests using thermally stimulated exoelectron emitting (TSEE) type dosimeters for personnel monitoring have been conducted for periods of between one day and one year and at exposures of gamma radiation ranging from essentially background level to about 100 mR/day. Performance is less satisfactory during the hottest and most humid weather of the year in Tennessee when fading is significant during three-month long exposures. Comparison with data from film, TLD and ionization chambers is satisfactory taking into account the variety of filter and absorber thicknesses used. A superior performance by the TSEE dosimeters is indicated where weaker penetrating radiations are present. The energy and angular dependence characteristics are very favorable for the purposes of X- and y-ray dosimetry. For the task of personnel monitoring, the following have been developed: a manual reader with good reproducibility for semi-routine use, a lightproof badge, and sensitive but stable BeO ceramic dosimeters. (See also W75-04152) (Houser-ORNL)
W75-04179

COMPARATIVE POPULATION RADIATION DOSE COMMITMENTS OF NUCLEAR AND FOSSIL FUEL ELECTRIC POWER CYCLES,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-04181

POPULATION EXPOSURE FROM HIGH-ENERGY ACCELERATORS,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5C.
W75-04183

ESTIMATION OF THE DOSE EQUIVALENT TO THE U.S. POPULATION FROM RADON IN LIQUIFIED PETROLEUM GAS,
Texas Univ., Houston. School of Public Health.
T. F. Gessell.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 347-354, 3 tab, 15 ref

Descriptors: *Radioactivity, *Measurement, *Radon, *Gases, *Natural Gas, *Human population, Public health, Estimating.
Identifiers: Doses, Estimating, Population exposure, Demography, Census, Dosimetry

Previous publications of the radiological health aspects of 222Rn in liquified petroleum gas (LPG) have reported measurements of 222Rn concentrations in LPG at the consumer level in 14 states and estimates of the resulting dose equivalents to the bronchial epithelium of individuals under hypothetical circumstances. In this paper the measured 222Rn concentrations in LPG are incorporated with information on the production and distribution of LPG to estimate an average 222Rn concentration in LPG for each state. These estimates, together with weather, demographic, and LPG consumption data are used to estimate the population dose equivalent to the bronchial epithelium of the general population from this source of 222Rn. The results are compared with the estimated population dose equivalent due to 222Rn in natural gas and due to 222Rn present naturally in the atmosphere. (See also W75-04152) (Houser-ORNL)
W75-04184

RADIATION DOSE FROM NATURAL GAS VS. THAT FROM NUCLEAR STIMULATED NATURAL GAS,
Georgia Inst. of Tech., Atlanta. Office of Interdisciplinary Programs.
M. W. Carter, and A. A. Moghissi.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 355-360, 1 tab, 10 ref.

Descriptors: *Radioactivity, *Radiation, *Radon, *Gases, *Tritium, *Krypton, Natural resources, *Natural gas, Consumptive use, Human population, Public health, Secondary recovery(Oil).

Natural gas contains radon and its daughter products which contribute to the population dose. Nuclear stimulated gas may also contain tritium and krypton-85 as contaminants. It is possible to compare radiation dose from radon with that from tritium and krypton-85 using various methods. Results are described of such a comparison based on previous experiments with tritiated natural gas. (See also W75-04152) (Houser-ORNL)
W75-04185

LARGE SCALE NUCLEAR GAS STIMULATION: POPULATION DOSES ESTIMATED IN THE ENVIRONMENTAL ASSESSMENT OF CARBON-14 RELEASES,
Oak Ridge National Lab., Tenn.
P. S. Rohwer, C. J. Barton, and R. E. Moore.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 361-368, 1 tab, 15 ref.

Descriptors: *Secondary recovery(Oil), *Natural gas, *Radioactivity, *Radioisotopes, *Nuclear explosions, Carbon, Environment, Pollutants, Estimates, Assessment, Human population, Public health, Fossil fuels.
Identifiers: *Doses, *Carbon-14.

Carbon-14 is present principally as 14CO2 and 14CH4 in natural gas from wells stimulated with nuclear explosives. The 14CO2 probably would be removed and released to the atmosphere at a processing plant before the gas is introduced into a transmission system supplying users. The 14C present as 14CH4 and other 14C hydrocarbons will be released, also as 14CO2, at the point of gas combustion. The hypothetical situation considered is a model field of 1200 nuclearly stimulated wells developed over a 30-year period, each well releasing ultimately 2 Ci of 14C as 14CO2. Doses to individual gas users, to a local population, and to the world population were estimated. Inhalation of 14CO2 in home exposure to gas combustion products from an unvented kitchen range is estimated to result in an annual total-body dose to the resident of 0.005 millirem. The annual population dose due to 14CO2 inhalation estimated for 1.42 million people living within 50 miles of a gas processing plant is 0.06 man-rem, with a maximum individual dose of 0.01 millirem and an average of 0.00004 millirem. Assuming zero population growth, the resulting population dose commitment is 120 man-rems for the entire world. These estimated population dose commitments are shown to be less than 10% of the population doses received annually from natural 14C. The present rate of burning 14C-free fossil fuels results in a theoretical annual reduction in the specific activity of 14CO2 in the troposphere (Suess Effect) that is approximately 100 times larger than the calculated increase from annual development of 40 new nuclearly stimulated wells. (See also W75-04152) (Houser-ORNL)
W75-04186

PHILOSOPHY AND METHODOLOGY OF ASSESSMENT OF RADIATION DOSES TO POPULATIONS FROM COMBUSTION PRODUCTS OF PLOWSHARE NATURAL GAS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W75-04187

EXPOSURES TO FIVE TARGET HEALTH HAZARDS,
Occupational Safety and Health Administration, Washington, D.C.
F. H. Ryer.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 389-394.

Descriptors: *Public health, *Hazards, *Toxins, *Toxicity, *Measurement, Pollutants, Bioassay, Pathology, Lead, Inhibitors, Control, Asbestos

Cotton, Dusts, Carbon, Gases, Silica, On-site data collections, Air pollution, Water pollution.
Identifiers: Cotton dusts, Carbon monoxide.

A target health hazards program (THHP) initiated in January 1972 by the Occupational Safety and Health Administration, is described. The five substances singled out as target health hazards (asbestos, cotton dust, carbon monoxide, lead, and silica) are discussed in detail. The exposure potential is given for each substance as well as the method for measuring the concentration in air. Optimum measures for controlling or preventing each hazard are given. The number of inspections made in workplaces from the time of program inception to date is presented. In addition, the number of employees affected in THHP inspections, the number of measurements made of exposures, the number of samples taken, and the severity of exposures for each hazard are given. (See also W75-04152) (Houser-ORNL)
W75-04190

BIOMEDICAL EVALUATION OF LOW FREQUENCY (LONG WAVE) ELECTROMAGNETIC RADIATION ASSOCIATED WITH ELECTRIC POWER TRANSMISSION,
Illinois Univ. Medical Center, Chicago, Ill. School of Public Health.
For primary bibliographic entry see Field 5C.
W75-04191

AN EXAMINATION OF DESIGN PARAMETERS IN A FIELD STUDY FOR EXPOSURE EVALUATION,
Eastern Environmental Radiation Facility, Montgomery, Ala.
J. A. Broadway, J. E. Partridge, S. T. Windham, and C. R. Phillips.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 405-410, 1 fig, 2 tab, 4 ref.

Descriptors: *Monitoring, *Measurement, *Radioactivity, *Effluents, *Nuclear powerplants, Evaluation, On-site tests, Investigations, Design criteria, Predictions, Forecasting, Xenon, Public health.
Identifiers: *Population exposure.

Continuous exposure measurements over several months in the vicinity of an operating boiling water nuclear power reactor (BWR) plant and corresponding predictions for exposure during the same time period have been examined by several statistical tests. The purpose of these tests has been to quantitate parameters important in the experimental design of such investigations. Conclusions regarding the length of such studies and the number of field measurement sites required are presented. Field measurement of ground-level 133Xe gaseous concentration has been compared with predicted concentrations. Implications regarding the conversion from atmospheric concentration to exposure rates are discussed. Overall implications regarding the design of other such field studies are presented. The Eastern Environmental Radiation Facility (EERF) has conducted a field study in the vicinity of an operating boiling water reactor. Results from a validation study for an atmospheric dispersion code (AIREM) developed by the Office of Radiation Programs have been reported previously. The present investigation was performed to analyze these results for implications important in the experimental design of similar such studies. Standard statistical tests have been employed to aid decision making to maximize the productivity while minimizing redundancy and cost involved in field studies. (See also W75-04152) (Houser-ORNL)
W75-04192

POPULATION EXPOSURE TO NATURAL TERRESTRIAL GAMMA RADIATION AROUND SELECTED NUCLEAR POWER PLANT SITES,
EG and G, Inc., Las Vegas, Nev.
Z. G. Burson.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 411-420, 3 fig, 3 tab, 10 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Air pollution, *Water pollution, *Measurement, Public health, Surveys, Remote sensing, On-site tests, Sites, Environment, Soil contamination, Fallout, Population, Distribution, Solar radiation, Background radiation.
Identifiers: *Population exposure, *Dose rates.

The average dose rates from external penetrating natural terrestrial gamma radiation have been determined from airborne survey data for specific areas surrounding each of 20 nuclear power plants. This dose rate information has been combined with population distribution data to obtain the average tissue dose-equivalent rate per person. This evaluation covers 19,400 square miles, inhabited by 4.4 million people. Average dose-equivalent rates ranged from a low of 18 mrem/yr at Oyster Creek to 113 mrem/yr at Fort St Vrain. For 18 sites in the Northeastern and North-central United States the mean terrestrial dose-equivalent rate per capita was 46 mrem/yr, while the average without regard to population distribution was 43 mrem/yr. In comparison, cosmic ray levels for the 18 sites range from 29 to 32 mrem/yr for elevations from 0 to 1200 ft above sea level. (See also W75-04152) (Houser-ORNL)
W75-04193

ASSESSMENT OF PUBLIC RADIATION EXPOSURE IN THE VICINITY OF U.S. AEC SITES,
Division of Operational Safety (AEC), Washington, D.C.
C. G. Welty, Jr., and M. W. Tiernan.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 421-428, 1 fig, 8 tab, 6 ref.

Descriptors: *Monitoring, Environment, *Surveys, *Measurement, *Sites, *Radioactivity, Regulation, Standards, Public Health, Operations, On-site tests, Investigations, Path of pollutants, Effluents, Meteorology, Dispersion, Air pollution, Water pollution, Soil contamination, Human population.
Identifiers: Dose, *Population exposure.

There are 27 major AEC sites in the United States which handle or process radioactive materials in quantities to warrant the maintenance of a routine environmental monitoring and reporting program. In 1972 as part of this routine program, these sites made an annual assessment of the radiation dose to the public which could have resulted from operations conducted at the site. Actual measurements of radioactivity in the pathways of exposure close to man are used whenever possible, although for certain nuclides, like noble gases, estimates of dose are normally made using effluent and meteorological data, and appropriate dispersion equations. Estimates include (1) site boundary dose rates, (2) population dose, and (3) the whole-body 80 kilometer man-rem population dose. In 1973 estimated whole-body dose rates near the boundary of AEC sites ranged from less than 1 to about 30 mrem per year, or from less than 1 to about 6 percent of the radiation protection standard for an individual. The doses are dependent on the types of operations conducted at the particular site and often on the size of the site itself. The 80 kilometer man-rem estimates for all AEC sites ranged from less than 1 to about 195 man-rem per year, the maximum due primarily to tritium. (See also W75-04152) (Houser-ORNL)
W75-04194

MATHEMATICAL MODELLING AND IDENTIFICATION OF THERMAL POLLUTION IN STREAMS: A REVIEW PAPER,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 5B.
W75-04230

DATA COLLECTION AND ANALYSIS TECHNIQUES FOR GLOBAL MARINE POLLUTION STUDIES,
Department of the Environment, Ottawa, (Ontario). Marine Sciences Directorate.
T. S. Murty.
In: Water For the Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 295-306. 5 fig, 4 ref.

Descriptors: *Water pollution, *Oceans, *Pollutants, Water quality, *Data collections, Programs, Investigations, *Monitoring, Water quality standards, On-site investigations, Oceanography, Canada, United States, Foreign countries.
Identifiers: Sweden, Japan, Netherlands, France, United Kingdom, Federal Republic of Germany, Denmark, USSR.

The marine pollution monitoring programs of ten nations involved in major efforts in oceanography were briefly reviewed. Information was presented on the physical and chemical parameters that are routinely monitored in support of pollution and fisheries problems. The methods of analyses were briefly discussed and some examples of products were included. (See also W75-04213) (Humphreys-ISWS)
W75-04236

A SURVEY OF ORGANIC CARBON CONSTITUENTS IN NATURAL FRESH WATERS,
Minnesota Univ., Minneapolis. Dept. of Civil Engineering and Hydraulics.
For primary bibliographic entry see Field 5B.
W75-04252

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 5B.
W75-04254

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME I - SYSTEM DEFINITIONS STUDIES.
Aerojet Electrosystems Co., Azusa, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 482, $8.50 in paper copy, $2.25 in microfiche. Report No. CG-D-45-74, June 1973. 257 p, 68 fig, 35 tab, 21 ref, 1 append. DOT-CG-22,170-A.

Descriptors: *Monitoring, *Oil spills, *Remote sensing, Aircraft, *Mapping, *Instrumentation, *Radar, Measurement, Electronic equipment, Cameras, Oil pollution, Microwaves, *Infrared radiation, Regulation, Data processing, Evaluation, Surveys, Radio waves, Environment, Oceans, Weather, Telemetry, Tracking techniques.
Identifiers: Low light level television.

Details were provided of the prototype Airborne Oil Surveillance System (AOSS) design. The AOSS is a multisensor airborborne surveillance system configured to assist the Coast Guard in enforcement of antipollution legislation and assessment/clean-up of accidental spills. The surveillance system consists of (1) an X-band sidelooking

radar system for long-range ship detection and adverse weather oil spill mapping; (2) a 37 GHz passive microwave imaging system for adverse weather spill mapping and spill thickness approximation; (3) multispectral low light level TV system for spill identification, high resolution documentation, and violator identification; (4) a multichannel infrared line scanner for spill identification and discrimination; (5) a position reference system for legal and operational effectiveness; and (6) a real-time processor/display console for maximum operational effectiveness. (Humphreys-ISWS)
W75-04259

EXPERIMENTAL DATA FOR HYGIENIC STANDARDIZATION OF DIHYDROPEROXIDE META-DIISOPROPYLBENZE IN SURFACE WATERS, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 5C.
W75-04319

5B. Sources Of Pollution

PREDICTION OF RADIOISOTOPE CONCENTRATIONS IN FRESHWATER STREAMS,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
J. G. Seelye, and N. R. Kevern.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-238 892, $5.25 in paper copy, $2.25 in microfiche. Technical Report No 42, Institute of Water Research, Michigan State University, East Lansing, December 1974; PhD thesis. 120 p, 26 fig, 28 tab, 34 ref, 2 append. OWRT A-075-MICH(1). 14-31-0001-4022.

Descriptors: *Radioisotopes, Aquatic life, Ponds, Hazards, Zooplankton, Sediments, Fish, Stable isotopes, *Forecasting, Alkalinity, Dissolved oxygen, Hardness(Water), *Cesium, *Zinc radioisotopes, *Path of pollutants.
Identifiers: Isotope additions, 512 channel spectrometers, Sodium iodide, Thallium activated detectors, Alkalinity, Total solids, pH measurements, Diurnal oxygen measurements, Oxygen-temperature monitoring, Cs134, Zn65, Isotope transfer, *Specific activity concept.

Predictions of radioisotope concentrations in components of aquatic systems have been attempted using the specific activity concept, an approach that seems theoretically sound. A comprehensive examination of the specific activities of 134 Cs and 65Zn in the components of a freshwater system, over a 10 month period, was conducted to evaluate the specific activity hypothesis under applied conditions. This study was designed to provide comparisons of predicted and observed specific activities and to test the equivalence of specific activities between all components of the system. Four ponds were used. A prediction of specific activities was made using Pond 1 data. The distribution of stable Cs and Zn throughout the system was determined and predictions of specific activities, based on these distributions were made. The other three ponds served as controls or provided observed specific activities. Radioisotopes of Cs and Zn were added to the system and after a period of equilibration comparisons were made between predicted and observed specific activities in the water, zooplankton, fish, plants, and sediment. In all cases observed specific activities for both 134Cs and 65Zn were significantly different between components of the systems at the end of the study period. Predicted 134Cs and 65Zn concentrations were lower than observed concentrations for fish from Pond 1. This nonconservativeness is important where hazard assessments are being made. Problems with statistical comparisons of derived variables are discussed and considered in interpreting the results.
W75-03852

CONTROL METHODS FOR WASTE WATERS AND SOLUTIONS OF SPECIFIC SUBSTANCES (METODI DI CONTROLLO DI ACQUE DI SCARICO E SOLUZIONI DI SOSTANZE SPECIFICHE),
Stazione Sperimentale per la Cellulosa, Carta e Fibre Tessili Vegetali ed Artificiali, Milano (Italy).
L. d'Angiuro, and L. Vicini.
Industria della Carta, Vol 11, No 8/9, p 329-335, Aug-Sep, 1973. 3 fig, 7 tab, 12 ref. English summary.

Descriptors: *Pulp wastes, *Organic loading, *Water pollution sources, *Industrial wastes, *Chemical wastes, Discharge(Water), Waste water(Pollution), Organic compounds, Additives, Pulp and paper industry, Oxygen demand, Biochemical oxygen demand, Chemical oxygen demand, Surface tension, Polymers, Cellulose, Proteins.
Identifiers: Permanganate number, Carboxymethylcellulose, Cellulose ethers, Cellulose derivatives, Polyacrylic acid, Amides, Polyvinyl alcohol, Casein.

Studies are reported on measurements of the surface tension, permanganate-number, oxygen consumption, COD, and BOD of solutions of carboxymethylcellulose, polyacrylic acid, a degraded amide, casein, and polyvinyl alcohol in order to assess the pollution loads caused by these compounds when used as papermaking additives and discharged into waste-receiving waters. (Speckhard-IPC)
W75-03885

ACETYLENE REDUCTION (NITROGEN FIXATION) BY PULP AND PAPER MILL EFFLUENTS AND BY KLEBSIELLA ISOLATED FROM EFFLUENTS AND ENVIRONMENTAL SITUATIONS,
McGill Univ., Ste. Anne de Belleire (Quebec).
R. Knowles, R. Neufeld, and S. Simpson.
Applied Microbiology, Vol 28, No 4, p 608-613, October, 1974. 3 fig, 3 tab, 20 ref.

Descriptors: *Pulp wastes, *Nitrogen fixation, *Nitrogen fixing bacteria, Aerobic conditions, Anaerobic conditions, Azotobacter, Industrial wastes, Natural streams, Rivers, Lakes, Drainage systems, Sewage effluents, Microbial degradation, Water pollution sources, Wastes, Aquatic microorganisms, Aquatic bacteria.
Identifiers: Woodroom(Pulp mill), Acetylene, Bacillus, Klebsiella.

High rates of acetylene reduction (nitrogenase activity) were observed in woodroom effluent from a neutral sulfite semichemical pulp mill under aerobic and anaerobic conditions. Under aerobic conditions up to 644 nanomoles of acetylene/ml/hr were produced, while under anaerobic conditions the rate was up to 135 nanomoles of acetylene/ml/hr. Pasteurized effluent developed acetylene reduction activity when incubated under anaerobic but not under aerobic conditions. Activities were increased by the addition of 0.5-3.0% glucose or xylose. Enrichment and enumeration studies showed that nitrogen-fixing Azotobacter and Klebsiella were abundant, and nitrogen-fixing Bacillus was present. Of 129 isolates of Klebsiella from pulp mills, lakes, rivers, and drainage and sewage systems, 32% possessed nitrogen-fixing ability. (Witt-IPC)
W75-03892

AN ALARMING SYSTEM FOR HIGH-SOLIDS WHITE WATER,
For primary bibliographic entry see Field 5G.
W75-03901

WATER POLLUTION AND CONTROL,
Rivers House, Glasgow, (Scotland).
G. A. Best.
Journal of the Society of Dyers and Colourists, Vol 90, No 11, p 389-393, November, 1974. 4 tab, 16 ref.

Descriptors: *Textiles, *Water pollution control, *Legislation, *Water quality standards, Waste water disposal, Governments, Water pollution sources, Waste water treatment, Water pollution, Financing, Industries, Effluents, Bleaching wastes, Biological treatment, Water treatment, Water sources, Rivers, Europe, Pollution abatement, Waste treatment.
Identifiers: *Scotland.

The demand for clean water for industry and for domestic supply is increasing yearly. Many readily accessible supplies are fully exploited, and water authorities must now consider hitherto polluted rivers as possible future water sources. To meet the demand for clean water and for cleaner rivers which receive waste discharges, considerable expenditures will be required from both central and local governments and from industry for new water treatment plants. Legislation covering river pollution and waste water disposal in Scotland is described, and the particular problem of effluents from the textile industry is discussed. Previous studies have demonstrated that waste water from the textile industry can be treated by conventional biological and other techniques and be purified sufficiently to meet national and local water quality standards. (Witt-IPC)
W75-03915

KINETICS OF MICROBIOLOGICALLY MEDIATED TRANSFORMATIONS OF HEAVY METALS IN AQUATIC ENVIRONMENTS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
A. W. Lawrence.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 148, $3.25 in paper copy, $2.25 in microfiche. Completion Report, (1974). 12 p, 54 ref. OWRT A-038-NY(2), 14-31-0001-3532, 3832, 4032.

Descriptors: *Heavy metals, *Aquatic environment, *Water quality, *Management, *Mercury, *Zinc, *Wastes, Research, Environmental effects, Kinetics, Anaerobic conditions, Aerobic conditions, Waste water treatment, Toxicity, Reverse osmosis, Bibliographies, Environmental engineering.
Identifiers: Heavy metal removal, Metal finishing wastes, Biological sludges.

Research project accomplishments, and application of the results, are presented from a study to investigate the fate of heavy metals in the aquatic environment for purposes of developing quantitative models for engineering management of water quality. Mercury, the subject of recent intense interest, was studied first. Primary emphasis was placed on determining the kinetics of microbially mediated transformation of mercury under both aerobic and anaerobic conditions. In the latter phase of the project, a literature review was conducted on the process methodology of removal of metals other than mercury from aqueous wastes prior to environmental release. Results of this review are useful in estimating the potential problems associated with metals other than mercury. Also, an experimental study on the fate of zinc-enriched biological sludges in an aquatic environment was performed. Zinc was selected for this final study because it does not appear to be microbially transformed as is mercury and thus may represent a second pathway for metal distribution of immobilization in aquatic systems. (Bell-Cornell)
W75-03945

EFFECT OF SULFURIC ACID AND SULFUR DIOXIDE ON THE AGGREGATE STABILITY OF CALCAREOUS SOILS,
UArizona Univ., Tucson Dept. of Soils, Water and Engineering.

For primary bibliographic entry see Field 2G.
W75-03952

NITROGEN FIXATION BY BLUE-GREEN ALGAE-LICHEN CRUSTS IN THE GREAT BASIN DESERT,
Utah State Univ., Logan. Dept. of Soil Biochemistry and Microbiology.
R. C. Rychert, and J. Skujins.
Soil Science Society of American Proceedings, Vol. 38, No. 5, September-October, 1974. p 768-771, 3 tab, 5 fig, 17 ref.

Descriptors: *Deserts, *Nitrogen fixation, *Nitrogen, *Moisture availability, Shrubs, Temperature, Light, Ecosystems, Moisture, Arid climates, *Cyanophyta.
Identifiers: Blue-green algae-lichen crusts, Water potential.

The nitrogen fixation process of blue-green algaelichen in a desert ecosystem was examined. The acetylene reduction technique was used to measure nitrogen fixation under field conditions which were then compared to laboratory nitrogen fixation potentials. The blue-green algae crusts were forced to have a laboratory potential for nitrogen fixation ranging from 75 to 84 percent of N fixed ha -1/hour -1. Peak values in the field were only 13 to 18 percent of these values. Prediction is possible based on temperature during fall and rainy seasons when light and moisture are generally not limited. During the hot, dry months, moisture limits nitrogen fixation. Nitrogen fixation was reduced under desert shrub canopies possibly as a result of alleopathic effects by the shrubs. Despite the many factors limiting nitrogen fixation, blue-green algae-lichen crusts are an important aspect of nitrogen input into the desert shrub ecosystem. (Mastic-Arizona)
W75-03963

SHALLOW GROUND WATER IN SELECTED AREAS IN THE FORT UNION COAL REGION.
Geological Survey, Helena, Mont.
Open-file report, 1974. 130 p, 18 fig, 12 tab, 68 ref.

Descriptors: *Strip mines, *Montana, *North Dakota, *Wyoming, *Water pollution sources, Water levels, Hydrogeology, Water resources, Aquifers, Environmental effects.
Identifiers: Environmental impact.

Groundwater conditions and the possible effects of strip mining on shallow aquifers are considered for three priority areas in the northern Great Plains--the Gascoyne area in North Dakota, the Gillette area in Wyoming, and several subareas within the Birney-Decker area in Montana. The effects of mining will include: (1) localized disruption of the coal and overlying sandstone aquifers and loss of existing wells in the mined area; (2) drainage of clinker beds adjacent to the mined area; (3) drainage of the coal and overlying sandstone aquifers in an area around the mine; this effect will be most apparent along the strike of the beds in the immediate vicinity of the mine; (4) underlying aquifers in recharge areas should be little affected, but removal of coal and overburden might cause a small increase in upward leakage from underlying aquifers in discharge areas; (5) blasting and handling of the coal could increase nitrate and sulfate concentrations in mine waters. The most detrimental effect on the groundwater system may be contamination of the water resource by dissolved materials leached from the excavated overburden or spoils, which are used for mine backfill. Available data indicate that the leachate may contain several times more dissolved solids than water in the aquifers and also may contain harmful concentrations of trace elements, including heavy metals. (Knapp-USGS)
W75-03974

HYDROLOGIC DATA FOR 1973, BROWARD COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 3B.
W75-03976

LIMNOLOGICAL STUDY OF LAKE SHASTINA, SISKIYOU COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2H.
W75-03982

PRECONSTRUCTION ASSESSMENT OF BIOLOGICAL QUALITY OF THE CHENA AND LITTLE CHENA RIVERS IN THE VICINITY OF CHENA LAKES FLOOD CONTROL PROJECT NEAR FAIRBANKS, ALASKA,
Geological Survey, Anchorage, Alaska.
G. A. McCoy.
Water-Resources Investigations 29-74, November 1974. 84 p, 9 fig, 21 tab, 48 ref, 3 append.

Descriptors: *Water quality, *Rivers, *Reservoirs, *Alaska, Flood control, Dissolved oxygen, Arctic, Cold regions, Pre-impoundment, *Data collections.
Identifiers: *Chena River(Alaska).

Chemical and biological data were collected on the Chena and Little Chena Rivers, Alaska, from October 1972 through August 1973 to determine the water quality of these rivers prior to construction of the Moose Creek and Little Chena Dams. Chemical-quality measurements included conductivity, alkalinity, pH, dissolved oxygen, nitrogen and phosphorous species, dissolved iron, and biochemical and chemical oxygen demand. Biological measurements included a semiquantitative and qualitative assessment of benthic invertebrates, periphyton, and phytoplankton. The river is a typical clean-water subarctic stream with excellent water-quality characteristics. The chemical and biological water-quality constituents in the studied reach of the Chena and Little Chena Rivers are relatively uniform with the possible exception of iron and chemical oxygen demand which increase downstream. Productivity is low. The flora and fauna are diverse and characteristic of cold water streams high in dissolved oxygen and low in productivity. The construction and operation of the Moose Creek Dam probably will not appreciably alter the present water-quality conditions of the system except for possible temporary effects due to construction. (Knapp-USGS)
W75-03988

EFFECT OF SOIL MOISTURE REGIMES, PHOSPHORUS AND NITROGEN ON N AND P UPTAKE BY BARLEY (HORDEUM VULGARE L.),
Haryana Agricultural Univ., Hissar (India).
For primary bibliographic entry see Field 3F.
W75-03991

SOLID WASTE AND WATER QUALITY, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
J. A. Heidman, and D. R. Brunner.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1315-1317, June, 1974. 20 ref.

Descriptors: *Water quality control, *Leaching, *Solid wastes, Hydrogeology, *Groundwater, Landfills, Attenuation, Waste disposal, Pesticides, Alkalinity, Nitrogen, Mercury, Cadmium, Chromium, Chemical oxygen demand, *Path of pollutants, *Bibliographies, *Reviews.
Identifiers: Leachate attenuation, Antimony, Cyanogens.

The potential for groundwater pollution resulting from the land disposal of solid wastes has been reviewed. Leachate characteristics, leachate attenuation in soil, leachate pollution problems, site evacuation methodology, and new refuse processing and disposal methods which have a potential effect on groundwater quality were examined. Solid waste disposal as related to leachate production and groundwater pollution and consideration to design of landfills for leachate control were discussed. Toxicity and solubility of hazardous solid and liquid wastes were considered. Reduction, neutralization, recovery and disposal techniques recommended for waste streams containing pesticides, CN, Hg, As, Cr, Cd and miscellaneous organic and inorganic materials and nuclear materials were examined also. The hydrogeologic factors in consideration of the situating and design of landfills under climatic conditions in northeastern Illinois were discussed. Engineering techniques effective in control of production and migration of leachate are also examined with conceptual designs for landfills in four different hydrogeologic environments. An evaluation of sanitary landfills and factors influencing leachate production was made. Soil types, groundwater flow patterns, and leachate characteristics at a landfill site in use for 5 years were examined in detail. (Leibowitz-FIRL)
W75-04016

NITRATE AND CHLORIDE ACCUMULATION AND DISTRIBUTION IN FERTILIZED TILE-DRAINED SOILS,
Minnesota Univ., St. Paul. Dept. of Soil Science.
R. G. Gast, W. W. Nelson, and J. M. MacGregor.
Journal of Environmental Quality, Vol 3, No 3, p 209-213, July-September, 1974. 5 fig, 3 tab, 9 ref.

Descriptors: *Nitrates, *Chlorides, *Soils, *Tile drains, Loam, Fertilization, Soil treatment, Denitrification, Leaching, Corn(Field), *Minnesota, Distribution.
Identifiers: Webster loam, Waldorf silty clay, Nitrate loss.

Corn studies on tile drained Webster loam in Minnesota determined that annual N application up to 70 percent greater than N removed in grain is necessary for maximum yields. The purpose of the study was to establish the relative role of N incorporation into the soil organic matter and/or loss through denitrification, downward leaching, or tile drainage in the determination of the fate of this fertilizer-N added above that removed in corn grain. Accumulation of nitrate and chloride and their distribution were determined in Webster loam and Waldorf silty clay loam profiles after long term fertilization for continuous corn crops. Concentrations in the profiles were determined at 0.3 m depth intervals and increasing distances from the tile lines. (Leibowitz-FIRL)
W75-04022

A SUMMARY AND COMPARISON OF NUTRIENTS AND RELATED WATER QUALITY IN LAKES ERIE, ONTARIO, HURON, AND SUPERIOR,
Burlington (Ontario). Canada Centre for Inland Waters.
H. F. H. Dobson, M. Gilbertson, and P. G. Sly.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 731-738, May, 1974. 13 fig, 7 ref.

Descriptors: *Nitrogen, *Phosphorus, *Carbon, *Nutrients, Organic matter, Dissolved oxygen, Chlorophyll, *Great Lakes, Pollutant identification, Water pollution sources.
Identifiers: *Secchi depth, Chlorophyll a, Silicon.

A summary and comparison of the nutrients and water quality of the Great Lakes was conducted, based on the presence of dissolved nutrient elements, nitrogen as nitrate and ammonia, phosphorus as inorganic phosphate or soluble

reactive phosphate, silicon as reactive silicate, carbon as inorganic carbon, dissolved organic matter, the Secchi depth, chlorophyll a, particulate phosphate, and dissolved oxygen. Related water quality is described by a simple indexing system, based on some of these parameters. (Orr-FIRL)
W75-04027

THE TOXICITY OF 2, 3, 7, 8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN GUPPIES (POECILIA RETICULATUS PETERS),
Forest Service (USDA) Corvallis, Oreg. Forestry Sciences Lab.
For primary bibliographic entry see Field 5C.
W75-04028

THE COMPARATIVE MARINE GEOCHEMISTRIES OF LEAD 210 AND RADIUM 226,
Scripps Institution of Oceanography, La Jolla, Calif.
K. W. Bruland, M. Koide, and E. D. Goldberg.
Journal of Geophysical Research, Vol 79, No 21, p 3083-3086, July 20, 1974. 3 fig, 1 tab, 12 ref.

Descriptors: *Geochemistry, *Lead radioisotopes, *Radium radioisotopes, Sea water, Pacific Ocean, Water pollution sources, Productivity, Upwelling *Radioisotopes, Oceanography, Surface waters, Gulfs.
Identifiers: *Gulf of California.

Concentrations of 226Ra and 210Pb in the Gulf of California and eastern North Pacific seawaters are apparently governed by the extents of upwelling and the consequential biological productivities. In the highly productive Gulf of California surface water, the residence times of 226 Ra and 210 Pb are estimated at a few months and less than one month, respectively, based on the upwelling rates. (Leibowitz-FIRL)
W75-04029

SOLID WASTE DISPOSAL BY LAND BURIAL IN SOUTHERN INDIANA,
Indiana Univ., Bloomington.
D. B. Waldrip, and R. V. Ruhe.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 225, $5.25 in paper copy, $2.25 in microfiche. Purdue Univ. Water Resources Research Center, West Lafayette, Indiana, Technical Report No. 45, November 1974. 110 p, 24 fig, 32 tab, 62 ref. OWRT B-049-IND(1).

Descriptors: *Landfills, *Solid wastes, *Water quality, Surface waters, *Groundwater, Disposal, *Waste disposal, Surface runoff, Overland flow, Percolating water, Subsurface water, Perched water, Water table, *Indiana, Water pollution sources, *Path of pollutants.

Studies were made of selected landfills in Southern Indiana to determine their effect on ground and surface waters. The purpose was to define field models of the geohydrologic systems, determine ground and surface water movement, analyze changes in water quality, establish landfill criteria for protection of the water, and develop landfill site guidelines. On the three sites examined, landfill leachate was introduced into the ground and/or surface water. The level of contamination was dependent on an interrelation of the original topography, the initial soil sediment stratigraphy, the ground and surface hydrologic system, modification of the topography and stratigraphy, and nature and volume of waste. Recommendations for landfill site selection are made and include: use of upland and non-flooding areas, the highest elevation of the water table should be several feet below the base of solid wastes, underlying soil should have high exchange capacity, leachate lagoons should be used where surface runoff is a problem, rilling of soil cover, and ground water wells and surface water monitoring stations should be installed. A progress report is also presented on the organic compounds and carbon in ground water from landfill effluent. (Wiersma-Purdue)
W75-04035

SPRING AND FALL THERMAL BAR DEVELOPMENT IN LAKE SUPERIOR,
Michigan Technological Univ., Houghton. Dept. of Chemistry and Chemical Engineering.
D. W. Hubbard, and J. D. Spain.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 227, $3.25 in paper copy, $2.25 in microfiche. Completion Report, Institute of Water Research, Michigan State University, E. Lansing, December 1974. 20 p, 13 fig, 4 ref, append. OWRT A-071-MICH(1). 14-31-0001-4022.

Descriptors: Pollutants, Fluorescence, *Lake Superior, *Seasonal, *Temperature, Computer programs, *Thermometers, Measurement, Water pollution sources, Lakes.
Identifiers: Digital thermistor thermometer, *Thermal bars.

The thermal bar is a downwelling phenomenon which occurs parallel to the shore during the spring warming and the fall cooling of large temperate zone lakes. The thermal bar is of practical interest because it traps pollutants in the nearshore zone during certain seasons of the year. The fine structure of the Lake Superior thermal bar was studied during the spring and fall of 1974 with approximately 16 transects being made across the bar using a digital thermistor thermometer capable of 0.01 C accuracy in the vicinity of 4C. This equipment was designed at Michigan Technological University and represents the most accurate portable equipment available at this time. Data were plotted by computer using the SYMAP program. Natural fluorescence arising from land runoff was employed to distinguish between inshore and offshore water masses. This study has provided enough data to demonstrate that the thermal bar rivals the well-known thermocline as an agent in limiting the movement of water masses. The results suggest that the thermal bar is affected by a variety of factors such as shoreline configuration, depth, wind, bottom slope, and previous temperature history.
W75-04038

IRREVERSIBLE THERMODYNAMIC CONCEPT ON HYDROGEOCHEMICAL TRANSPORT SYSTEMS,
Nevada Univ., Reno. Desert Research Inst.
J. V. A. Sharp, and C. L. Carnahan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 254, $3.25 in paper copy, $2.25 in microfiche. Completion Report, January, 1975. 7 p, 9 ref. OWRT A-046-NEV(2).

Descriptors: Thermodynamics, *Thermodynamic behavior, Geochemistry, *Groundwater movement, *Path of pollutants, *Energy transfer, Heat transfer.
Identifiers: *Irreversible thermodynamics.

Accurate, useful interpretation of ground-water flow systems as mobilization and transportation agents for various chemical constituents is required for better understanding of the movement of chemical parameters (and contaminants) in the subsurface. In order to develop the most accurate means of modeling a ground-water flow system, irreversible thermodynamic theory is applied. Assembling and solving mathematical expressions relating chemical and thermal potentials to velocity of ground-water flow and incorporating time- and concentration-dependent expressions for rates of various types of reactions which alter chemical and thermal potentials and concentrations of dissolved constituents are explored. Using ground water as a closed system in which energy is interchanged with its surroundings through heat transfer and also as an open system which included mass interchanges were developed. Results show that the utilization of irreversible thermodynamics provides a consistent and unifying approach to the study of simultaneous, coupled, non-equilibrium processes affecting chemical mobilization and transport in ground-water systems. (Fallon-Nevada)
W75-04041

DEGRADATION IN GROUNDWATER AND MOBILITY OF HERBICIDES,
Nebraska Univ., Lincoln. Dept. of Agronomy.
C. W. Weidner.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 242, $4.75 in paper copy, $2.25 in microfiche. M.S. Thesis, June 1974. 69 p, 9 fig, 10 tab, 55 ref. OWRT A-024-NEB(2). 14-31-0001-4027.

Descriptors: Water quality, *Groundwater, *Herbicides, *Degradation(Decomposition), *Path of pollutants, Pesticide residues.
Identifiers: Atrazine, Alachlor, Butylate, Picloram.

Laboratory studies were conducted to determine the degradation rates for atrazine, alachlor, butylate and picloram stored in groundwater. A significant amount of herbicide degradation occurred over the duration of the experiment. The rate of degradation was dependent on chemical properties of the herbicide, concentration, storage temperature and to a lesser extent the source of the water samples. Butylate showed the largest amount of degradation followed by alachlor, atrazine and picloram respectively. The 0.072 and 0.72 ppmw concentration samples result in more degradation than the 10 ppmw concentration samples. The samples stored at 25C resulted in more degradation than the samples stores at 10C. Water samples from the Clay Center location showed more herbicide degradation than the other three water sources. While herbicide degradation in groundwater did occur, the rate was much slower than would be expected for the same herbicides in a soil medium.
W75-04045

LONG TERM TRENDS IN WATER QUALITY, LOWER HAW AND NEW HOPE RIVERS - 1966-1973,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
C. M. Weiss.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 232, $7.75 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Rept. No. 101, October 1974. 196 p, 1 fig, 14 tab, 16 ref, 3 append. OWRT A-056-NC(4). 14-01-0001-3533.

Descriptors: Water quality, *Biochemical oxygen demand, *Phosphorous, *Nitrogen, *Dissolved oxygen, *Monitoring, Forecasting, *Long-term planning, *North Carolina, Water pollution sources, Rivers.
Identifiers: Haw River(NC). New Hope River(NC).

A seven-year river sampling series of the lower Haw and New Hope Rivers, North Carolina, designed to establish their water quality profiles, has shown a level of quality generally associated with substantial pollution loads. However, in the main stem of the Haw at a point at the head of the arm of the proposed B. Everett Jordan Lake (New Hope Lake), oxygen and BOD5 quantities indicate that stabilization of oxygen-demanding materials and nitrification of nitrogenous substances have occurred. The total phosphorus concentration in the Haw River is several times that of control streams of the area and the total load of trans-

ported phosphorus (lbs/day) is approximately five times that of the New Hope River. Sharp changes in several water quality parameters were evident in a comparison of the period prior to 1970 and after 1970. These changes have been identified with an overall change in river runoff in the region, resulting from a shift in the pattern of dry to wet years. The change in water quality caused by variation in average runoff was substantial enough to mask any changes that may have occurred from variations in quantity of polluting substances introduced from upstream sources. This emphasizes the difficulty of establishing long-term trends based upon infrequent and short-term sampling series. (McJunkin-N.C. State)
W75-04046

THE DILUTION CAPACITY OF SMALL STREAMS IN SOUTH CAROLINA,
South Carolina Univ., Columbia. Dept. of Geology.
W. E. Sharp.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 231, $4.75 in paper copy, $2.25 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report Number 48, September 1974. 70 p, 1 fig, 3 tab, 4 ref. OWRT A-026-SC(7).

Descriptors: *Waste dilution, Mixing, *Path of pollutants, *South Carolina, *Maps, *Streams, Statistical methods, Rivers, *Classification, Topography.
Identifiers: *Santee River(SoCar).

Topographic and stream maps may be used to make preliminary estimates of the dilution capacity of rivers and small streams. Statistical work indicates that for rivers of South Carolina both area and link magnitude (M) of rivers (map scale = 1:500,000) are excellent predictors of discharge along the length of a river basin. The expected river discharges are: maximum 242 cfs/M, mean 34.5 cfs/M and minimum 6.4 cfs/M. Good estimates of small stream discharge were much more difficult to make and are not as reliable as river discharge. The greatest uncertainty here arises from the definition of a first magnitude stream (map scale = 1:24,000) as interpreted by the map makers. The newer maps tend to show more streams than do the older maps. This effect is particularly emphasized in areas where large numbers of farm ponds have been constructed. Reasonable preliminary discharge values are: maximum 152 to 176 l/sec/M (5.65 cfs/M); mean 8.5 to 21.7 l/sec/M (0.3 to 0.77 cfs/M); minimum 0.5 l/sec/M (0.018 to 0.12 cfs/M). In small stream basins, the down stream estimate of discharge can be obtained by using a gamma distribution law.
W75-04050

A CONTINUOUS FLOW KINETIC MODEL TO PREDICT THE EFFECTS OF TEMPERATURE ON THE TOXICITY OF WASTE TO ALGAE,
Utah Water Research Lab., Logan.; and Utah State Univ., Logan. Div. of Environmental Engineering.
For primary bibliographic entry see Field 5C.
W75-04052

BIOLOGICAL AVAILABILITY OF SEDIMENT PHOSPHORUS TO MACROPHYTES,
Wisconsin Univ., Madison. Water Chemistry Program; and Wisconsin Univ., Madison. Dept. of Soil Science.
W. C. Li, D. E. Armstrong, and R. F. Harris.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 269, $3.75 paper copy, $2.25 microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1974. 26 p, 3 fig, 6 tables, 18 refs. OWRT A-040-WIS(1). 14-31-0001-3550, 14-31-0001-3850.

Descriptors: Sediments, *Phosphorus, *Lake sediments, Nutrients, Rooted aquatic plants, Wisconsin, *Absorption, *Nutrient removal.
Identifiers: *Myriophyllum spicatum, *Macrophytes.

The quantity of available P in selected sediments was evaluated by measurement of the amounts of P removed from sediments by Myriophyllum spicatum L. grown in columns containing sediment as the sole P source and amended with other essential nutrients. The relationships between the amount of sediment inorganic P added, the yield and P content of the plants, and the uptake of sediment inorganic P were evaluated. Available P comprised from 12.3 to 17.2% of total sediment inorganic P for the eight lake sediments investigated. Relationships between P uptake by Myriophyllum plants (microg P/g of sediment) and the total Pi, nonoccluded Pi, and Total Exch Pi contents of sediments were evaluated. Correlation coefficients were 0.99, 0.98, 0.97, respectively for the dependent variables, namely, total Pi, nonoccluded Pi, and Total Exch Pi, indicating that each of these measurements provided a good index of available P in lake sediments. However, the uptake of sediment P by Myriophyllum plants arose mainly from the nonoccluded Pi fraction (NaOH-P in calcareous sediments and NH4F-plus NaOH-P in noncalcareous sediments), and most of the exchangeable inorganic P was contained in the nonoccluded Pi fraction, indicating that available P was obtained mainly from the exchangeable inorganic P fraction.
W75-04053

NUCLEAR METEOROLOGY,
Hydrometeorological Service of the USSR, Moscow.
Available from the National Technical Information Service, Springfield, Va. 22161, as TT-74-50011, $10.60 paper copy, $2.25 microfiche. Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk 1974. 387 p, 133 fig, 100 tab, 525 ref.

Descriptors: *Meteorology, *Nuclear energy, *Radioactivity, *Nuclear explosions, *Fallout, Air pollution, Water pollution, Soil contamination, Radioactive tracers, Aerosols, Rain, Raindrops, Geophysics, Instrumentation, Measurement, Radiochemical analysis.
Identifiers: *USSR.

The All-Union Conference on Nuclear Meteorology was held on 23-28 June 1969 at the Institute of Experimental Meteorology in the town of Obinsk. The following are the main topics discussed at the Conference: (a) Utilization of radioactive tracers in meteorological investigations; (b) global contamination of the atmosphere and fallout of radioactive products of nuclear blasts; (c) natural radioactivity of the atmosphere; (d) atmospheric scavenging of radioactive contaminants; (e) formation of radioactive contamination of the environment. Other questions relating to the accumulation of radioactive products of nuclear blasts on the earth's surface were also examined. (See W75-04055 and W75-04108) (Houser-ORNL)
W75-04054

VERTICAL DISTRIBUTION OF RADIOACTIVE AEROSOLS IN THE TROPOSPHERE OVER THE EUROPEAN USSR IN 1964-1967,
L. E. Nazarov, L. A. Volokitina, Y. I. Gaziev, A. F. Kuzenkov, and S. G. Malakhov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 1-16, 3 fig, 10 tab, 10 ref.

Descriptors: *Meteorology, Nuclear energy, *Nuclear explosions, *Radon, *Aerosols, Air pollution, Distribution, Radiation, Atmosphere.
Identifiers: *Troposphere, *Stratosphere, *USSR.

Data are given on the vertical distribution of the concentration of decay products of radon and aerosol products of nuclear blasts in the troposphere over the USSR in 1964-1967. Aerosynoptic analysis of cases of considerable growth and decrease in the concentration of fission products in the ground air layer in the vicinity of Moscow established that the drift of stratospheric aerosols into the upper troposphere takes place at the tropopause discontinuity or funnel at the cyclonic periphery of the jet. At ground level the radioactive spot appears most frequently beneath the anticyclonic periphery of the jet. Examination of the simplest theoretical models of the vertical concentration distribution of fission products and short-lived decay products of radon in the troposphere yields the coefficient of vertical turbulent diffusion k(sub z) and speed of vertical ordered motion Omega, whose values are given. (See also W75-04054) (Houser-ORNL)
W75-04055

DISTRIBUTION OF FISSION PRODUCTS OVER OCEANS IN THE TROPICAL ZONE AND THEIR RELATION TO ATMOSPHERIC PROCESSES,
G. V. Dmitrieva, Y. V. Krasnopevtsev, and S. G. Malakhov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 17-28, 7 fig, 9 ref.

Descriptors: *Meteorology, *Nuclear energy, *Radioactivity, *Atmosphere, Transport, *Oceans, Pacific Ocean, Indian Ocean, Tropical cyclones, Measurement, Latitudinal studies, Tropical regions, Distribution.
Identifiers: *Fission products.

New data (for the period 1967-1968) are examined regarding the latitudinal distribution of the concentration of fission products over oceans in different regions of the tropical zone. The data show that the air at sea level in the tropical zone over the Indian Ocean and the West Pacific in the considered period is very inhomogeneous as regards the content of radioactive products. This inhomogeneity was caused by the influx in the tropical zone of air with higher radioactivity from subtropical or moderate latitudes (winter hemisphere) after the passage in these latitudes of quasimeridional cold fronts. These incursions possibly contribute sometimes also to the formation of separate zones of convergence lines in the equatorial region. Under certain synoptic conditions, the air entering the equatorial region from extratropical latitudes at times crossed the equator and could be included in the circulation of the other hemisphere. The assumption is made that, after their transformation into deep wide cyclones, Pacific typhoons can contribute to the transport of air from the southern to the northern hemisphere. (See also W75-04054) (Houser-ORNL)
W75-04056

DETERMINATION OF RADIOISOTOPE FALLOUT FROM ITS CONTENT IN CHRONOLOGICAL LAYERS OF HIGH-ALTITUDE GLACIERS,
For primary bibliographic entry see Field 5A.
W75-04057

RADIOACTIVE ISOTOPES OF EUROPIUM PRODUCED BY NUCLEAR BLASTS,
For primary bibliographic entry see Field 5A.
W75-04058

SOME CHARACTERISTICS OF UPPER CLOUDS AND SUGGESTIONS REGARDING THE UTILIZATION OF RADIOACTIVE TRACERS IN MERIDIONAL FLOWS,
For primary bibliographic entry see Field 2B.
W75-04059

MEAN AND TURBULENT TRANSFER OF SUBSTANCES OVER THE USSR,
For primary bibliographic entry see Field 2B.
W75-04060

RATE OF ATMOSPHERIC FALLOUT OF CESIUM-137 AND STRONTIUM-90 AEROSOLS,
For primary bibliographic entry see Field 5A.
W75-04061

ACCUMULATION OF STRONTIUM-90 IN SOILS,
E. B. Tyuryukanova.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 61-66, 4 fig, 4 tab, 12 ref.

Descriptors: Meteorology, Nuclear energy, *Radioisotopes, *Nuclear explosions, *Fallout, *Air pollution, *Soil contamination, *Strontium, Distribution, Assay, Soil properties, Soil types, Sands, Loam, Humus, Physicochemical properties, Geochemistry.
Identifiers: Weapons testing, USSR.

A very uneven distribution of Sr-90 is observed in the soils of the Russian Plain. The content of this radioactive nuclide in sandy soils is lower than in loamy soils, and depends on the amount of soil humus and its qualitative composition. The accumulation of Sr-90 in soils is determined both by its physiochemical composition, and by the landscape and geochemical conditions. Of great importance is the character of the runoff. In most soils Sr-90 is concentrated in the upper layer (0-5 to 0-20 cm). (See also W75-04054) (Houser-ORNL)
W75-04062

CESIUM-137, STRONTIUM-90, AND LEAD-210 IN SOIL OF THE FAR NORTH REGIONS,
M. N. Troitskaya, M. S. Ibatullin, B. Y. Litver, A. N. Nizhnikov, and P. V. Ramzaev.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 67-71, 4 tab, 4 ref.

Descriptors: Meteorology, Nuclear energy, *Nuclear explosions, Fallout, *Cesium, *Strontium, *Lead, *Radioisotopes, *Soil contamination, Geographical regions, Migration, Physicochemical properties, Permafrost, Arctic, Snow cover, Plutonium, Assay, Radioecology, Absorption.
Identifiers: Far North, USSR.

The part played by soil in the pollution of subsequent links of the chain of natural and artificial radionuclides in regions of the Far North is considered. While a geographic variation exists of the levels of artificial contamination of the soils, the ratio of cesium-137 to strontium-90 in all regions remains between 1.3 and 1.6. Experimental data are given on the mechanism governing the contamination of lichen (the main fodder of reindeer) by natural and artificial nuclides. An analysis is given of museum samples (1900-1945), indicating the absence of any connection between the high levels of lead-210 in the North and nuclear tests. The levels of plutonium-239 content in the vegetation of some regions of the Far North are determined. (See also W75-04054) (Houser-ORNL)
W75-04063

COMPARATIVE DISTRIBUTION OF STRONTIUM-90 AND CESIUM-137 IN DIFFERENT TYPES OF SOILS,
E. I. Belova, and Z. G. Antropova.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 72-75, 3 tab, 4 ref.

Descriptors: *Meteorology, *Nuclear energy, *Radioisotopes, *Fallout, *Strontium, *Cesium, Distribution, Migration, Assay, *Soil types, Soil profiles, Geochemistry, Physicochemical properties.

Results are presented of investigations into the distribution of strontium-90 and cesium-137 along the profile of five types of virgin soil 10 years after their contamination. The investigations were conducted under natural conditions on artificially contaminated plots of sod podzolic, gray forest, leached chernozem, meadow solod and solonchak soils. By the tenth year some characteristic features are observed in the distribution of the investigated radioisotopes along the profile of different types of soils. The influence of the forest cover on the migration rate and distribution of radioisotopes along the soil profile is noted. The soils are arranged in the following series according to the content of cesium-137 in the upper layer (0-4 cm): meadow solod < gray forest < solonchak < leached chernozem. The series for strontium-90 content is as follows: meadow solod < sod podzolic < solonchak < gray forest < leached chernozem. (See also W75-04054) (Houser-ORNL)
W75-04064

DISTRIBUTION AND MIGRATION OF STRONTIUM-90 IN SOILS,
L. I. Gedeonov, S. P. Rosyanov, and V. K. Vinogradova.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 76-84, 5 fig, 4 tab, 5 ref.

Descriptors: *Radioactivity, *Fallout, *Strontium, Assay, *Soil profiles, Migration, Distribution, Soil types, Physicochemical properties, Analytical techniques, Diffusion, Radiochemical analysis, Sands, Loam.

Results are given of a study of Sr-90 distribution along soil profiles. These data can be used in an attempt to study the mechanism of Sr-90 migration in soil. Soil samples taken at depths down to 30 cm were subjected to radiochemical analysis for Sr-90. Sr-90 in 1964-1965 was mainly retained in a 15-cm soil layer. Measurable amounts of Sr-90 were found in the 25-30-cm layer. The distribution of Sr-90 along the profile of loamy soils can be described in a first approximation by a power law. Calculations with its aid show that Sr-90 penetrates deeper than 40-60 cm. The motion of radioactive fission products inside the soil cover involves a combination of different physicochemical processes in the soil, the most important of which are Sr-90 migration by diffusion and isotope migration together with the soil solution. The vertical distribution of Sr-90 in soils resulting from diffusion alone was calculated with the aid of the coefficients found. Comparison of the calculated distribution of Sr-90 with the distribution obtained by radiochemical determination of Sr-90 showed that in loamy chernozem Sr-90 migrates mainly by diffusion. In sandy sod podzolic soil this process is of the same order as the others. (See also W75-04054) (Houser-ORNL)
W75-04065

HORIZONTAL WATER MIGRATION OF STRONTIUM-90,
I. G. Vodovozova.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 85-87, 1 fig, 1 tab, 5 ref.

Descriptors: Meteorology, *Radioisotopes, *Strontium, Fallout, *Snow, *Melt water, *Assay, Movement, Cations, Migration, Soil contamination, Water pollution, Leaching, *Path of pollutants.

During spring snowmelting, radioactive strontium deposited on the earth's surface participates with melted snow in migration processes. Data are presented on the physicochemical state of strontium-90 migrating with water; 73% of strontium-90 falling with snow is in cationic form. Atmospheric precipitation is deposited in the soil, participates in the migration processes, and subsequently leaches mainly soluble strontium-90 from the soil and its proportion in cationic form in the melted snow and river water increases to 100%. Existing in an easily mobile cationic form, strontium-90 is discharged in the river together with floodwaters. (See also W75-04054) (Houser-ORNL)
W75-04066

FORMATION OF RADIOACTIVE PARTICLES DURING NUCLEAR BURSTS IN THE TROPOSPHERE,
Y. A. Izrael', and A. A. Ter-Saakov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 88-94, 8 ref.

Descriptors: Meteorology, *Nuclear energy, *Nuclear explosions, *Aerosols, *Radioisotopes, Zirconium, Lanthanum, Yttrium, Thermal radiation, Thermodynamic behavior, Equilibrium, Thermodynamics, Temperature, Sorption, Solids, Clouds, Particle size, Condensation, *Model studies.

A theoretical model of aerosol radioactivation in the fireball of a nuclear burst is examined. Formulas are derived for the distribution of the radioactivity of isotopes on the aerosol particles as a function of particle radius. Three mechanisms of particle radioactivation are treated. In the first case, condensation of radioactive isotope vapors occurs at temperatures higher than the vaporization temperature of the soil particles (approx. 2300 C), i.e., under conditions far removed from thermodynamic equilibrium. Such is the case for isotopes of zirconium, lanthanum, yttrium, and other refractory elements. In the second case the condensation of radioisotopes occurs on the surface of fused soil particles, i.e., under conditions of thermodynamic equilibrium (in the temperature range 2300-1400 C). In the third case aerosol activation is determined by radioisotope sorption on the surface of solid particles. Such is the case for isotopes which have gaseous precursors with half-decay periods from tens of seconds to several minutes (Sr-89, Sr-90, Cs-137, Ba-140). The influence of the precipitation of large particles from a cloud at the moment of radioactivation is taken into account. (See also W75-04054) (Houser-ORNL)
W75-04067

CALCULATION OF FRACTIONATION EFFECTS IN ATMOSPHERIC NUCLEAR BURSTS,
Y. A. Izrael'.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 95-100, 3 fig, 6 ref.

Descriptors: Meteorology, *Nuclear energy, *Nuclear explosions, Theoretical analysis, *Distillation, *Radioactivity effects, *Thermodynamics, Liquids, Gases, Tellerium, Strontium, Cesium, Mathematics
Identifiers: Isotopic fractionation, Raoult's Law, Isotopic fractionation.

A theoretical calculation is given of the coefficients of fractionation of radioactive isotopes in aerosols, formed during nuclear bursts. The calculations are conducted on the assumption of thermodynamic equilibrium between the liquid and gaseous fractions with the utilization of Raoult's law. The results are given of the calculation of the fraction of radioactive isotopes of the most important mass chains condensing on the aerosols as a function of the time after the burst. Also calculated are the coefficients of fractionation fi. 95 for the isotopes Te-132, Sr-90, Sr-89, and Cs-137 in the form of functions of particle radius (the time of particle solidification is 7 sec). The calculations are performed for the nearest trace of the surface blast. The derived theoretical correlation curve of fractionation of the series of isotopes agrees satisfactorily with measurements of isotope fractionation at the nearest trace of the 'Small Boy' low-strength American nuclear explosion. (See also W75-04054) (Houser-ORNL)
W75-04068

THE ATMOSPHERIC FORMATION OF SECONDARY AEROSOLS DURING VENTILATED UNDERGROUND NUCLEAR TESTS,
V. N. Petrov, and A. A. Ter-Saakov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 101-103, 3 ref.

Descriptors: *Model studies, Meteorology, *Nuclear energy, *Nuclear explosions, Underground, *Radioactivity, Radioisotopes, Soil contamination, Air pollution, Krypton, Xenon, *Aerosols.

In underground nuclear tests, some radioactive products may be discharged into the atmosphere through excess pressure or ventilation due to the destruction of rocks in the test area and the formation of cracks near to ground level. The direct outflow into the atmosphere of nongaseous radioactive products is hardly probable, due to their sorption in the subsoil rock layer. It is therefore natural to assume that, in the main, chemically inert gases (such as the isotopes of krypton and xenon) are discharged into the atmosphere. The appearance of nonvolatile radioisotopes in the atmosphere can be associated with the decay of radioactive gases, which are the precursors of such isotopes in the corresponding chains of radioactive transformations. Nongaseous radioisotopes formed in the atmosphere are deposited on atmospheric dust particles and form so-called 'secondary' aerosols. A model of the atmospheric formation of the decay products of gaseous radioisotopes during underground nuclear tests is examined. (See also W75-04054) (Houser-ORNL)
W75-04069

SIZE DISTRIBUTION OF HIGH-ACTIVITY PARTICLES IN THE TROPOSPHERE IN SEPTEMBER-DECEMBER 1967,
Y. I. Gaziev, S. G. Malakhov, and L. E. Nazarov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 104-110, 4 fig, 1 tab, 18 ref.

Descriptors: *Meteorology, *Nuclear energy, *Nuclear explosions, Testing, *Aerosols, Radioactivity, Particle size, Distribution, Distillation, Cerium, Ruthenium, Zirconium, Stratosphere, Troposphere, Fallout.
Identifiers: *Isotopic fractionation.

High-activity particles of artificial radioactive aerosols were observed in the troposphere in September-December 1967. The 'age' of the aerosols at the beginning of the observation period was approx. 2.5 months. Radioactive particles of diameter d > or = 0.9 microns were investigated. According to the results obtained in the ground layer of the atmosphere and the upper troposphere, the integral and differential size distribution of these particles was exponential for d > or = 0.9 microns. On the average for the troposphere the exponent was equal to 1.4 plus or minus 0.2 d/micron. For radioactive particles of diameter between 2 and 6 microns, the fractionation coefficients of the isotopes Ce144, Ce141, and Ru103 were determined with respect to Zr95. The values of these coefficients were roughly the same as those given earlier in the literature for micron particles of atmospheric nuclear blasts. The time of residence in the stratosphere particles of diameter between 2.5 and 6 microns was roughly 4.5 months. The scavenging rate of radioactive particles of micron size (d = 1-6 microns) in the lower troposphere was close to 2km/day. (See also W75-04054) (Houser-ORNL)
W75-04070

STATE OF STRONTIUM-90, CESIUM-137, AND CERIUM-144 IN RADIOACTIVE FALLOUT,
F. I. Pavlotskaya, R. Surotkevichiene, and G. P. Levina.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 111-117, 1 fig, 3 tab, 14 ref.

Descriptors: Meteorology, Nuclear energy, *Radioactivity, *Radioisotopes, *Fallout, Chemical properties, Chemical reactions, Solvents, *Strontium, *Cesium, *Cerium, Cation absorption, Anion adsorption, Ion exchange.

Investigations into the state and chemical form of existence of Sr90, Cs137, and Ce144 in global fallout during 1958-1968 are described. Substantial differences are shown between the soluble and insoluble fractions in the distributions of the different radionuclides. Independently of the geographical location of the observation stations, the decreasing soluble fraction in the indicated period is preserved in the sequence Sr90 > Cs137 > Ce144, the values being on the average 78, 62, and 16%, respectively. The radionuclides in the insoluble fraction possess different mobilities. When treating the insoluble remainder by 1 N CH3COONH4 and 1N HC1, more than 90% of the Sr90 and up to 65-70% of the Cs137 and Ce144 pass into the solution. The latter indicates that most of the radionuclides in the insoluble fraction are in exchange and mobile states, and not in the form of slightly soluble compounds (such as Ce02). In a soluble state, the radionuclides are present in cationic, anionic, and neutral forms. The ratios between the latter are different in the various radionuclides. The distribution between these three forms is 90, 6, and 4% for Sr90, 72, 16, and 12% for Cs137, 55, 18, and 27% for Ce144. Acertain trend is observed toward an increase in the relative fraction of Sr90 and Cs137 in anionic form and a decrease in the fraction in neutral form during the winter compared with the summer period. (See also W75-04054) (Houser-ORNL)
W75-04071

SOME THEORETICAL NOTIONS OF RADIOACTIVITY ACQUISITION BY RAINDROPS,
A. S. Avramenko, and K. P. Makhon'ko.
In: Nuclear Meteorology, Preceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 118-132, 8 fig, 21 ref.

Descriptors: *Meteorology, *Nuclear energy, *Absorption, *Raindrops, *Radioactivity, Precipitation(Atmospheric), Clouds, Air circulation, Size, Distribution, Nuclear explosions, Aerosols, Transmissivity, Fallout, Dusts, Scavengers.

An approximate model is given of the acquisition of radioactivity by raindrops during their formation and precipitation from a cloud. The process taking place in a cloud with ordered ascending currents, leading to the size distribution of the specific radioactivity of raindrops observed on the earth, is examined. Comparison of theoretical calculations of the concentrations of the products of nuclear bursts in raindrops of different sizes with experimental data enabled us to determine the value of the coefficient of radioactive aerosol-particle washout by cloud-borne droplets and to establish the existence of an inverse relationship between the concentration of nuclear burst products in cloud-borne droplets and their radius. This relationship is near-inverse for raindrops. The obtained size distribution of the specific radioactivity of raindrops can lead to an increase in the specific radioactivity of rainwater at the end of brief showers due to the decrease in raindrop size. (See also W75-04054) (Houser-ORNL)
W75-04072

DISTRIBUTION OF RAINDROPS WITH RESPECT TO SPECIFIC RADIOACTIVITY,
For primary bibliographic entry see Field 2B.
W75-04073

APPLICATION OF THE STOCHASTIC APPROACH TO THE PROBLEM OF THE RADIOACTIVITY OF RAINDROPS AND CLOUD-BORNE DROPS,
A. S. Avramenko.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 137-145, 1 fig, 13 ref.

Descriptors: *Meteorology, *Nuclear energy, *Radioactivity, *Raindrops, *Statistical models, *Stochastic processes, Mathematics, Distribution, Clouds, Rain, Size.

An attempt is made to apply the stochastic approach to the problem of the radioactivity of raindrops and cloud-borne drops. A general system of equations is written with which to calculate the distribution function of the cloud-borne drops with respect to activity for the radioactive series of natural decay products in elemental state. A steady solution is given for the case when the concentrations of the preceding elements of the radioactive series can be neglected. The obtained distribution is used to derive a relationship between the number of nonradioactive raindrops and their size. The theoretical relationships and published experimental data are in satisfactory agreement. (See also W75-04054) (Houser-ORNL)
W75-04074

COMPARISON OF THE CHARACTERISTICS OF HYGROSCOPIC AND NON-HYGROSCOPIC AERSOL WASHOUT BY CLOUD-BORNE DROPS,
I. I. Burtsev, and L. V. Burtseva.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 146-153, 4 fig, 2 tab, 11 ref.

Descriptors: *Meteorology, Nuclear energy, *Radioactivity, *Fallout, *Raindrops, *Aersols, *Hygroscopic water, Moisture, Adsorption, Distribution, Particle size, Raindrops, Physical properties, Comparative productivity, Radioisotopes.

Washout by cloud-borne drops of aerosol of size 0.1-0.5 microns is examined as a function of its hygroscopicity. Radioactive hygroscopic P2(to the 32nd power)05 and non-hygroscopic Sr89CO3 aerosols were investigated and their washout characteristics compared. On the basis of an experimental comparison of the characteristics of the capture of aerosol of the same disperse group, but with different physical properties, that the hygroscopicity of the aerosol substantially affects its behavior in a cloud medium. The capture efficiency of hygroscopic aerosol is twice that of nonhygroscopic aerosol. (See also W75-04054) (Houser-ORNL)
W75-04075

ATMOSPHERIC WASHOUT OF RADIOACTIVE CONTAMINANT IN THE MOUNTAINS OF CENTRAL CAUCASUS,
A. S. Avramenko, and K. P. Makhon'ko.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 154-165, 4 fig, 3 tab, 22 ref.

Descriptors: *Meteorology, *Nuclear energy, *Radioactivity, *Fallout, *Rain, Measurement, Altitude, Clouds, Atmosphere, Dusts, Assay, Precipitation(Atmospheric), Snow, Air circulation, Velocity, Sampling, Radon.
Identifiers: Specific radioactivity.

The coefficient Sigma of radioactive dust washout from the subcloud layer of the atmosphere was determined by measuring the contaminant concentration in precipitation at two different altitudes in 1968-1969 in mountains. The mean value of Sigma for the products of nuclear bursts in steady rain was 3 times 10(-5) sec(-1); for showers Sigma is roughly twice as large, and for snows five times as large. Measurements during steady rain for upslope and downslope winds enabled us to estimate the mean speed of the ascending air currents, found to be approx 0.6 m/sec. With increase in precipitation intensity I the value of Sigma decreases rapidly at first, passes through a

minimum when I approx. 1 mm/hr, and then increases. Vertical air currents affect the obtained relationship. When measuring Sigma for short-lived decay products of radon, samples were taken simultaneously at two altitudes, a radiotelephone being used to ensure simultaneity. Due to the brief sampling time of rapidly decaying samples, the influence of fluctuations in the concentration of natural radioactivity in precipitation (C) and in air (q) and fluctuations in precipitation intensity was so large that it was not possible to determine Sigma for rains; for snow Sigma approx 9 times 10(-5) sec (-1) with a 95% error. Similarly, from the results of 313 observations no time-dependence was detected of the specific radioactivity of precipitation (C) against the background of the large fluctuations in the measured quantity. (See also W75-04054) (Houser-ORNL)
W75-04076

UTILIZATION OF NATURAL RADIOACTIVE SUBSTANCES IN THE STUDY OF TURBULENT EXCHANGE AND ATMOSPHERIC SCAVENGING BY MEANS OF GROUND MEASUREMENT,
V. N. Bakulin, E. E. Sen'ko, B. G. Starikov, and V. A. Trufakin.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 166-172, 2 fig, 14 ref.

Descriptors: *Meteorology, *Radioactivity, Winds, *Thoron, *Lead, Measurement, Atmosphere, Fallout, Anticyclones, Precipitation(Atmospheric), Rain, Aerosols, Transmissivity, Uniformity coefficient, Research and development, *Turbulence.
Identifiers: *Troposphere, *Stratosphere, *Inversion.

On the basis of round-the-clock measurements of the exhalation of thoron and the concentrations of thoron and Pb212 (ThB) at heights of 1 and 5 m, mean values were obtained of the growth rate of the turbulence coefficient with height in a summer anticyclone, equal to 5-10 cm/sec by day and about 3 cm/sec at night. These data enable one to evaluate the mean value of the turbulence coefficient in the lower km layer of the troposphere with the aid of ground measurements. Unlike thoron and Pb212(ThB), radon cannot be considered as existing in quasi-steady conditions, and nonsteady models of its behavior in the atmosphere must be used . Near the earth, the ratio between the decay products of radon is a good indicator of the time variation in the turbulent exchange . Maximum perturbations of equilibrium in the radon series are observed in the morning and evening, during the establishment and destruction of the night inversions. It is noteworthy that in the morning hours one can observe many specific features in the height distribution of radioactive substances, explained by the mechanisms of the inversion destruction process. Data are given about the washout coefficients of radioactive aerosols by precipitation on the basis of Pb212(ThB), radon and Pb210(RaD) concentration measurements. (See also W75-04054) (Houser-ORNL)
W75-04077

SOME FEATURES OF ATMOSPHERE CLEANSING BY GROUND CONDENSATION,
For primary bibliographic entry see Field 5A.
W75-04078

RELATION BETWEEN ATMOSPHERIC PRECIPITATION WASHOUT OF RADIO-ACTIVITY AND NONACTIVE IONS,
L. I. Piskunov, and S. I. Tarasov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 182-186, 32 ref.

Descriptors: *Meteorology, *Radioactivity, *Radioisotopes, *Stable isotopes, *Air pollution, *Correlation analysis, Equations, *Fallout, Rain, Evaluation, Radiation, Assessment, Research and development, Background radiation, Chlorides, Sulfates, Troposphere, Mathematics.

A correlation in the form of a power relationship is assumed between the atmospheric washout of radioactive and nonactive contaminants. The latter chlorides and sulfates were selected, they differ from the others in that their background ratio in atmospheric precipitation for the continental part of European USSR is stable. For a tropospheric background radioactivity, the constancy of the relation in atmospheric precipitation of the radioactivity q withrespect to the chlorides m and the sulfates n follows from their identical washout laws. On the basis of logarithmic equilibrium constants P1 and P2, it is possible to derive an approximate evaluation of the radioactive state of the atmosphere. To determine constants P1 and P2 one requires observations with sufficient statistics subject to the conditions of the background concentration of the contaminants. It is assumed that the absence of a correlation between dust washed out from the atmosphere, radioactive components, and the background concentration of nonactive ions can serve as an indicator of anomalous phenomena. (See also W75-04054) (Houser-ORNL)
W75-04079

ACCOUNTING FOR SOME NONSTEADY PROCESSES IN RECORDING NATURAL AIR RADIOACTIVITY,
For primary bibliographic entry see Field 5A.
W75-04080

COSMOGONIC SODIUM-22 AND BERYLLIUM-7 ISOTOPES IN INVESTIGATIONS OF ATMOSPHERIC DYNAMICS,
V. Y. Luyanas, R. Y. Yasyulenis, and B. I. Styro.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 194-196, 1 tab, 2 ref.

Descriptors: *Meteorology, Atmosphere, *Air pollution, Radioactivity, *Radioisotopes, *Sodium, *Beryllium, Evaluation, Ratios, Mathematics, Measurement, Aircraft, Sampling, Research and development, Background radiation.
Identifiers: Troposphere, Stratosphere, *Cosmogonic radioisotopes, Cosmic rays.

The possibility of using the ratio of concentrations of the cosmogonic radioisotopes Na22 and Be7 for dnetermining the penetration of stratospheric air to the earth's surface is examined. The measurements were carried out at Elektrenai and Vilnius between 1965 and 1969. In some cases, the Na22/Be7 ratio reached values that were typical of stratospheric air. It is preferable to use a pair of isotopes of which one has a lifetime of several years, to study the air exchange between the stratosphere and troposphere. (See also W75-04054) (Houser-ORNL)
W75-04081

ARGON SPALLATION YIELDS OF COSMOGONIC RADIOISOTOPES,
R. Y. Yasyulenis, V. Y. Luyanas, and B. I. Styro.
In: Nuclear Meteorology, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 197-200, 2 tab, 8 ref.

Descriptors: Meteorology, *Argon, *Radiation, *Nuclear physics, *Radioisotopes, Rates, Frequency, Mathematics, Equations, Yield equations, Elements(Chemical).
Identifiers: *Cosmic rays, *Cosmogonic radioisotopes, *Spallation.

The evaluation of the rates at which cosmogonic isotopes are formed by argon spallation is described. The cross sections of isotope formation are calculated from a refined Rudstam formula. The yields are given for one star of F18, Ne24, Na22, Na24, Mg28, Al28, Al29, Si31, Si32, P30, P32, P33, S37, C134, C136, and C138 isotopes. The yield dependence on one star from the depth of the atmosphere is also given. (See also W75-04054) (Houser-ORNL)
W75-04082

LONG-LIVED ALPHA-RADIOACTIVITY IN FALLOUT AT VILNIUS AND AT VARIOUS ATLANTIC LATITUDES,
For primary bibliographic entry see Field 5A.
W75-04083

SEASONAL BERYLLIUM-7 VARIATIONS IN GROUND LEVEL AIR,
For primary bibliographic entry see Field 5A.
W75-04084

CONCENTRATION OF SODIUM RADIOISOTOPES IN THE GROUND LAYER OF THE ATMOSPHERE AND IN PRECIPITATION,
For primary bibliographic entry see Field 5A.
W75-04085

CONCENTRATION OF PHOSPHORUS RADIOISOTOPES IN THE GROUND LAYERS OF THE ATMOSPHERE AND IN PRECIPITATION,
For primary bibliographic entry see Field 5A.
W75-04086

RADIUM-226 IN ATMOSPHERIC PRECIPITATION, AND THE POSSIBILITIES FOR LEAD-210, BISMUTH-210 AND POLONIUM-210 TO PENETRATE THE ATMOSPHERE FROM THE EARTH'S SURFACE,
For primary bibliographic entry see Field 5A.
W75-04087

POLONIUM-210 IN THE ATMOSPHERE AND ITS RATIO TO LEAD-210,
For primary bibliographic entry see Field 5A.
W75-04088

TIME FLUCTUATIONS OF LEAD-210 CONCENTRATION IN THE GROUND LAYER OF THE ATMOSPHERE,
For primary bibliographic entry see Field 5A.
W75-04089

ASSESSMENT OF RADON EMANATION FROM THE SURFACE OF EXTENSIVE TERRITORIES,
T. I. Sisigini.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 239-244, 2 fig, 3 tab, 10 ref.

Descriptors: *Meteorology, *Radium, *Radon, Movement, *Soils, *Measurement, Assay, Density.
Identifiers: *Emanation, Flux, USSR.

A method is discussed of assessing radon emanation from a surface covered by one type of soil, under uniform and stable conditions. The results of comprehensive observations are examined, including measurements of the flux density of radon from the soil surface into the atmosphere, of radon concentration in the soil profile to a depth of 2 m, emanation factors and radium content in the soil, and the determination of soil porosity and water content. Based on experimental data obtained at about 40 different locations in European USSR, a correlation is established between radium content in the surface soil layer and radon emanation into the ground layer of the atmosphere. (See also W75-04054) (Houser-ORNL)
W75-04090

FILTERING AEROSOLS WITH NATURAL ATMOSPHERIC RADIOACTIVITY THROUGH FIBROUS MATERIALS,
For primary bibliographic entry see Field 5A.
W75-04091

DEVELOPMENT OF A METHOD FOR DETERMINING THE SIZE DISTRIBUTION OF RADIOACTIVE AEROSOLS WITH THE AID OF FILTERING MATERIALS,
For primary bibliographic entry see Field 5A.
W75-04092

PRELIMINARY DATA ON THE MEASUREMENT OF THE ATMOSPHERIC AEROSOL CHARACTERISTICS WITH A CENTRIFUGAL SPECTROMETER,
For primary bibliographic entry see Field 5A.
W75-04093

MEASURING THE CONCENTRATION OF HIGHLY-DISPERSE RADIOACTIVE AEROSOLS BY THE DIFFUSION METHOD,
For primary bibliographic entry see Field 5A.
W75-04094

SEPARATE DETERMINATION OF RN, RAA, RAB, AND RAC CONCENTRATIONS IN AIR FROM THE ALPHA-ACTIVITY DECAY CURVE OF A FILTER,
For primary bibliographic entry see Field 5A.
W75-04095

NEW METHODS OF MEASURING RN220 (THORON) EXHALATION AND SOME RESULTS,
For primary bibliographic entry see Field 5A.
W75-04096

A SIMPLE TWO-DIMENSIONAL ANALYZER OF BETA-GAMMA COINCIDENCES IN THE STUDY OF RADIOACTIVE FALLOUT SAMPLES,
For primary bibliographic entry see Field 5A.
W75-04097

SPECTROMETRIC METHOD OF MEASURING THE CONCENTRATION OF NATURAL RADIOACTIVE AEROSOLS,
For primary bibliographic entry see Field 5A.
W75-04098

ISOTOPE ANALYSIS OF RADIOACTIVE FALLOUT AND AEROSOL SAMPLES BY BETA-SPECTROMETRY,
For primary bibliographic entry see Field 5A.
W75-04099

RAPID SYSTEM OF AUTOMATIC PUNCH-TAPE OUTPUT OF INFORMATION FROM THE AI-100-1 ANALYZER,
For primary bibliographic entry see Field 5A.
W75-04100

GRAPHOANALYTICAL METHOD FOR DETERMINING CESIUM-137 CONCENTRATION IN SOIL SAMPLES FROM THE GAMMA SPECTRUM,
For primary bibliographic entry see Field 5A.
W75-04101

RADIOCHEMICAL METHOD OF DETERMINING LOW STRONTIUM-90 CONCENTRATION LEVELS IN ENVIRONMENTAL SAMPLES,
For primary bibliographic entry see Field 5A.
W75-04102

FALLOUT AND ACCUMULATION OF RADIOACTIVE DECAY PRODUCTS IN 1966-1968 IN THE VICINITY OF LENINGRAD,
N. V. Vasil'eva, L. I. Gedeonov, Z. G. Gritchenko, M. I. Zhilkina, and V. M. Flegontov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 340-346, 3 fig, 2 tab, 8 ref.

Descriptors: Meteorology, Nuclear energy, *Fallout, *Nuclear explosions, *Measurement, *Radioisotopes, Cerium, Ruthenium, Zirconium, Cesium, Strontium, Density, Atmosphere, Air circulation, Movement.
Identifiers: *USSR(Leningrad).

Results are presented of observations of the isotope composition of global radioactive fallout in 1966-1968 in the Leningrad region, the fallout density of radioactive fission products, and the amount of radioactive products deposited on the ground surface at the observation point. Ce141, Ru103, and Zr95 were recorded in 1966-1968 in the ground layer of the atmosphere and in atmospheric precipitation. Longer-lived radionuclides such as Ce144 and Ru106, mostly penetrating from the stratospheric source of radioactive contamination, in 1968 contributed much to the overall proportion of total beta activity. The recording of these radionuclides in radioactive fallout samples in 1967 was at the sensitivity limit of the measuring instruments. The fallout density of Sr90 was 1.6 mcurie/km sq in 1966, 0.8 mcurie/km sq in 1967, and 1.0 mcurie/km sq in 1968; that of Cs137 was 1.3, 1.7, and 1.9 mcurie/km sq, respectively. Altogether 50.3 mcurie/km sq Sr90 and 96.9 mcurie/km sq Cs137 fell to the ground in 1954-1968 in the vicinity of Leningrad (the figures refer to the moment of fallout). Based on an analysis of the activity ratio of short-lived radionuclides (Ce141, Zr95) to long-lived ones (Sr90, Ru106, Ce137, Ce144), the global radioactive fallout in the Leningrad district in 1966-1968 is due almost entirely to 1966-1967 nuclear explosions, while Sr90 and Cs137 from earlier nuclear tests were present in insignificant amounts only. At the end of 1968, the accumulated activity of the total beta-radioactive fission products is given for major radioisotopes. Owing to the low rate of Sr90 and Cs137 fallout, the accumulated activity of these radionuclides remained at the 1965 level of 42.3 and 82 mcurie/km sq, respectively. (See also W75-04054) (Houser-ORNL)
W75-04103

PENETRATION OF RADIOACTIVE FISSION PRODUCTS FROM 1964-1967 NUCLEAR TESTS INTO THE GROUND LAYER OF THE ATMOSPHERE IN THE LENINGRAD AREA,
L. I. Gedeonov, Z. G. Gritchenko, and V. M. Flegontov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 347-352, 6 fig, 7 ref.

Descriptors: *Meteorology, *Nuclear energy, *Nuclear explosions, Testing, *Fallout, Density, Measurement, *Radioisotopes, Atmosphere, Barium, Lanthanum, Cerium, Ruthenium, Zirconium, Niobium, Cesium, Aerosols, Sampling, Stratosphere, Withdrawal.
Identifiers: Gamma spectrometers, *USSR(Leningrad), Troposphere.

Radioactive fission products formed during tests of nuclear weapons in countries that did not adhere to the Moscow agreement on the prohibition of nuclear tests in the three media were recorded in 1964-1968 in the ground layer of the atmosphere in the Leningrad area. The following radioactive isotopes were determined with the aid of a scintillation and a Ge(Li) drift gamma spectrometer in radioactive aerosols filtered out of the ground layer of atmospheric air: Ba140, La140, Ce141, Ru103, Zr95, Nb95, Ce144, Ru106, and Cs137. The forming of these radioactive fission products was dated from the activity ratios of the following pairs of radionuclides: Ba140/Ce141, Ce141/Zr95, Ce141/Ce144, Zr95/Ce144, and Ce144/Cs137. These radionuclides turned out to have been released into the atmosphere during the explosions of 14 October 1964, 14 May 1965, 9 May, 27 October and 28 December 1966, 17 June and 24 December 1967. Atmospheric nuclear tests of increasing power and the depletion of the stratospheric reserve of radioactive fission products from the 1961-1962 test series produced a stable balance in the stratosphere between the long-lived radionuclides from nuclear tests conducted in 1964-1967. The proportion of long-lived fission products from these nuclear explosions therefore began to predominate in 1966 in global radioactive fallout. (See also W75-04054) (Houser-ORNL)
W75-04104

STUDY OF THE RESISTANCE OF FIBROUS FILTERING MATERIALS IN RAREFIED AIR,
For primary bibliographic entry see Field 5A.
W75-04105

VERTICAL DISTRIBUTION OF THE CONCENTRATION OF RADON DECAY PRODUCTS IN THE 0-300-M LAYER,
L. V. Kirichenko, and S. G. Malakhov.
In: Nuclear Meteorology, Proceedings, All-Union Conference on Nuclear Meteorology, June 23-28, 1969, Obninsk. p 358-360, 2 tab, 1 ref.

Descriptors: *Meteorology, *Vertical migration, *Distribution, Height, *Measurement, *Radon, Data collections, Data transmission, Sites, Density, Analytical techniques, Filters, Air, Time, Temperature.
Identifiers: Temperature inversions, Troposphere.

Data on the vertical distribution of the concentration of radon decay products in the 0-300-m layer of the atmosphere are provided. The measurements were carried out in August 1961 on the Obninsk altitude tower of the Institute of Experimental Meteorology. During daytime, the concentration of radon decay products remains practically constant throughout the layer. In the evening and at night it drops rapidly with increasing altitude from the ground surface up to a height of 50-75m. (See also W75-04054) (Houser-ORNL)
W75-04106

NATURAL SNOWFLAKE RADIOACTIVITY DUE TO SHORT-LIVED RADON DECAY PRODUCTS,
For primary bibliographic entry see Field 5A.
W75-04107

TRACE ELEMENTS AND NATUR RADIOACTIVITY IN CLOUD WATER AND ATMOSPHERIC PRECIPITATION IN THE CENTRAL CAUCASUS MOUNTAINS,
For primary bibliographic entry see Field 5A.
W75-04108

BENTHOS AND ALLOCHTHONOUS ORGANIC MATTER IN STREAMS,
Waterloo Univ. (Ontario). Dept. of Biology.
H. B. Hynes, N. K. Kaushik, M. A. Lock, D. L. Lush, and Z. S. J. Stocker.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 545-553, May, 1974. 10 fig, 13 ref.

Descriptors: *Benthos, *Animal groupings, Autumn, Leaves, Streams, *Nutrients, *Organic matter, Ecology, *Decomposing organic matter, *Biodegration, Bacteria, Fungi, Food habits, Seasonal.
Identifiers: Gammarus, Chironomidae, Blackfly larvicide.

A coring technique showed that stream animals are vertically distributed many centimeters down

into the gravel, with 17 percent in the top 5 cm. Arctic stream sampling chironomid larvae comprised 70-80 percent of numbers in the benthos; their rate of drift did not vary with the time of day. The effect of nutrients and temperature on the decomposition of autumn leaves shed in water was studied. The addition of nutrients N and P increased the amount of nitrogen after incubation, but temperature affected only the decomposition rate. The importance of bacteria and fungi in decomposition were noted. Food preference for several leaf species were shown by Gammarus. Up to 40 percent of autumn-shed leaf is water-soluble. One process by which it is made available to stream animals is conversion to particles and involves mechanisms similar to those found in soils. Field investigations showed large-scale fluctuations, in a short time period, of dissolved and particulate matter in the water. (Carpenter-FIRL)
W75-04119

MIXING IN ANAEROBIC DIGESTION,
Notre Dame Univ., Ind. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W75-04120

DICHROMATE RELUX CHEMICAL OXYGEN DEMAND: A PROPOSED METHOD FOR CHLORIDE CORRECTION IN HIGHLY SALINE WASTES,
Jacobs Engineering Co., Pasadena, Calif.
For primary bibliographic entry see Field 5A.
W75-04124

HYDRAULIC AND FLOW STUDIES RELATED TO SEDIMENT TRANSPORT, KENTUCKY RIVER, KENTUCKY,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 2J.
W75-04147

INTERACTIONS BETWEEN LIGHT AND CARBON DIOXIDE AVAILABILITIES AS A CONTROL OF ALGAL SPECIES SUCCESSION,
Missouri Univ., Columbia. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W75-04148

POLLUTION POTENTIAL OF AQUATIC SEDIMENTS,
Missouri Univ., Rolla. Dept. of Civil Engineering.
J. C. Huang, L. A. Hinkle, K. C. Tsai, and M. Mariappan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 258, $4.75 in paper copy, $2.25 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, August 1974. 87 p, 24 fig, 14 tab, 26 ref. OWRT A-069-MO(1). 14-31-0001-4025.

Descriptors: *Pollutants, *Sediments, *Environmental effects, Water quality, *Water pollution sources, Humic acids, Hydrogen ion concentration, Water pollution effects.
Identifiers: Microbial activity.

Significant fractions of past incoming pollutants have accumulated in the sediment phase, which can gradually and continuously release the pollutants into the overlying water, thereby degrading the water quality. This study was undertaken to investigate important factors governing the release of pollutants from selected sediments and subsequent effects on water quality. Research data obtained have indicated that the mechanisms of pollutant release are mostly physical-chemical in nature. Biological action plays only a minor role. Magnitudes of pollutant release have been found to be more pH dependent than temperature dependent. An increase in pH will result in a corresponding increase in organic release which may be explained in part by the increased dissociation of humic acids at a higher pH. Under a closed system used in this study, the pollutant release can reach an equilibrium state in a matter of two to three days.
W75-04150

THE USE AND MISUSE OF POPULATION EXPOSURES IN RADIATION PROTECTION,
Environmental Protection Agency, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5C.
W75-04154

POPULATION EXPOSURE TO NATURAL RADIATION BACKGROUND IN PUERTO RICO,
Puerto Rico Nuclear Center, Rio Piedras.
A. E. Gileadi, and D. L. Pitre.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 53-60, 5 fig, 1 tab, 9 ref.

Descriptors: *Monitoring, *Geographical regions, *Puerto Rico, *Background radiation, *Human population, *Distribution, Geography, Radioactivity, Fallout, Computer programs.
Identifiers: Natural radiation, Cosmic radiation, Demography, Terrestrial radiation.

External exposure to natural radiation background of the population in Puerto Rico has been estimated using published data concerning terrestrial and cosmic radiation, and demographic data on population distribution with respect to elevation and geographic location. Cosmic radiation data published by a number of investigators, along with methods to account for the variation of cosmic radiation intensity as a function of geomagnetic latitude and elevation, were used to determine the cosmic radiation dose equivalent as a function of geographic location in Puerto Rico. Data measured in the framework of the ARMS-Aerial Radiation Measurement Survey program at an elevation of 500 feet above ground level, along with an appropriate conversion factor, were used to evaluate the terrestrial component as a function of geographic location. Estimates of the annual dose equivalent rate due to exposure to external natural radiation background for each municipality of Puerto Rico and the insular average value were derived by means of a computer program written for that purpose. Inputs for this program included measured and calculated values of terrestrial and cosmic ray components of the natural radiation background in Puerto Rice, fallout corrections and relevant demographic data. (See also W75-04125) (Houser-ORNL)
W75-04160

TEMPORARY BODY BURDENS IN DOSE-EFFECT STUDIES OF THE BRAZILIAN AREAS OF HIGH NATURAL RADIOACTIVITY,
Pontificia Universidade Catolica do Rio de Janeiro (Brazil); and Universidade Federal do Rio de Janeiro (Brazil).
For primary bibliographic entry see Field 5C.
W75-04161

A REVIEW OF EFFLUENTS, GENERAL POPULATION DOSES, AND OCCUPATIONAL DOSES RESULTING FROM COMMONWEALTH EDISON'S USE OF NUCLEAR POWER,
Commonwealth Edison Co., Chicago, Ill.
J. C. Golden, and R. A. Pavlic.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 173-180, 3 fig, 3 tab, 10 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Measurement, *Monitoring, *Human population, *Distribution, *Public health, Operations, Power operation and maintenance, Iodine, Tritium, Liquid wastes.
Identifiers: Population exposure, Occupational exposure, Non-occupational exposure, Doses, Noble fission gases.

Commonwealth Edison has 5270 MWe (net) of nuclear power licensed today and an additional 9316 MWe (net) scheduled for operation by the end of 1983. Operation of these power reactors exposes people to low level environmental and occupationally incurred radiation. The integral dose 'man-rem' is a useful term for measuring the total radiation dose received by a group of people because the term reflects the dose and population distributions within or around a station. At Dresden with three operating boiling water nuclear power reactors (BWR) units, the first of which began operation in 1960, the 1973 non-occupation population dose (to 50 miles radius) was 275 man-rem (with a shielding and occupancy factor of two included). At Quad Cities with two two-year old BWR units, the dose was 30 man-rem, and at Zion, two pressurized water reactor (PWR) units in start-up testing, the dose was essentially zero. The 1973 occupational doses were 908 man-rem at Dresden, 201 man-rem at Quad Cities, and 15.4 man-rem at Zion. The annual population doses from natural radiations are 610,000 man-rem at Dresden, 60,000 man-rem at Quad Cities, and 720,000 man-rem at Zion. Hence, the total contribution to the population dose from operation of Commonwealth Edison's nuclear facilities--the sum of the occupational plus nonoccupational doses--is much less than one percent of that received from natural sources. A review is presented of the effluents, and general population and occupational doses resulting from Commonwealth Edison's use of nuclear power from 1960 to mid-1974. (See also W75-04152) (Houser-ORNL)
W75-04164

TRENDS IN POPULATION RADIATION EXPOSURE FROM OPERATING BWR GASEOUS EFFLUENTS,
Office of Radiation Programs, Washington, D.C.
J. A. Martin, Jr., C. B. Nelson, and H. T. Peterson, Jr.
In: CONF. 741018, Preceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 181-190, 2 fig, 3 tab, 15 ref.

Descriptors: *Nuclear powerplants, Effluents, *Measurement, *Radioactivity, *Diffusion, *Standards, Public health, Assay, Assessment, Safety, Evaluation, Xenon, Absorption, Control, *Air pollution.
Identifiers: Dose, *Population exposure, Boiling water reactors, Noble gases, Charcoal beds.

External radiation exposures resulting from atmospheric emissions of radionuclides from operating boiling water nuclear power reactors (BWRs) were computed using the EPA AIREM diffusion-dose code. In 1971, 10 operating BWRs generated a total of 1850 megwatt-years of electrical energy. Three million curies of noble gases were discharged resulting in a population-integrated radiation dose of 900 person-rems delivered to 16 million people. In 1972 14 BWRs produced 3400 MW(e)-yrs and resulted in a total population dose of 1650 person-rem to the 22.4 million people residing within 80 km (50 miles) of these facilities. Projections for the 400 GW(e) installed BWR capacity forecast for the year 2000 indicate that over 450 potential health effects could be committed annually if only a 30-minute holdup were employed. Use of charcoal adsorption beds with a 10-day xenon holdup could reduce this annual impact to 14 potential health effects. (See also W75-04152) (Houser-ORNL)
W75-04165

POPULATION EXPOSURE ESTIMATES AS DERIVED FROM AN ENVIRONMENTAL ASSESSMENT OF LWR FUEL CYCLE FACILITIES. PART I: POPULATION DOSES FROM OPERATING FACILITIES,
Oak Ridge National Lab., Tenn.
J. P. Witherspoon.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 191-198, 4 tab, 13 ref.

Descriptors: *Nuclear powerplants, *Fuels, *Environment, *Radioactivity, *Assessment, *Public health, Effluents, Model studies, Population, Uranium, Plutonium, Path of pollutants, Food chains, Operations, Ecology, Ecosystems.
Identifiers: Fuel reprocessing plants, Fuel cycle, Source terms.

Model facilities which are typical in terms of current design, location, and surrounding populations were used as the basis for this study. The radiological impacts of a uranium mill (2000 tons of ore per day), fuel fabrication plants (5 tons of uranium dioxide fuel per day and 1 ton of uranium-plutonium oxide per day), and a fuel reprocessing plant (5 tons of fuel per day were determined. Estimates of radiation dose to total body and organs of populations out to a distance of 50 miles were made for each facility. Sources of radioactive effluents were process dusts and airborne-tailings (mills), vented particulates (fabrication plants), and stack releases of gases and particulates (reprocessing plant). Pathways for external exposure (immersion in air and contaminated ground surface) and internal exposure (inhalation and ingestion) were considered. Estimates of radiation dose to populations (man-rems) and identification of exposure pathways and major radionuclides are given for each facility. (See also W75-04152) (Houser-ORNL)
W75-04166

POPULATION EXPOSURE ESTIMATES AS DERIVED FROM AN ENVIRONMENTAL ASSESSMENT OF LWR FUEL CYCLE FACILITIES, PART II: LONG-TERM POPULATION DOSES FOLLOWING CESSATION OF PLANT OPERATIONS,
Oak Ridge National Lab., Tenn.
J. P. Witherspoon, and D. C. Parzyck.
In: CONF. 741018, Preceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 199-206, 4 tab, 7 ref.

Descriptors: *Nuclear powerplants, *Fuels, *Effluents, *Radioactivity, *Environment, *Assessment, Safety, Evaluation, Population, Public health, Model studies, Uranium, Plutonium, Path of pollutants.
Identifiers: *Population exposure, Fuel cycle, Source terms, Doses.

The increased use of nuclear power reactors for generation of electricity will require a growth in the number of nuclear fuel cycle facilities to support the power reactors. Facilities in the nuclear fuel cycle release radionuclides to the environment which may contribute to population radiation dose long after the nuclear facility has ceased operation. The long-term environmental impact of model support facilities was studied. The contribution of the long-lived radionuclides released by the nuclear fuel cycle plants to long-term population exposures was calculated from the time of cessation of plant operations until significant decay of the radionuclides. The model plants were typical of current design and location, and the surrounding populations were representative of present-day populations. The model facilities included a uranium mill (2000 metric tons of ore per day), fuel fabrication plants (5 metric tons of uranium dioxide fuel per day, 1 metric ton of uranium-plutonium oxide fuel per day), and fuel reprocessing plant (5 metric tons of fuel per day). The longest-lived radionuclides released by each type of plant were enumerated and the area of radionuclide deposition defined. The significant pathways of exposure were examined with an evaluation of the population exposure resultant from resuspension of deposited activity, ingestion of deposited radionuclides, and radiation from contaminated ground surface. Dose estimates were made for populations (man-rems) living in the vicinity of the nuclear plants, and the average dose was calculated for the critical organ for each long-lived radionuclide. (See also W75-04152) (Houser-ORNL)
W75-04167

PROJECTIONS OF RADIOACTIVE WASTES FROM THE NUCLEAR FUEL CYCLE,
Oak Ridge National Lab., Tenn.
J. O. Blomeke, and C. W. Kee.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 215-222, 10 tab, 5 ref.

Descriptors: *Nuclear energy, *Nuclear reactors, *Nuclear powerplants, *Radioactivity, *Effluents, Properties, Waste identification, Waste treatment, Waste storage, Waste disposal, Fuels, Transportation, Assay, Assessment, Toxicity, Public health, Air pollution, Water pollution, Forecasting, Projections.
Identifiers: *Waste management, Fuel cycle.

Estimates of the properties and quantities of radioactive waste materials that will be generated in commercial nuclear fuel cycle operations are useful in establishing a basis for planning and development of safe and environmentally acceptable methods of management of these wastes. A comprehensive set of projects of radioactive wastes to be generated is projected for the remainder of this century based on the most recent forecast of nuclear power growth in the United States. Ten types of radioactive wastes are identified on the basis of their packaging, shipping, and probable disposal requirements, and the annual rates of generation, annual numbers of shipments, and accumulations of each type of waste are estimated. In addition, a measure of the relative toxicity of each waste on an annual and accumulated basis is tabulated. The measure of toxicity is defined as the cubic meters of air or water that would be required to dilute all the radioactive constituents of the waste to the concentrations specified in the AEC's Radiation Concentration Guide as being the maximum allowable for unrestricted use. (See also W75-04152) (Houser-ORNL)
W75-04169

DOSIMETRY OF INTERNAL EMITTERS FOR POPULATION EXPOSURE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W75-04172

CONDOS-A MODEL AND COMPUTER CODE TO ESTIMATE POPULATION AND INDIVIDUAL RADIATION DOSES TO MAN FROM THE DISTRIBUTION, USE AND DISPOSAL OF CONSUMER PRODUCTS THAT CONTAIN RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
F. R. O'Donnell, F. H. Clark, O. W. Burke, L. R. McKay, and A. N. Tse.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 327-332, 2 tab, 3 ref.

Descriptors: *Monitoring, *Model studies, *Computer programs, *Radioactivity, *Instrumentation, *Distribution patterns, *Ion transport, *Waste disposal, Human population, Public health, Estimation, Assessment, Measurement.
Identifiers: Doses, Computer codes.

A model and computer code (CONDOS) is being developed that estimates radiation doses to man from distribution, use, and disposal of a variety of consumer products that contain radioactive materials. CONDOS utilizes a generalized format in which the life span of a consumer product is divided into five main stages (distribution, transport, use, disposal, and emergencies) that require descriptions of the activities by which man will be exposed to the product (events) during each stage. These descriptions delineate homogeneous groups of exposed persons, and thus facilitate the selection of individuals who represent the exposed groups. The radiation doses associated with one year of product use to the total body and selected reference organs and tissues of representative individuals can be estimated for each mode of exposure that is applicable to each event. Summation of the doses to representative individuals yields group and total population doses. An example of the use of CONDOS is presented. (See also W75-04152) (Houser-ORNL)
W75-04182

WATER FOR THE HUMAN ENVIRONMENT, VOLUME IV, SPECIAL SESSIONS.
Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois. 557 p.

Descriptors: *Water resources, *Conferences, *Planning, *Environment, *Thermal pollution, *Systems analysis, *Water pollution, Hydraulics, Heated water, Water temperature, Water cooling, Water pollution sources, Lakes, Aquatic environment, Ecology, Agriculture, Water quality, Waste water treatment, Hydrographs, Unit hydrographs, Watersheds(Basins), Heating.
Identifiers: *Human environment.

Water for the human environment was discussed at a congress held at Chicago in 1973. The four broad topics discussed in Volume IV were: (1) thermal pollution, (2) systems analysis, (3) post-construction assessment, and (4) water pollution. Subjects discussed included identifying and assessing local thermal inputs on physical and biological environments, experimental and analytical characterization of thermal discharge, utilization of waste heat in agriculture, wastewater treatment, recreation, and a system concept incorporating power generation with other industrial process activities. (See W75-04214 thru W75-04258) (Humphreys-ISWS)
W75-04213

EVALUATION OF WATER TEMPERATURE FIELDS RESULTING FROM HEATED WATER DISCHARGES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
H. Stefan, and T. Skoglund.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 32-47. 12 fig, 1 tab, 11 ref, 1 append.

Descriptors: *Thermal pollution, *Cooling water, *Thermal stratification, *Thermal powerplants, Thermal properties, Heat transfer, Water cooling, *Minnesota, Heated water, *Discharge(Water), Water temperature, Heat budget.
Identifiers: Upper Mississippi River, Lake St. Croix, Minneapolis-St. Paul.

Both physical and biological facts are needed to prevent real thermal pollution damage from heated water discharges to lakes and streams. The problem of obtaining such facts is compounded by

regional climatological and hydrologic conditions, plant operational conditions, and the forms of life in receiving water bodies. Four different cooling water outfalls in the Upper Mississippi River basin were used to show steady-state temperature distributions downstream of the outfall for various seasonal conditions, frequency and amplitude of hourly and daily transitory temperature characteristics, temperature versus residence-time relationships for various flow paths, and modifications of overall temperature levels through the heat budget and stratification. These evaluations of physical effects in a temperature-area-time frame can be useful for further biological interpretation. (See also W75-04213) (Harmeson-ISWS)
W75-04215

SOME CHARACTERISTICS OF COUNTERJET FLOW,
Sir George Williams Univ., Montreal (Quebec).
A. S. Ramamurthy, and L. Robillard.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 62-69. 4 fig, 1 tab, 2 ref.

Descriptors: *Jets, *Mixing, *Waste dilution, Circulation, Turbulence, Nozzles, Orifices, Diffusion, Discharge(Water), Outlets, Flow, Path of pollutants, Waste water treatment.
Identifiers: Jet orientation.

One of the methods of effectively diluting the industrial effluent (pollutant) in a stream is to inject the former as a counter jet into the stream. The orientation of the jet is a pertinent variable that influences the characteristics of the jet's near wake region where mixing occurs. There can be two distinct modes of counter jet flow for any given jet orientation. In one of the modes, the jet oscillates about the plane of symmetry. In the other mode, the jet stays on one side of the plane of symmetry and the mixing process in the jet wake region is drastically reduced. The mode of flow is dependent on the ratio of the jet velocity to the main stream velocity for fixed jet orientations and geometry of the injecting device. (See also W75-04213) (Jess-ISWS)
W75-04217

SOME RESULTS FROM EXPERIMENTAL DATA ON SURFACE JET DISCHARGE OF HEATED WATER,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
M. A. Shirazi.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 89-108. 4 fig, 2 tab, 12 ref.

Descriptors: *Thermal pollution, *Heated water, *Jets, *Surface waters, Thermal powerplants, Distribution patterns, Analytical techniques, Dimensional analysis, On-site data collections, Laboratory tests, Flow, Hydraulics, Currents(Water), Discharge(Water), Froude number, Water temperature.

Published laboratory and field data on heated surface jets were compiled from several sources and presented in a unified and easily usable format. Partial analysis of the data was presented to show the general influences of the (a) ambient current, (b) the initial discharge angle, (c) the jet densimetric Froude number and, (d) the jet aspect ratio on the plume trajectory, plume half-width, and centerline temperature. Due to a lack of comprehensive high quality data, it was not possible at this time to specify the precise effects of the ambient current, the jet densimetric Froude number, the aspect ratio, and the angle of discharge on the plume behavior. However, despite the scatter and the elementary nature of the data analysis, the qualitative results appeared to be physically reasonable. They presented a general picture of the plume and were believed to be of considerable utility in the development of mathematical models for surface jets. A complete tabulation of the data was conveniently grouped and identified. (See also W75-04213) (Humphreys-ISWS)
W75-04220

COOLING POND TEMPERATURE PREDICTION,
Towson State Coll., Baltimore, Md. Dept. of Computer Science.
W. L. Graves, Jr.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 120-132. 7 fig, 1 tab, 3 ref.

Descriptors: *Cooling water, *Powerplants, *Water temperature, Thermal power, Thermal powerplants, Simulation analysis, Computer models, Water cooling, Planning, Ponds, Model studies, *Forecasting, *Thermal pollution
Identifiers: Thermoelectric power, Signal theory.

A model was described that predicts temperature responses in the environment that are associated with the operation of a natural gas fueled thermoelectric power generation station. The model is a piecewise computer simulation, limited to closed cooling water systems. The techniques developed may be applicable to larger-class cooling systems. Signal theory methods were used to simplify the digital computer analysis. An optimal data set, from the point of view of information per unit cost, was described for the model. (See also W75-04213) (Terstriep-ISWS)
W75-04222

SOME BIOLOGICAL ASPECTS OF AQUATIC THERMAL DISCHARGES,
Yale Univ., New Haven, Conn. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-04225

THERMAL POLLUTION ASPECTS IN EUROPE,
Ente Nationale per l'Energia Elettrica, Florence (Italy). Compartimento di Firenze.
F. P. Guli.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 165-179. 6 fig, 35 ref.

Descriptors: *Thermal pollution, *Cooling water, *Thermal powerplants, *Nuclear powerplants, *Europe, Powerplants, Streamflow, Sea water, Energy budget, Water pollution sources, Water pollution effects.

Current energy consumption in Europe was assessed and recent forecasts of future total energy requirements were reported. The cooling potential for conventional steam electric and nuclear power production of European rivers, lakes, and ponds are being assessed on the basis of five indexes: (1) 'power density' which is the ratio of a country's installed thermal power capacity to its area; (2) 'sea coastal availability' which is a ratio of installed thermal power capacity to the country's sea coast length; (3) 'fresh water disposability(I)' which is the ratio between average yearly streamflow originating in a country and its average yearly once-through cooling water withdrawals; (4) 'freshwater disposability (II)' which is the ratio between a country's average yearly streamflow leaving its boundaries and its average yearly once-through cooling water, withdrawals; and (5) 'thermal discharge loading' which is the quotient of a country's yearly average thermal plant heat discharges and its yearly average solar radiation. Because of the steadily increasing demand for electrical energy in all of Europe, the adoption of uniform control regulations was urged and the free exchange of meteorological, hydrological, and ecological data was proposed. (See also W75-04213) (Harmeson-ISWS)
W75-04226

DESIGN OF THERMAL COOLING SYSTEMS USING THE CASCADE OF ENERGY CONCEPT,
Oklahoma Univ., Norman. Dept. of Aerospace, Mechanical and Nuclear Engineering.
For primary bibliographic entry see Field 5D.
W75-04228

REVIEW OF HEATED SURFACE DISCHARGE MODELS APPLICABLE TO RIVERS,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
B. A. Benedict, and L. T. Jones.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 194-203. 6 fig, 12 ref. EPA Grant Nos. 16130 FDQ and R-800613.

Descriptors: *Heated water, *River systems, *Mathematical models, Discharge(Water), Jets, Diffusion, *Thermal pollution, Ecology, Cooling water, Density, Froude number, Drag, Model studies, *Path of pollutants, *Reviews.
Identifiers: Waste heat, Crossflows.

Currently available mathematical models for heated water surface discharges were reviewed. This review showed that four models could be utilized for river systems. Models selected included one jet model by Motz and Benedict; three diffusion models; the Cornell version of the Brooks diffusion model; and the two-dimensional and three-dimensional models presented by Edinger and Polk. In addition, the data from Carter showed promise but had a very limited range of applicability. For each model generalized, nondimensional solutions were developed in graphical form with the quantities of surface area, longitudinal distance, and lateral distance shown plotted against temperature rise. Models were compared for a hypothetical case. Model comparisons generally showed no great difference between two-dimensional and three-dimensional models. The jet model gave results that were similar to those of the diffusion models. (See also W75-04213) (Bhowmik-ISWS)
W75-04229

MATHEMATICAL MODELLING AND IDENTIFICATION OF THERMAL POLLUTION IN STREAMS: A REVIEW PAPER,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
J. W. Foley, M. A. Cardenas, and Y. Y. Haimes.
In: Water For The Human Environment, Vol IV. Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago Illinois, September 24-28, 1973. International Water Resources Association, Business Office 425 Illinois Building, Champaign, Illinois, p 204-216. 1 fig, 1 tab, 12 ref.

Descriptors: *Heated water, *Dispersion, Analytical techniques, *Thermal pollution, Diffusion

Degradation(Streams), Model studies, Computers, Environmental effects, Water temperature, Streams, Lakes, *Mathematical models, *Path of pollutants, *Reviews, *Pollutant identification.
Identifiers: *Model topology, Identification structures.

Dynamic mathematical models are required to represent the dynamic nature of the dissipation of thermal pollution in water bodies. The trade-off between sophistication in system modeling and the cost of the analysis is an important consideration in the selection of model topology. For dynamic systems, quasilinearization has proved to be an effective methodology for improving a model's topology. A basic exponential decay of the excess temperature with respect to a particular equilibrium temperature is usually postulated for tackling the temperature prediction problem in the case of streams with assumed one-dimensional, homogeneous flow characteristics. The model input includes mean velocity, exchange coefficient, equilibrium temperature, and boundary conditions. Using more flexible system techniques, the temperature prediction was shown to be very tractable for streams, lakes, impoundments, and other water bodies. Present day computers permit the structuring of data generation and identification-strategy ranking schemes which can complement more traditional model and parameter estimate procedures. (See also W75-04213) (Singh-ISWS)
W75-04230

THERMAL POLLUTION OF THE GREAT LAKES -- A NON-PROBLEM,
Argonne National Lab., Ill.
P. F. Gustafson.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 217-223. 1 ref.

Descriptors: *Thermal pollution, *Great Lakes, *Cost-benefit analysis, Lake Michigan, Powerplants, Cooling water, Heated water, Water temperature, Water quality, Biological communities, Ecology, Freshwater, Decision making.

The Great Lakes are a significant multipurpose freshwater resource for the United States and Canada. With the growing number of steam-generating plants for electric power being built on both sides of the border, it is not surprising that the Great Lakes are being looked at as a source of condenser cooling water. The Great Lakes have been, and continue to be, subjected in varying degrees to stresses due to human activity along their shores. In some cases there are demonstrable adverse changes in water quality, accompanied by undesirable changes in the biological communities within these waters. Man-made thermal discharges constitute an additional artificial input to the lake system, and have the potential for producing adverse effects. Considerable public concern has arisen in regard to the effects of this thermal pollution. In recent years considerable research has been done on Lake Michigan to determine natural and man-made thermal distributions and their effects upon the biota in the lake. The research underway on the Great Lakes is a necessary step in determining the capacity of the lakes to act as heat sinks without causing unacceptable ecological damage. Cost-benefit analyses are also underway to determine if shifting from once-through cooling to closed-cycle cooling systems would be a wise decision. (See also W75-04213) (Scott-ISWS)
W75-04231

NITRIFICATION IN SOIL-WATER SYSTEMS: A COMPUTERIZED ACTIVATED COMPLEX MODEL,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
M. J. Shaffer, and G. R. Dutt.
In: Water for the Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 284-294. 4 fig, 3 tab, 11 ref.

Descriptors: *Nitrification, *Soils, Soil-water-plant relationships, *Soil water, Nitrites, Nitrates, Digital computers, Computer programs, Computer models, Nitrogen fixing bacteria, Fertility, Nitrogen compounds, Great plains, Nitrogen cycle, Incubation, California, Arizona, Soil contamination, Fertilization.
Identifiers: *Typic torriorthent soils, *Typic torrifluvent soils, Nitrifiers.

A computerized model was developed to predict nitrification rates in soil-water systems. Model construction involved the application of activated complex theory together with experimental nitrification rate data provided by an incubation study of two soils. These data indicated that the activated complex has a structure more like NH20H or NH4 (+) than like NO2 (-). The completed model was verified by application of published nitrification data for two soils from the northern great plains. Correlation coefficients of 0.944 and 0.940 were obtained for the individual soils. (See also W75-04213) (Sanderson-ISWS)
W75-04235

MECHANICS OF DISPERSION OF POLLUTANTS IN COASTAL ENVIRONMENT,
Department of Water Affairs, Orania (South Africa).
J. M. Jordaan, Jr.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 307-318. 5 fig, 4 ref.

Descriptors: *Pollutants, *Sea water, *Dispersion, *Mathematical studies, *Effluents, Diffusion, Turbulence, Seashores, Waves(Water), Waste dilution, Coasts, Environment, Surf, Model studies, On-site tests, *Path of pollutants, Water pollution sources.
Identifiers: Mill-pond conditions.

The diffusion process is governed by boundary and initial conditions. In the case of effluent discharging into the marine environment its controls at the release point are known as a slug flow or a continuous discharge. To assess the process governing the diffusion and to predict its further progress mathematically, it is necessary to determine the state of the receiving medium or its capability to disperse the diffusant. Diffusion constants can be measured by slug dosing and by sampling the center of the patch at intervals. The natural processes that control the dispersion in the nearshore regions were studied in a wind-wave channel and in the field. Interpretative conclusions were drawn on the practice of nearshore disposal of effluents. Some of the significant conclusions were: turbulance levels are proportional to wave height squared and reciprocal of wave period; the mass transport of the diffused current increases with distance of travel indicating a regular entrainment over the width of the surf zone; in the mill-pond situation, the effluent remains in a well-defined patch with a clearly defined edge; a safe disposal distance offshore is not less than 2 kilometers for industrial effluents on typical open straight shorelines; and pre-dilution of effluents is advantageous before discharge to guard against the possibility of mill-pond conditions. (See also W75-04213) (Singh-ISWS)
W75-04237

DEVELOPMENT OF A COMPLETE MATHEMATICAL MODEL FOR DESCRIBING THE POINT BEACH NUCLEAR POWER PLANT THERMAL PLUME,
Limnetics, Inc., Milwaukee, Wis.
D. S. Wu, and B. J. Gallagher.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 319-336. 6 fig, 13 ref.

Descriptors: *Heated water, *Nuclear powerplants, *Condensers, *Cooling water, *Mathematical models, Water quality, Environmental effects, Analytical techniques, Channels, Flow characteristics, *Lake Michigan, Electric powerplants, Equations, Model studies.
Identifiers: *Point Beach Plant, Thermal Plume.

Approximately 20 large electric generating plants in Lake Michigan require more than 1000 cfs of cooling water each for their condenser units. Development of mathematical models for predicting temperature distributions underscores the efforts to help establish water quality guidelines and to design and locate discharge structures so as to minimize adverse impacts on the receiving environment. The Wisconsin Electric Power Company's Point Beach Plant on the west coast of Lake Michigan uses about 1500 cfs of water for condenser cooling and discharges it to the lake through two 35 ft wide and 13.5 ft deep channel flumes. The water temperature rises by about 10C under full load conditions. The governing equations of the four characteristics resulting from a heated discharge in a receiving water body are the equations of continuity, motion, diffusion, and state. The flow field was considered in two parts: the near field where the one-dimensional integral approach is valid, and the far field where the differential approach is applied. Complete mathematical models were developed to cover both the near and far fields. Existing near field models were integrated to the far field models by solving the diffusion equation. The two fields were connected through the consideration of the plume centerline velocity. (See also W75-04213) (Singh-ISWS)
W75-04238

REJUVENATION OF THE BUFFALO RIVER,
State Univ. Coll., Buffalo. Great Lakes Lab.
For primary bibliographic entry see Field 5C.
W75-04248

DISPOSAL OF POLLUTED DREDGINGS FROM THE GREAT LAKES AREA,
Northwestern Univ., Evanston, Ill. Technological Inst.
R. J. Krizek, and G. M. Karadi.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 482-491. 3 tab, 6 ref.

Descriptors: *Dredging, *Channel improvement, *Disposal, *Great Lakes, *Sediments, Lake sediments, Pollutants, Dikes, Settling basins, Water pollution, Sediment distribution, Sediment yield, Suspended solids, Deposition(Sediments), Water pollution treatment, Dams, Embankments, Levees, Harbors, Excavation, Navigation, Landfills, Bottom sediments.
Identifiers: *Spoil disposal.

Since much of the spoil dredged from the harbors and waterways around the Great Lakes is classified as polluted, open lake disposal is prohibited. Pursuant to a study of several alternative methods of disposal, technical and economic reasons indicate that the placement of these dredgings in

diked containment areas is the best currently available solution. When properly done, such a procedure can successfully remove pollutants from the lake environment and create new landfill for community or industrial development. However, in order to maximize the potential usefulness of such a landfill, the dredging operation should be properly designed and carried out according to a well planned schedule, but the technical feasibility of obtaining an effective distribution of the dredged materials and accelerating the drying process is governed to a large degree by the difficulties associated with the large scale of the operation. In addition to the pollution related aspects of the dredgings disposal problem, many other factors enter into a comprehensive evaluation of the alternatives, and economic considerations do not clearly justify the use of diked containment areas instead of open water disposal. (See also W75-04213) (Sanderson-ISWS)
W75-04251

A SURVEY OF ORGANIC CARBON CONSTITUENTS IN NATURAL FRESH WATERS,
Minnesota Univ., Minneapolis. Dept. of Civil Engineering and Hydraulics.
W. J. Maier, H. L. McConnell, and L. E. Conroy.
In: Water for the Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 500-513. 8 fig, 4 tab, 15 ref, 1 append.

Descriptors: *Organic compounds, *Carbon, *Organic matter, *Testing procedures, Water properties, Inorganic compounds, Decomposing organic matter, Data collections, Measurement, Great Lakes region, *Minnesota, Organic acids, Organic wastes, Water quality, Oxygen sag, Photosynthesis, Seasonal, Flow, Analytical techniques, Anaerobic conditions.
Identifiers: St. Croix. Basin(Minn), St Louis River(Minn).

A one year test program to determine organic and inorganic carbon concentrations in Minnesota's major bodies of water was carried out. Carbon contents were measured with a modified Beckman Carbon Analyzer. The organic carbon concentrations in the major Minnesota river basins range from 7 to 45 mg/l with a mean of 22 mg/l; Lake Superior is the exception and has about 5 mg/l in the near shore area. Seasonal variations and the effects of flow were discussed. Information about sources and composition of naturally occurring organics was reviewed. The results provide some bench marks for assessing present water quality and for use as reference points in evaluating long term trends. (See also W75-04213) (Henley-ISWS)
W75-04252

INTERACTION OF BULK PRECIPITATION, STREAM WATER, AND SEWAGE IN A SMALL WATERSHED NEAR OXFORD, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
K. J. Banaszak.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 524-536. 2 fig, 4 tab, 29 ref. OWRR A-063-MISS(2).

Descriptors: *Rainfall-runoff relationships, *Water sources, *Watersheds(Basins), *Surface runoff, *Precipitation(Atmospheric), Rain, Rainfall, Runoff, Streamflow, Streams, Surface water, *Small watersheds, Analytical techniques, Surface drainage, Trace elements, Water analysis, Testing procedures, Sampling, Nutrients, Geologic formations, Heavy metals, Erosion rates, *Mississippi.
Identifiers: Oxford(Miss), Atomic absorption spectroscopy.

A 500 hectare (54% forest, 26% pasture and fallow field, and 20% rural urban) rainfed watershed near Oxford, Mississippi, was studied from July 1, 1972, to June 30, 1973. During this period, 200 centimeters (132 cm are 'normal') of precipitation with an average pH of 4.6 and an average composition in parts per million of 0.66 calcium, 0.04 magnesium, 0.54 sodium, and 0.23 potassium fell. The stream discharge of 80 centimeters had a neutral pH and an average composition in parts per million of 6.4 calcium, 1.5 magnesium, 6.4 sodium, 2.2 potassium, 13 bicarbonate, 12 sulfate, and 5.5 chloride. A sewage influx of 50 liters per second had little noticeable effect on the composition of storm runoff. The reasons for the change from bulk precipitation to stream water are not clear but must involve biologic, aerosol, and anthropogenic material. The change is compatible with a change from a water in equilibrium with gibbsite to a water in equilibrium with gibbsite and kaolinite. The net output for the study period from the watershed in kilograms per hectare-year was 43 for calcium, 12 for magnesium, 44 for sodium, 14 for potassium, and 36 for silica. These outputs are not compatible with earlier studies but are compatible with gross chemical erosion rates. Data for cadmium and zinc were inconclusive. A major study was suggested to determine the true input by aerosols, both natural and anthropogenic, to watersheds. (See also W75-04213) (Henley-ISWS)
W75-04254

WATER QUALITY ASPECTS OF THE 1973 OPENING OF THE MISSISSIPPI RIVER DIVERSION SPILLWAY AT BONNET CARRE, LOUISIANA, U.S.A.,
Army Engineer District, New Orleans, La.
P. G. Combs, and E. P. Russo.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 548-557. 4 fig, 1 tab, 3 ref.

Descriptors: *Diversion structures, *Flood control, *Flood protection, *Levees, *Flood routing, *Mississippi River, Diversion, Floodways, Watershed management, Mississippi River Basin, Drainage systems, Floods, Spillways, Water quality, Flood discharge, Salinity, Aquatic life, Flood data, Estuaries, Sampling, Louisiana.
Identifiers: Bonnet Carre Spillway(La), Nursery area, *Lake Pontchartrain(La).

The Bonnet Carre Spillway is located on the east bank of the Mississippi River approximately 40 km above New Orleans. The spillway consists of 9 km of leveed floodway conveying water from the Mississippi River to Lake Pontchartrain, then into Lake Borgne and into the Gulf of Mexico. In 1973 when it became evident that flood waters would have to be diverted through the Spillway, and since Lake Pontchartrain is considered a nursery area for many marine species, a water quality sampling program was established to document the effect that the diverted water would have on the Lake Pontchartrain estuary. One of the most extensive data gathering programs ever undertaken by the New Orleans District of the Corps of Engineers was initiated with the opening. Visual observations and remote sensing were made by NASA on a daily basis from an altitude of 2440 m, intermittently by NASA-STAR at 20,000 m, and also by means of the Earth Resources Technology Satellite which processed data in four different wavelengths. Results of these remote sensings and ground truth data were compared. Bottle samples were obtained at 70 locations daily and were analyzed for the presence of 28 parameters which included heavy metals, nutrients, bacteria, sediment, etc. In situ measurements of temperature, pH, salinity, and dissolved oxygen were also made at these 70 locations. The progression of the river water through the lake was also given, showing the retarding effects of the extremely high gulf tide that occurred during this period. (See also W75-04213) (Henley-ISWS)
W75-04256

AN ANALYSIS OF OIL OUTFLOWS DUE TO TANKER ACCIDENTS, 1971-1972.
Henry (J.J.) Co., Inc., Moorestown, N.J.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 315, $6.25 in paper copy, $2.25 in microfiche. Report No. CG-D-81-74, November 1973. 157 p, 15 fig, 29 tab, 6 ref, 3 append. DOT-CG-31,445-A.

Descriptors: *Oil spills, *Accidents, *Oceans, *Oil pollution, Ships, Damages, Oil, Disasters, Water pollution sources, Evaluation, Data collections, *Path of pollutants.
Identifiers: Ship collisions, Ship groundings, Ship casualty data, Tanker pollution.

An analysis was made of the reported and estimated oil outflow resulting from tanker casualties. The data consisted of 1587 world-wide tanker casualties occurring in 1971-1972, of which 376 incidents involved pollution. Only tanker vessels exceeding 100 GRT were considered. Trend comparisons were shown between this two year period and the 1969-1970 period. Data tabulations of the 376 tanker polluting incidents and the 1587 tanker casualties were presented in appendixes. (Humphreys-ISWS)
W75-04260

COMPUTATION OF TIDES, CURRENTS, AND DISPERSAL OF POLLUTANTS IN THE NEW YORK BIGHT FROM BLOCK ISLAND TO ATLANTIC CITY WITH LARGE GRID SIZE, SINGLE AND TWO-LAYER HYDRODYNAMICAL-NUMERICAL MODELS, PART 4,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
T. Laevastu, R. Callaway, A. Stroud, and M. Clancy.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 617, $4.75 in paper copy, $2.25 in microfiche. Technical Note No. 4-74, January 1974. 84 p, 69 fig, 1 tab, 9 ref.

Descriptors: *Currents(Water), *Mathematical models, *Estuaries, *Computer models, Tides, Circulation, Dispersion, Pollutants, Analytical techniques, Hydrodynamics, Numerical analysis, Model studies, New York.
Identifiers: *New York Bight, Two-layer model, Flushing times.

One- and two-layer large grid hydrodynamical-numerical models were applied to the New York Bight. A few current measurements from lightships were used to verify the models. Tidal currents and wind currents were computed to determine overall circulation patterns. Definite differences in current velocity and direction between the upper and lower layers were demonstrated. Diffusion computations for short time periods were not fully satisfactory. The movement of the centers of release points and net transport through various sections were presented. Graphical results were presented to demonstrate the application of the computer models. To a large extent the problem depended on conditions along two long, open boundaries. The specified conditions on these open boundaries were used to tune the results inside the computational region. (Adams-ISWS)
W75-04262

INDUSTRIAL WASTEWATERS, RED RIVER ARMY DEPOT, TEXARKANA, TEXAS,
Army Construction Engineering Research Lab, Champaign, Ill.
For primary bibliographic entry see Field 5D.

W75-04263

METHODS FOR ESTIMATING TRANSPORT MODEL PARAMETERS FOR REGIONAL GROUNDWATER SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 2F.
W75-04271

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA, PART V; DATA REPORT, TEMPERATURE, SALINITY, OXYGEN AND HYDROGEN ION CONCENTRATION IN OUTER LOS ANGELES HARBOR, JUNE 1971 TO NOVEMBER 1973.
Southern California, University of Los Angeles. Sea Grant Program.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-11122, $4.75 paper copy, $2.25 microfiche. Report No. USC-SG-3-74, February 1974. 76 p, 1 fig, 5 ref. Edited by Soule, D.F., and Oguri, M. NOAA 04-3-158-45.

Descriptors: *Water properties, *Salinity, *Temperature, *Hydrogen ion concentration, *Dissolved oxygen, Sea water, Physical properties, Saline water, Chemical properties, Water quality, Water analysis, Testing, Sampling, Monitoring, Instrumentation, Conductivity, Data collections, Computers, Environment, Harbors, *California.
Identifiers: Marine studies, *Los Angeles Harbor(Calif), San Pedro Bay(Calif).

Data were presented showing the temperature, salinity, dissolved oxygen content, and the pH of the water in the outer Los Angeles Harbor from June 1971 to November 1973. Graphs indicating these water quality parameters were produced by computer plots. Single monthly readings were taken at each station at one meter increments to give profiles of parameters with depth. Each monthly segment showed readings at 0, 5, 10, 15, and 20 meters on the horizontal axis and the appropriate unit of temperature, salinity, dissolved oxygen, or pH on the vertical axis. Dotted lines connected the highs and lows to show seasonal trends, while solid lines between the dotted lines indicated changes in the profile with depth. Complete data, from which the graph points were taken, were presented in computer printout tables. (Henley-ISWS)
W75-04272

EXPERIMENTAL METHODS FOR OBTAINING PERCOL MODEL INPUT AND VERIFICATION DATA,
Battelle-Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.
R. J. Serne, R. C. Routson, and D. A. Cochran.
Available from the National Technical Information Service, Springfield, Va. 22161, as BNWL 1721, $4.00 paper copy, $2.25 microfiche. Report No. BNWL-1721, 1973. 38 p, 9 fig, 5 tab, 24 ref. AEC Contract AT (45-1)-2130.

Descriptors: *Model studies, *Basic data collections, *Chemical reactions, *Numerical analysis, Computer programs, Chemical wastes, Cation exchange, Mathematical studies, Physical properties, Hydraulic models, Soil chemistry, Soil analysis, Percolation, Infiltration.
Identifiers: *Model verification data, Equilibrium model.

A soil-waste chemical equilibrium model, PERCOL, was developed to numerically simulate the complex chemical reactions that occur while a solution is percolating through porous media. Procedures for measuring the many parameters and necessary input data were described. To validate the PERCOL model, small experimental columns were packed with soil and simulated waste solutions were pumped through the columns to approximate percolation. The effluent solution was serially collected and its chemical composition determined and compared with PERCOL's predictions. The column verification methods were described. Parameters measured included soil cation-exchange capacity, soil cation selectivity constants, soil apparent porosity, soil moisture content, soil bulk density, trace constituent sorption constants, sparingly soluble salt content, soluble salt content, and influent and effluent solute chemical composition. (Prickett-ISWS)
W75-04276

BIOLOGICAL PROCESSES INVOLVED IN POLLUTION OF COASTAL AQUACULTURE WATERS,
Central Inland Fisheries Research Inst., Barrackpore (India).
For primary bibliographic entry see Field 5C.
W75-04281

INVESTIGATION FOR THE MARINE DISPOSAL OF EFFLUENTS,
Watson (J. D. and D. M.), London (England).
K. D. Staples.
Water Pollution Control, Vol 73, No 4, p 417-424, 1974.

Descriptors: *Water pollution sources, *Effluents, *Sea water, Phenols, Cyanide, Toxicity, Colloids, Suspended solids, Discharge, *Sewage disposal, Coastal areas, Industrial wastes, Oxidation, Chemical pollution, Dissolved solids, *Waste water disposal.
Identifiers: *Marine disposal systems, Buoyant materials, Settleable solids, Intermediate solids.

Marine disposal should be undertaken as economically as possible consistent with the proper protection of the public health, as well as the minimum damage to amenity, recreational and industrial use of the receiving waters and the minimum waste of natural resources or disruption of the environment. The inland disposal of polluting discharges must inevitably mean disposal into the sea, since waters flowing through almost all lakes, streams and rivers eventually reach the seas. The oceans, it can be assumed, have become progressively polluted with a variety of chemical salts amounting to some 34,000 mg/liter total dissolved solids. Many of the naturally derived chemicals occurring in waste discharges are amenable to sea degradation; acids and alkalis are rapidly dispersed by the sea, while toxics such as phenols and cyanide compounds are rapidly degraded if prior to discharge they have been properly diluted. Buoyant materials are not easily broken down, and by surface wind action are liable to return to the shoreline, creating unsightly pollution. The greatest amount of pollution is discharged in solution or colloidal suspension, including the liquid fraction of sewage and industrial wastes. Stable toxins must not be discharged except as trace contaminants. (Leibowitz-FIRL)
W75-04289

LYSIMETRIC AND CHEMICAL INVESTIGATIONS OF PEDOLOGICAL CHANGES: I. LYSIMETERS AND THEIR DRAINAGE WATERS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 2G.
W75-04311

EFFECTS OF NATURAL MICROBIAL PREPARATIONS ON THE ELECTROKINETIC POTENTIAL OF BACTERIAL CELLS AND CLAY MINERALS,
New York Univ., N.Y. Dept. of Biology.
L. Kiremidjian, and G. Stotzky.
App. Microbiol. Vol 25, No 6, p 964-971. 1973, Illus.

Identifiers: Agrobacterium-Radiobacter, *Bacterial cells, *Clay minerals, *Electro-kinetics, *Microbial activity, Minerals, Sewage, *Soil treatment, Soil applications.

A complex mixture of fermentation residues and eutrophication products used commercially as a soil amendment and in various phases of sewage treatment was effective in reducing the electrophoretic mobility of clay minerals (kaolinite and montmorillonite) and cells of Agrobacterium radiobacter. The active fraction(s), which is active at very low concentrations, appears to be a stable (to heat, dialysis, concnetration, and storage), net negatively charged polymer which may have several positively charged sites. The material does not significantly alter the viscosity or surface tension of aqueous systems and is probably a microbial metabolite(s).--Copyright 1974, Biological Abstracts, Inc.
W75-04317

HYDRODYNAMIC EFFECTS OF OIL SLICK MECHANICAL CONTROL DEVICES,
Texas A and M Research Foundation, College Station.
For primary bibliographic entry see Field 5G.
W75-04327

MODELS OF DISPERSION IN A GRANULAR MEDIUM,
California Univ., Davis.
For primary bibliographic entry see Field 2F.
W75-04340

SULFATE REDUCTION AND SULFIDE OXIDATION IN FLOODED SOIL AS AFFECTED BY CHEMICAL OXIDANTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Office of Dredged Material Research.
R. M. Engler, and W. H. Patrick, Jr.
Soil Sci Soc Am Proc. Vol 37, No 5, p 685-688. 1973, Illus.
Identifiers: *Anaerobic conditions, *Chemical oxidants, *Flooded soils, Oxidation, Redox, Soils, *Sulfate reduction, *Sulfide oxidation, Sulfur.

The effect of various chemical oxidants on inhibition of sulfide (S2-) in a previously reduced soil was studied. O2, KNO3, MnO2, ferricitrophosphate, and FePO4 . 2H2O at rates equivalent to 1000 ppm O2 (O2 added at rates of either 300 or 500 ppm) were both added prior to flooding and after soil reduction had reached a maximum. The more soluble oxidants had the greatest effects in maintaining more positive redox potentials and in delaying sulfate (SO42-) reduction to S2-. The soluble oxidants (KNO3 and ferricitrophosphate) delayed S2- production by 17 and 9 days, respectively. The less soluble compounds (MnO2 and FePO4 . 2H2O) were less effective in delaying S2- production but persisted longer in preventing maximum S2- buildup. Adding the oxidants after maximum S2- accumulation showed the most pronounced effect on S2- oxidation from KNO3 and the least effect from MnO2. O2 at the rate of 500 ppm was also a very effective oxidant. Sulfate reduction to S2- and S2- oxidation were apparently controlled by, or at best related to the redox potential since SO42- reduction and S2- oxidation both appeared to commence at potentials in the vicinity of -100 mV.--Copyright 1974, Biological Abstracts, Inc.
W75-04347

CONVERSION OF DDT TO DDD IN FLOODED SOIL,
Bangladesh Agricultural Univ., Mymensingh. Dept. of Soil Science.
Z. H. Bhuiya, and D. F. Rothwell.
Plant Soil. Vol 39, No 1, p 193-196. 1973.
Identifiers: *Anaerobic conditions, *DDD, *DDT, Dechlorination, *Flooded soils, Insecticides,

Microbial, Soil moisture, Water pollution sources, Pesticide residues.

Anaerobic conditions obtained by flooding the soil caused reductive dechlorination of p,p'-DDT and its conversion to p,p'-DDD was enhanced under waterlogged conditions creating or favoring anaerobiosis. The DDT showed recalcitrance in the soil kept at 15% moisture. More o,p'-DDT was lost from the flooded soil. Similar amounts of p,p'-DDE were detected in all of the 3 levels of technical DDT treatments and the concentrations were not significantly different under both aerobic and anaerobic conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-04348

EFFECT OF NITRATE AND SEDIMENT CONSTRAINTS ON ECONOMICALLY OPTIMAL CLAY PRODUCTION,
Illinois Univ., Urbana. Agricultural Experimental Station.
For primary bibliographic entry see Field 4D.
W75-04349

HEAT DISSIPATION FROM TURBULENT OPEN CHANNEL FLOW,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
P. G. Mayer, and M. D. Moss.
In: Water For The Human Environment, Volumen IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 492-499. 2 fig, 11 ref. OWRT A-048-GA(1).

Descriptors: *Thermal pollution, *Heat balance, *Turbulent flow, *Heat flow, *Open channel flow, *Cooling, Water cooling, Hydrothermal studies, Heat transfer, Heated water, Turbulence, Energy transfer, Evaporation, Mathematical studies.
Identifiers: *Heat loss, Karman-Prandtl coefficients.

The advantage of using open channel flow for heat dissipation was proposed. It was indicated that the design of rough open channels resulting in highly mixed flows may be a viable alternative to cooling towers and conventional cooling ponds. an examination was made in terms of increased thermal transport due to an increased surface temperature from mixing near the surface in turbulent open channel flow. A determination of the additional thermal transfer to be obtained by mixing was suggested in terms of the evaporative cooling as a function of surface temperature increase. (Jess-ISWS)
W75-04350

5C. Effects Of Pollution

PREDICTION OF RADIOISOTOPE CONCENTRATIONS IN FRESHWATER STREAMS,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W75-03852

EFFECTS OF TEMPERATURE ON THE TOXICITY TO THE AQUATIC BIOTA OF WASTE DISCHARGES-A COMPILATION OF THE LITERATURE,
Utah Water Research Lab., Logan.
E. J. Middlebrooks, M. J. Gaspar, R. D. Gaspar, J. H. Reynolds, and D. B. Porcella.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-239 127, $6.25 in paper copy, $2.25 in microfiche. Publication PRWG105-1, October 1973. 170 p, 1 tab, 1,289 ref. OWRR B-070-UTAH(4). 14-31-0001-3659.

Descriptors: *Thermal pollution, *Toxicity, Bioassay, Temperature, *Water temperature, Bioindicators, *Reviews, *Bibliographies, Aquatic environment, Waste water(Pollution), Laboratory tests, Biota, Water pollution effects.
Identifiers: *Temperature-toxicity relationships, Experimental design.

An extensive compilation and general evaluation of the literature is presented which describes the temperature interaction with toxicity. Recent literature is summarized and made accessible along with a few generalized relationships such that researchers may design studies in a manner that will increase the utility of their results. A detailed indexing system is employed which makes the information contained in the report accessible by author, toxicant, and test organism. Summary tables of the most pertinent literature are also presented for easy subject retrieval. It was concluded that very little uniformity in experimental design is found between experiments on temperature-toxicity relationships, and a generalized summary of the results presented in the literature is essentially impossible because of the inconsistencies in experimental designs. The utilization of standard bioassay procedures is highly recommended, and these procedures should be applied to experimental designs which allow the estimation of parameters related to the theoretical effects of temperature.
W75-03854

FURTHER OBSERVATIONS ON ENDEMIC FLUORIDE-INDUCED OSTEOPATHIES IN CHILDREN,
L.L.R.M. Medical Coll., Meerut (India). Dept. of Human Metabolism.
M. Teotia, and S. P. S. Teotia.
Fluoride. Vol 6, No 3, p 143-151. 1973.
Identifiers: Diagnosis, Endemic areas, *Fluoride, *Fluorosis(Skeletal), *Osteopathies, Human diseases, *Public health.

Fluoro-osteopathy is described in 4 children aged 6 or above. These observations contrast with the concept that skeletal fluorisis cannot develop prior to 10-20 yr of high fluoride intake. The pathogenesis and the mechanism underlying the causation of this disease is discussed on the basis of the occurrence of skeletal fluorosis in growing children. Since skeletal fluorosis is a preventable disorder, it must be recognized or considered in the differential diagnosis of each bone and joint disease in a child residing in an endemic area.--Copyright 1974, Biological Abstracts, Inc.
W75-03909

THE BIOCHEMICAL OXYGEN DEMAND OF FINELY DIVIDED LOGGING DEBRIS IN STREAM WATER,
Oregon State Univ., Corvallis.
S. L. Ponce.
Water Resources Research, Vol 10, No 5, p 983-988, October, 1974. 4 fig, 6 tab, 9 ref.

Descriptors: *Biochemical oxygen demand, *Lumbering, Natural streams, *Wood wastes, *Water pollution effects, *Dissolved oxygen, Leaves, Toxicity, Water pollution, Fishkill, Water pollution sources, Industrial wastes, Water quality, Softwood, Forests, Coniferous trees, Hardwood, Deciduous trees.
Identifiers: Twigs, Needles, Douglas-fir(Pseudotsuga menziesii), Hemlock(Tsuga), Alder(Alnus), Logging residues.

The impact of Douglas-fir needles and twigs, western hemlock needles, and red alder leaves on dissolved oxygen and thus on the quality of mountain stream water was examined. The mean COD, 90-day BOD, and BOD rate coefficients were, respectively, 454 mg 0/g, 110 mg 0/g, and 0.125 for Douglas-fir needles; 947 mg 0/g, 110 mg 0/g, and 0.056 for Douglas-fir twigs; 570 mg 0/g, 200 mg 0/g, and 0.049 for western hemlock needles; and 882 mg 0/g, 286 mg 0/g, and 0.047 for alder leaves. Further analysis showed that the 90-day values for BOD and K (reaction rate coefficient) could be estimated accurately by tests of shorter duration: 20 days for Douglas-fir needles, 20 days for hemlock needles, and 60 days for alder leaves. Leaf material exposed to fluctuating temperature exerted a 5-day BOD 4.0, 2.4, and 4.2 times greater than the standard temperature 5-day BOD for Douglas-fir needles, hemlock needles, and red alder leaves, respectively. The toxicity of a leachate extracted from each species was determined on guppies and steelhead trout fry. The concentration of leachate needed to produce toxic effects was so high that oxygen depletion probably would be responsible for death long before the leachate effect. The results of this study, combined with reaeration and debris accumulation studies, will enable foresters to predict on-site and downstream dissolved oxygen levels with time after the introduction of a known amount of logging slash. (Witt-IPC)
W75-03913

THE THERMAL REQUIREMENTS AND TOLERANCES OF KEY ESTUARINE ORGANISMS,
Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Research.
J. A. Mihursky, V. S. Kennedy, A. J. McErlean, W. H. Roosenburg, and A. J. Gatz.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 073, $6.25 in paper copy, $2.25 in microfiche. Technical Report No 26. Maryland Water Resources Research Center, College Park, (1974), 146p. OWRT A-011-MD(5), A-002-MD(15), 14-31-0001-3020.

Descriptors: *Thermal pollution, Water pollution effects, *Chesapeake Bay, *Water temperature, Data collections, *Estuarine fisheries, Model studies, Bays.
Identifiers: Thermal effects, *Estuarine organisms, Steam electric stations, Pumped-entrainment, *Thermal tolerance, Species diversity indices.

The research program employed temperature as a major variable in exploring effects on estuarine organisms under both single variate and multivariate experimental designs. Laboratory data were developed for 10 species common to the Chesapeake Bay region, using three basic approaches: (1) temperature effects on mortality; (2) temperature effects on performance, and (3) temperature effects on metabolic activity. Multivariate experiments used time as well as temperature as major variables. This latter approach addressed the question of pumped-entrainment effects on organisms contained in steam electric station cooling water supplies. An analysis was also completed on field data dealing with an estuarine fish community response to a thermal discharge from a steam electric station. Various species diversity indices were developed and compared for a two year pre-operational and a two year post-operational period of the steam electric station. Laboratory data demonstrated that under summer conditions, for typical Chesapeake Bay species, approximately 32C tended to be a thermal 'break point', in that temperatures above 32C tended to exceed tolerance limits of the organisms. Results of the multivariate temperature-time experiments on molluscan earlu life history stages (cleavage stages, trochophone larvae and straight-hinged veliger larvae) demonstrated the need for steam electric station operational designs to keep temperature increases and time exposures to a minimum in order to assure maximum survival. The earliest life history stage (cleavage stage) had the greatest sensitivity to increased temperature. Data were used to develop a thermal biotic predictive model for an estuarine system. Application of data in combination with steam electric station design and operating knowledge plus certain other environmental information on the Chesapeake

Bay system was used to provide an ecological basis for a regional planning scheme.
W75-03944

KINETICS OF MICROBIOLOGICALLY MEDIATED TRANSFORMATIONS OF HEAVY METALS IN AQUATIC ENVIRONMENTS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-03945

AN EXPERIMENTAL BASIS FOR MAXIMAL PERMISSIBLE CONCENTRATIONS OF PATORAN IN SURFACE WATERS, (IN RUSSIAN),
Research Inst. of Labor Protection and Occupational Diseases, Sofia (Bulgaria).
S. P. Novakova, S. Dinoeva, and S. Danon.
Gig Sanit. 38(3): 86-89. Illus. 1973.
Identifiers: Blood, Cell, Enzymes, Equilibrium, Inhibition, Kidney, Liver, Microorganisms, Oxidation, *Patoran, *Pesticide residues, Rat, Respiration, Spleen, Surface waters, *Lethal limit, *Toxicity, *Organoleptic properties, Water pollution effects.

The toxic effect and the permissible concentrations in water of the pesticide patoran (N-4-bromphenl-N'-methyl bromide) were studied. Tests at concentrations of 0.125, 0.25, 0.5, 1, 2, 4, 8 and 16 mg/1 revealed that patoran has an adverse effect on the organoleptic properties of water. A threshold was observed at 0.2 mg/1. Concentrations up to 20 mg/1 did not affect the self-purification of reservoirs. At a concentration of 50 mg/1, patoran prolonged the existence of microorganisms. In acute experiments in rats, the LD50 was 3875 mg/kg. In acute and semiacute experiments, patoran inhibited tissue respiration and oxidative-reductive processes in cells and led to toxic damage to liver, kidneys and spleen, including a tendency toward development of cirrhosis of the liver. Chronic experiments in 210 white rats over a 6 mo. period under 5 experimental conditions at daily doses of 0.1-80 mg/kg revealed that above 0.1 mg/kg, patoran adversely affected white and red blood cells, disturbed enzyme equilibrium, inhibited tissue respiration and cellular oxidation-reduction processes and affected the liver, kidneys and spleen. Changes were dose-related. The limiting sign of damaging effects of patoran is its influence on the organoleptic properties of water. It is concluded that 0.20 mg/1 is the maximum permissible levels of patoran in reservoirs.--Copyright 974, Biological Abstracts, Inc.
W75-03959

LIMNOLOGICAL STUDY OF LAKE SHASTINA, SISKIYOU COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2H.
W75-03982

A SUMMARY AND COMPARISON OF NUTRIENTS AND RELATED WATER QUALITY IN LAKES ERIE, ONTARIO, HURON, AND SUPERIOR,
Burlington (Ontario). Canada Centre for Inland Waters.
For primary bibliographic entry see Field 5B.
W75-04027

THE TOXICITY OF 2, 3, 7, 8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN GUPPIES (POECILIA RETICULATUS PETERS),
Forest Service (USDA) Corvallis, Oreg. Forestry Sciences Lab.
J. A. Norris, and R. A. Miller.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 76-80, July, 1974. 1 fig, 2 tab, 18 ref.

Descriptors: Fish, *Herbicides, Pollutants, *Toxicity, Chemicals, 2,4,5-T, Brush control, Analytical techniques, Water pollution effects, Mortality, *Path of pollutants, Organic compounds.
Identifiers: *Guppies, *Poecilia reticulatus, *TCDD.

The compound 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is a contaminant of the herbicide 2,4,5,-trichlorophenoxyacetic acid. TCDD is immobile, slowly degraded in soils, not taken up readily by plants, subject to photodecomposition, low in water solubility, and highly toxic and teratogenic in mammals. This experiment determined the characteristics of TCDD in guppies. Exposure of the guppies to 0.1, 1.0 and 10.0 ppb TCDD for 120 hours caused complete mortality in the following 32, 21, and 30 days, respectively. The suggested reason for the apparent decrease in toxicity between 1.0 and 10.0 ppb TCDD is that fish in the 1.0 ppb TCDD concentration may have been exposed to supersaturated levels of TCDD. There was a significant positive correlation of duration of survival with the body length. (Orr-FIRL)
W75-04028

COMPARATIVE BIOCHEMISTRY, BIODEGRADABILITY, AND TOXICITY OF DDT AND CARBOFURAN ANALOGUES,
Illinois State Natural History Survey, Urbana.
R. L. Metcalf, A. Keturah, J. R. Reinbold, W. F. Sanborn, and W. N. Childers.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 252, $4.25 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, (UILU-WRC-74-0095), Research Report No. 95, December 1974. 49 p, 3 fig, 11 tab, 19 ref. OWRT B-070-ILL(1). 14-31-0001-3879.

Descriptors: *Biodegradation, Aldrin, *Pesticides, DDT, *Sunfishes, *Toxicity, Biochemistry, Water pollution effects, Pesticide residues.
Identifiers: *DDT analogues, *Methoxychlor, Green sunfish, Trifluralin, *Carbofuran.

The aquatic persistence, toxicity, and biodegradability of DDT, methoxychlor, and 28 analogues were evaluated using the green sunfish Lepomis cyanellus. Study of DDT analogues with degradophores located in aryl or alkyl moieties of the DDT-type molecule showed that the toxicity to and persistence of these compounds in the green sunfish is correlated with the environmental temperature of exposure and ability of multi-function oxidase enzymes of the fish to attack specific chemical groupings on various parts of the molecule. The green sunfish can readily oxidize alkyl and methylthio groups of the aryl portion of the molecule to water partitioning moieties but alkoxy groups are not as readily attacked. Persistent and highly insecticidal DDT molecules can be developed which have greatly reduced toxicity to fish. The biochemical role of the multi-function oxidase enzymes in biodegradation of pesticides in the green sunfish was explored in detail using the oxidase inhibitor piperonyl butoxide together with radiolabeled methoxychlor, aldrin, and trifluralin. The reactions which were inhibited were 0-demethylation, N-dealkylation, and epoxidation. Where piperonyl butoxide was present, the fish accumulated from 15 to 45 times more of the parent compound, over a 16-day period.
W75-04034

ENHANCEMENT OF RECREATIONAL USES OF ESTUARINE WATERS THROUGH STUDY OF POTENTIAL CONTROL METHODS FOR STINGING SEA NETTLES,
Maryland Univ., Solomons. Natural Resources Inst.
D. G. Cargo.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 226, $3.25 in paper copy, $2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No. 23, (1974). 12 p. OWRT B-002-Md(1). 14-01-0001-1055.

Descriptors: *Sea nettles, Chesapeake Bay, Chrysophyta, Cyanophyta, Water temperature, Food chains, Growth rates, Spawning, Reproduction, Thermal stress, Jelly fish.
Identifiers: *Chrysaora, *Cyanea, Polyps, *Nudibranch, Medusa growth, Ctenophores, Mnemiopsis, Scypistoma.

A number of laboratory and field oriented experiments and observations are described. Temperature tolerance of polyps of the sea nettle showed that they encyst at 4C and again at 35C. Most polyps set on the under sides of substrates. Predation upon polyps by the nudibranch Coryphella pellucida is revealed. Observations on the winter jellyfish showed that this species is seasonally opposite to the summer nettle and has all the same stages. Growth of medusae, variation in seasonal abundance and setting patterns of planula larvae were examined. Maximum growth observed was from 3 mm to 170 mm in 33 days. Peaks of abundance and spawning take place in late July and early August. A laboratory experiment showed that the ctenophore is an acceptable and nutritious food for sea nettles.
W75-04037

ACCUMULATION OF MERCURY BY FISH AND TURTLES OF THE LITTLE PINEY RIVER,
Missouri Univ., Rolla. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-04040

A CONTINUOUS FLOW KINETIC MODEL TO PREDICT THE EFFECTS OF TEMPERATURE ON THE TOXICITY OF WASTE TO ALGAE,
Utah Water Research Lab., Logan.; and Utah State Univ., Logan. Div. of Environmental Engineering.
J. H. Reynolds, E. J. Middlebrooks, D. B. Porcella, and W. J. Grenney.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 194, $5.25 paper copy $2.25 microfiche. Report PRWG 105-3, June 1974. 112 p. 34 fig, 29 tab, 91 ref., 7 append. OWRT B-070-Utah(5). 14-31-0001-3659.

Descriptors: Water pollution effects, *Bioassay, *Toxicity, Bioindicators, Industrial wastes, *Phenols, *Kinetics, *Mathematical models, *Algae, Temperature, *Thermal pollution, Inhibition, Enzymes, Model studies.
Identifiers: Chemostat, Oil refinery wastes, Enzyme inhibition, Competitive, Non-competitive inhibition, *Selenastrum capricornutum.

Many industries, such as pulp and paper mills, tanneries, and oil refineries, discharge toxic wastes at extremely high temperatures. The temperature of an oil refinery waste may range from 22C (71F) to 41C (106F). These high temperatures could have a significant effect on the toxicity of a given waste. Therefore, it is necessary to develop relationships which will evaluate and predict the effects of increased temperature on the toxicity of various wastes. Equations have been developed utilizing continuous flow stirred tank reactor (chemostat) kinetics and enzyme inhibition kinetics to describe the effects of temperature on toxicity to microorganisms. These equations were tested by semicontinuous and continuous flow experiments with phenol and the algae Selenastrum capricornutum. The data obtained were fitted to competitive, uncompetitive, and non-competitive inhibitor models. The results indicated that phenol exerts a competitive inhibition effect on the growth of S. capricornutum. Comparison of the competitive inhibition constants, KI, for S. capricornutum exposed to phenol at 20C, 24C, and 28C, indicates that phenol toxicity increases with an increase in temperature according to the Arrhenius function.

W75-04052

BIOLOGICAL AVAILABILITY OF SEDIMENT PHOSPHORUS TO MACROPHYTES,
Wisconsin Univ., Madison. Water Chemistry Program; and Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-04053

THE TOXICITIES OF SEWAGE EFFLUENTS, INDUSTRIAL DISCHARGES AND SOME CHEMICAL SUBSTANCES TO BROWN TROUT (SALMO TRUTTA) IN THE TRENT RIVER AUTHORITY AREA,
Trent River Authority (England). Pollution Control and Fisheries Dept.
F. S. Woodiwiss, and G. Fretwell.
Water Pollution Control, Vol 73, No 4, p 396-405, 1974. 3 fig, 13 tab, 3 ref.

Descriptors: *Water pollution, *Effluent control, *Fishkills, *Industrial wastes, *Trout, Rivers, Toxicity, Sewage effluents, Rainbow trout, *Toxicity, *Brown trout.
Identifiers: *Trent River Authority(UK).

An intensive investigation resulted in the conclusion that unidentified complex organic compounds originating at the chemical manufacturing industry around Loughborough were killing the fish population in the lower part of the Soar River, a tributary of the Trent. A toxicity test was developed between 1965-1969 for an examination of the effluents in the Trent River Authority area. A modified version of the Standard test recommended by the Ministry of Housing and Local Government involved the following procedures: the test species was changed from brown trout to rainbow trout because of the availability and the standard length of 60 and 150 mm for the tested fish; the temperature used during the tests was increased from 10 degrees C to 15 degrees C because of easier attainability; and, the dilution water was standardized, with a choice of either hard (250 mg/liter) or soft (25 mg/liter) water being recommended so that the one which most closely approximates the receiving water can be chosen. Several industrial waste water discharges to sewers were tested on behalf of sewage works to trace the toxicity source in their effluents, or the cause of operational problems such as the inhibition of sludge digestion and the reduced efficiency of aerobic processes. (Leibowitz-FIRL)
W75-04110

THE MORPHOEDAPHIC INDEX, A FISH YIELD ESTIMATOR--REVIEW AND EVALUATION,
Ontario Ministry of Natural Resources, Thunder Bay. Fish and Wildlife Research Branch.
R. A. Ryder, S. R. Kerr, K. H. Loftus, and H. A. Regier.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 663-688, May, 1974. 6 fig, 107 ref.

Descriptors: *Dissolved solids, *Yield equations, *Fish populations, Statistics, Depth, Reviews, Evaluation, Estimating.
Identifiers: *Morphoedaphic index, Angling yield, Commercial fish yield, Mean depth.

The morphoedaphic index (MEI), a fish yield estimator, was reviewed and evaluated. Background papers leading to the development of the MEI and more recent advances were discussed. The MEI was defined and its criteria for use examined. The significance of its components - total dissolved solids and mean depth - was explained. A comparison between the MEI and related models was also made. The global range of the MEI was outlined as well as restrictions on its use. Sustained fish yields at different MEI values for various climatic regions were predicted. Several special applications of the MEI include: prediction of angling yield in north-temperate lakes; prediction of commercial fish yield on a newly created reservoir; indication of ecological stresses and changing environments; and contrasting responses to cultural eutrophication in the littoral and profundal zones of lakes. The implications of the MEI for ecological theory were discussed. (Orr-FIRL)
W75-04116

MICROBIOLOGY OF WASTE TREATMENT, (LITERATURE REVIEW),
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 5D.
W75-04117

INTERACTIONS BETWEEN LIGHT AND CARBON DIOXIDE AVAILABILITIES AS A CONTROL OF ALGAL SPECIES SUCCESSION,
Missouri Univ., Columbia. Dept. of Civil Engineering.
D. L. King, and R. King.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 284, $4.75 in paper copy, $2.25 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, June 17, 1974. 74 p, 32 fig, 6 tab, 14 ref, 2 append. OWRT A-071-MO(2). 14-31-0001-4025.

Descriptors: *Algae, *Carbon dioxide, Light, *Photosynthesis, *Growth rates, Anabaena, Scenedesmus, *Algal control.
Identifiers: *Algal species succession, Pediastrum biradiatum, Phormidium.

The primary objective was to evaluate the role played by the interaction between light availability and a carbon dioxide source for algal photosynthesis. Algae used included Pediastrum biradiatum, Phormidium olivacea, Anabaena variabilis, and Scenedesmus acutiformis. The growth kinetics of all four algae were shown to follow the Mowod model under high free carbon dioxide concentrations (CO2f) and variable light intensity, but under high light intensity and variable CO2f the growth kinetics fit the Monod model well only at high CO2f. However, the limit on specific growth rate imposed by CO2f availability and the limit imposed by light intensity were shown to interact in a multiplicative manner for all four algae. While correlation coefficients between measured and calculated specific growth rates for the four algae ranged from .96 to .99; each alga differed in its ability to compete under conditions of changing light and changing CO2f as well as under variations in the product of these two variables.
W75-04148

POLLUTION POTENTIAL OF AQUATIC SEDIMENTS,
Missouri Univ., Rolla. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-04150

SYMPOSIUM ON POPULATION EXPOSURES,
Health Physics Society, East Weymouth, Mass.
Available from the National Technical Information Service, Springfield, Va. 22161, as CONF-741018, $10.60 in paper copy, $2.25 in microfiche. CONF. 741018 Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, Oct 21-24, 1974, Knoxville, Tennessee, 446 p.

Descriptors: *Public health, *Radioactivity, *Nuclear powerplants, *Energy, Physics, Radiation effects, *Human population, Environment, Environmental effects, Path of pollutants, Measurement, Assessment, Safety, Evaluation, Fuels, Gases, Waste disposal, Hazards, Toxins, Toxicity.
Identifiers: *Population exposure.

The Eighth Midyear Symposium provided an opportunity for consideration and discussion of technical questions involving (i) potential adverse effects that the nuclear power industry may have on the environment, (ii) pathways that various radionuclides follow in the biosphere when released in air or water, (iii) the relationship of such information to other radiological hazards, and (iv) environment problems associated with the alternative fossil-fuel production of electricity. Although the primary emphasis is on radiation, exposure to non-radioactive environmental pollutants resulting from power generation was also discussed. (See W75-04153 thru W75-04194) (Houser-ORNL)
W75-04152

THE HISTORICAL DEVELOPMENT OF CONCEPTS OF RADIATION DOSE COMMITMENT,
Office of Radiation Programs, Washington, D.C.
A. C. B. Richardson.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tenn., p 1-8, 19 ref.

Descriptors: *Radioactivity, *Human population, Mathematics, *Public health, Nuclear explosions, Fallout, Environment, Safety, Evaluation, Assessment.
Identifiers: Dose, *Dose commitment, Weapons testing, *Population exposure.

Calculations of future doses to individuals from ingested radioactive materials, both for estimating the consequences of radiopharmaceutical use and in connection with occupational exposure guidance, provide the firs examples of the use of the concept of dose commitment. In 1958 Lindell introduced expanded concepts which later developed into the United Nations Scientific Committee on the Effects of Atom Radiation (UNSCEAR) definition of 'dose commitment' in order to provide a measure of the public implication of fallout from atmospheric weapons testing. Recently, even broader concepts, variously termed the 'environmental dose commitment' and the 'collective dose commitment,' have been developed which encompass the total population impact of environmental levels of radioactive materials. The historical development, interrelationship, and functions of these concepts are examined with a view to defining their most useful present roles in radiation protection. (See also W75-04152) (Houser-ORNL)
W75-04153

THE USE AND MISUSE OF POPULATION EXPOSURES IN RADIATION PROTECTION,
Environmental Protection Agency, Research Triangle Park, N.C.
P. C. Tompkins.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tenn., p 9-16, 2 tab, 7 ref.

Descriptors: *Radioactivity, *Human population, *Public health, *Environment, Radioactivity effects, Environmental effects, Safety, Evaluation, Assessment, Technology, Assay, Fallout, Nuclear Explosions, Air pollution, Water pollution, Food chains.
Identifiers: *Dose, Weapons testing.

Estimates of population doses to ionizing radiation have been made by official and unofficial groups for at least 25 years. The general use of such estimates falls in two categories (1) establish the relative importance of different sources of population exposure to radiation and (2) technology assessment. The concept of the Dose Commitment was introduced by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in 1962 as a basis for evaluating the public health significance of fallout from nuclear weapons testing and is defined as the population dose accumulated over 'infinite' time associated

with one unit of practice. Using appropriate transport, uptake of physiological models, the integral dose to relevant tissues was calculated and the resulting estimate is representative of the mean dose to relevant tissues of the world population associated with complete decay of relatively long-lived nuclides such as 90Sr and 137Cs. (See also W75-04152) (Houser-ORNL)
W75-04154

CONSIDERATION OF BACKGROUND IN DEVELOPMENT OF ENVIRONMENTAL STANDARDS,
Georgia Inst. of Tech., Atlants. Office of Interdisciplinary Programs.
For primary bibliographic entry see Field 5G.
W75-04155

DATA NEEDS FOR THE ASSESSMENT OF POPULATION DOSE FROM BACKGROUND RADIATION,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W75-04156

THE USE OF AN AUTOMATED POPULATION DATA BASE IN POPULATION EXPOSURE CALCULATIONS,
Office of Radiation Programs, Silver Spring, Md. Electromaganetic Radiation Analysis Branch.
For primary bibliographic entry see Field 5A.
W75-04157

THE USE OF ENVIRONMENTAL MONITORING DATA IN DETERMINING BACKGROUND RADIATION DOSES,
Health Physics Society, East Weymouth, Mass.
For primary bibliographic entry see Field 5A.
W75-04158

ENVIRONMENTAL RADIATION MEASUREMENTS USING IN SITU AND CORE SAMPLING TECHNIQUES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-04159

POPULATION EXPOSURE TO NATURAL RADIATION BACKGROUND IN PUERTO RICO,
Puerto Rico Nuclear Center, Rio Piedras.
For primary bibliographic entry see Field 5B.
W75-04160

TEMPORARY BODY BURDENS IN DOSE-EFFECT STUDIES OF THE BRAZILIAN AREAS OF HIGH NATURAL RADIOACTIVITY,
Pontificia Universidade Catolica do Rio de Janeiro (Brazil); and Universidade Federal do Rio de Janeiro (Brazil).
L. E. Gonzales, C. C. Ribeiro, H. Mosse, T. H. Cullen, and W. C. Pfeiffer.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 61-72, 5 fig, 1 tab, 24 ref.

Descriptors: *Radioactivity, *Radioactivity effects, *Human population, *Sands, *Background radiation, Analytical techniques, Food chains, Diets, Epidemics, Epidemiology, Chromosomes, Cytological studies, Thorium, Uranium, Lead, Model studies.
Identifiers: *Brazil.

To investigate the possible dose-effect relationship of populations subjected to chronic, low level ionizing radiation, a multifaceted radiological analysis of the high background area in Guarapari is under way. Although its 12,000 population will not exhibit epidemiological manifestations, elevated rates of chromosome aberrations in the peripheral lymphocytes are observed when compared to a control population with a similar water and food supply. The chromosome break structure and the local presence in Guarapari of monazite sand containing up to 6% thorium and 0.3% uranium suggest an inhaled contamination due to alpha emitting radionuclides. A compatible study in a Rio de Janeiro gas mantle (Th02) factory was initiated to calibrate in an average way, the highly varying radiation environment of Guarapari. Here, 212Pb attached to submicron aerosols give concentrations up to 4 pCi/1 of air, and workers in this type of environment are observed to have chromosome aberrations rates higher than Guarapari. The resulting temporary body burdens have been assessed by extensive whole-body counting as a function of average air quality and time spent in and out of the factory. It shows daily variations with associated air concentrations, partial decay during off work hours and complete decay to individual backgrounds over a weekend period. A generalized phantom capable of modeling a wide variety of internally distributed radionuclides was developed to calibrate these temporary body burdens. Preliminary results for the average dose/work-year delivered to the cellular fraction of the blood as a critical organ are presented, and its implication on the cytogenetic and Guarapari studies are discussed. (See also W75-04152) (Houser-ORNL)
W75-04161

ENTRAINMENT OF STRATOSPHERIC TRITIUM: ANOTHER RADIOLOGICAL ANOMALY OF THE ROCKY MOUNTAIN WEST,
NUS Corp., Rockville, Md.
For primary bibliographic entry see Field 5A.
W75-04162

AS LOW AS PRACTICABLE: A CRITICAL APPRAISAL OF POPULATION HEALTH RISKS FROM POWER PLANT EFFLUENTS,
Brookhaven National Lab., Upton, N.Y.
For primary bibliographic entry see Field 5A.
W75-04163

A REVIEW OF EFFLUENTS, GENERAL POPULATION DOSES, AND OCCUPATIONAL DOSES RESULTING FROM COMMONWEALTH EDISON'S USE OF NUCLEAR POWER,
Commonwealth Edison Co., Chicago, Ill.
For primary bibliographic entry see Field 5B.
W75-04164

TRENDS IN POPULATION RADIATION EXPOSURE FROM OPERATING BWR GASEOUS EFFLUENTS,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-04165

POPULATION EXPOSURE ESTIMATES AS DERIVED FROM AN ENVIRONMENTAL ASSESSMENT OF LWR FUEL CYCLE FACILITIES. PART I: POPULATION DOSES FROM OPERATING FACILITIES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-04166

POPULATION EXPOSURE ESTIMATES AS DERIVED FROM AN ENVIRONMENTAL ASSESSMENT OF LWR FUEL CYCLE FACILITIES, PART II: LONG-TERM POPULATION DOSES FOLLOWING CESSATION OF PLANT OPERATIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-04167

DETERMINATION OF GAMMA-RAY EXPOSURE IN THE VICINITY OF A BOILING WATER POWER REACTOR,
Atomic Energy Commission, New York, New York, Health and Safety Laboratory.
For primary bibliographic entry see Field 5A.
W75-04168

PROJECTIONS OF RADIOACTIVE WASTES FROM THE NUCLEAR FUEL CYCLE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-04169

EFFECT OF STACK HEIGHT ON INDIVIDUAL AND POPULATION DOSES ATTRIBUTABLE TO GASEOUS EFFLUENTS FROM A MODEL FUEL REPROCESSING FACILITY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-04170

C-14 GASEOUS EFFLUENT FROM PRESSURIZED WATER REACTORS,
New York State Dept. of Health, Albany. Radiological Sciences Lab.
For primary bibliographic entry see Field 5A.
W75-04171

DOSIMETRY OF INTERNAL EMITTERS FOR POPULATION EXPOSURE,
Oak Ridge National Lab., Tenn.
W. S. Snyder.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 235-250, 6 fig, 3 tab, 22 ref.

Descriptors: Radioactivity, *Radioactivity effects, *Fallout, *Air pollution, *Water pollution, *Food chains, Diets, Milk, Foods, Social aspects, Economics, Cesium, Iodine, Strontium, Retention, Potable water, *Human population.
Identifiers: Age effect, Dose rate.

A population consists of fetuses, infants, children, adults, and the aged, yet the dosimetry of internal emitters for a population is usually based on the dose appropriate for an adult. This paper examines in some detail whether or not this practice is justified. The dimensions of the body and the masses of the organs vary by an order of magnitude or more with age; this changes the dose rate per photon by one or two orders of magnitude. The dose rate from electrons and alpha particles is generally inversely proportional to the mass of the organs; this also produces differences of an order of magnitude or more in different individuals. Fortunately, intakes of air, fluids, and food are, to some extent, proportional to body mass. However, if contamination is limited to water, milk, or certain foodstuffs, differences of intake with age or with socio-economic groups may be present. Additionally, there are differences in retention of the various radionuclides and their compounds which may greatly influence the total dose received. There is considerable evidence that infants and children have a shorter cesium and iodine biological half-time than adults. Changes of retention with age are indicated also for strontium, although the net effect is not so clear. Judged by the data on fallout, the net effect of dietary factors and retention does not appear large--perhaps a factor of two in the total dose received, except for iodine. However, for short-term intake the difference may be larger. (See also W75-04152) (Houser-ORNL)
W75-04172

MEASUREMENT OF ABSORBED FRACTIONS FOR PHOTON SOURCES DISTRIBUTED UNIFORMLY IN VARIOUS ORGANS OF A HETEROGENEOUS PHANTOM,
Oak Ridge National Lab., Tenn.

For primary bibliographic entry see Field 5A.
W75-04173

DECAY SCHEME DATA FOR RADIATION DOSE CALCULATIONS,
National Environmental Research Center, Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W75-04174

A METABOLIC MODEL FOR WHOLE BODY AND GI TRACT RETENTION IN A HUMAN INFANT DEDUCED FROM EXPERIMENTAL DATA ON SUCKLING RATS ADMINISTERED A SINGLE ORAL DOSE OF CERIUM-141 AT DIFFERENT AGES,
Oak Ridge National Lab., Tenn.
S. R. Bernard.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 267-274, 6 fig, 4 ref.

Descriptors: *Radioactivity, *Cerium, *Air pollution, *Water pollution, Absorption, *Human population, *Food chains, Retention, Radioactivity effect, Research and development, Model studies, Biology, Metabolism.
Identifiers: Population exposure, Dose, Inhalation, Ingestion, Age effect, GI tract.

Inaba and Lengemann (1972) administered single oral doses of 141Ce(NO3)3 via a stomach tube to nonfasted rats of ages 0, 7, 14, and 25 (weaned) days. They measured total body retention in all pups and GI tract retention in the pups dosed at birth. Over an interval of one month, when there is negligible loss of 141Ce from organs in the total body minus the GI tract and contents, the fractional retention in the total body is approximately given by the complement of a 20-term, cumulative, Poisson function, plus a constant. For fractional retention in the gut and contents, a formula is given which assumes permanent fixation of a fraction fg(A) in the gut walls. The parameters fg(A) and lambda A depend on the age at the time of administration of the 141Ce(NO3)3. In the formula, (lambda A t) to the 0 power for t = 0 is taken as unity. The model has been extrapolated to human retention. Dose has been estimated for a single intake of 1 micron Ci of 141Ce(NO3)3, assuming complete absorption of beta energy in the walls. The dose was about 6 rad if ingestion occurred at birth. The retention in the gut wall was taken as constant after 180 days, but the dose due to this retention was about 0.03 rad. The model and the dose estimate and its uncertainties are discussed. (See also W75-04152) (Houser-ORNL)
W75-04175

AGE FACTORS FOR DOSE RATES FROM AN INFINITE CLOUD OF A PHOTON EMITTER,
Oak Ridge National Lab., Tenn.
J. W. Poston, W. S. Snyder, and G. G. Warner.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 275-282. 4 fig, 2 tab, 5 ref.

Descriptors: Radioactivity, *Radioactivity effects, *Krypton, *Xenon, *Assessment, Age, Growth stages, Human population, Public health, Research and development, Model studies, Biology, Biocontrol.
Identifiers: Infinite cloud, Photons, *Population exposure, *Dose rate, *Age effect.

Estimates of dose to many of the various organs of the body have been given for an adult immersed in an infinite cloud of a photon emitter (Health Phys. 26, 287, 1974). Similar results are now available for phantoms representing individuals of ages 0 (newborn), 1, 5, 10, and 15 years of age. The ratio of the dose rates received per microcurie-hour of exposure of the younger individuals to that for the adult is examined. The results can be expressed as a set of curves, one for each target organ, and for the different ages. In general, the ratios are higher for the younger individuals and for the newborn are frequently higher by a factor of 10 or more. There are a number of departures from this simple generalization which can be interpreted in terms of depth of the organ below the surface of the body, photon energy, etc. These curves are convenient for calculation of the doses received by various segments of the population or for estimation of the average dose received by a population from an infinite cloud source. Examples are given for 85Kr and 133Xe. (See also W75-04152) (Houser-ORNL)
W75-04176

THE EFFECT OF DEPOSITION VELOCITIES ON ESTIMATES OF ENVIRONMENTAL TRANSPORT AND POPULATION DOSES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-04177

LOW LEVEL POPULATION EXPOSURE MEASUREMENTS USING THERMOLUMINESCENT DOSIMETERS,
Eastern Environmental Radiation Facility, Montgomery, Ala.
For primary bibliographic entry see Field 5A.
W75-04178

FIELD TESTING OF TSEE DOSIMETERS FOR PERSONNEL MONITORING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-04179

HEALTH EFFECTS OF FOSSIL FUEL POWER PLANTS,
Brookhaven National Lab., Upton, N. Y.
L. D. Hamilton, and S. C. Morris.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 305-316. 4 tab, 14 ref.

Descriptors: *Electric powerplants, *Fossil fuels, *Effluents, *Environment, *Coals, Effects, *Air pollution, *Water pollution, Public health, Assessment, Evaluation, Morbidity, Mortality, Epidemiology, Research and development.
Identifiers: Fuel cycle.

Most efforts to estimate national health and environmental effects of the energy system or their costs have proceeded from an overall estimate to an allocation of these costs to different portions of the energy system. Such analyses have not been realistic because they have not taken into account the varying ways in which emissions and resource uses produce effects; moreover, they have not been representative enough of local diversities. The Biomedical and Environmental Assessment Group of Brookhaven National Laboratory (BEAG) will estimate effects in specific circumstances, taking into account known variables, that will then be aggregated for national estimates. Each portion of the energy system will be analyzed and associated with a set of 'effects modules', i.e., effects common to different stages of various energy alternatives. Then, because the effects which result depend upon local conditions, appropriate sets of representative regions will be developed (about 20 for the U.S.). Effects estimates will be made for these regions and summed to obtain national estimates. (See also W75-04152) (Houser-ORNL)
W75-04180

COMPARATIVE POPULATION RADIATION DOSE COMMITMENTS OF NUCLEAR AND FOSSIL FUEL ELECTRIC POWER CYCLES,
Office of Radiation Programs, Washington, D.C.
J. E. Martin.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 317-326, 2 fig, 1 tab, 9 ref.

Descriptors: *Nuclear powerplants, *Fossil fuels, *Effluents, *Electric power production, Human population, Public health, Radioactivity effects, Coals, Uranium, Carbon.
Identifiers: Nuclear fuels, *Fuel cycle, *Population exposure.

Past comparisons of the radiological impact of electricity generation by fossil and nuclear fuels have focused on doses to individuals from the power plants and have excluded impacts from the total cycle on the total population. A comprehensive perspective of the radiological impact of a decision to generate electricity by one means or the other is properly based on the total fuel cycle impact and the long-term total effects (environmental dose commitments) on populations. This comparison, using the Biological Effects of Ionizing Radiation (BEIR) Committee data, is made between a typical light-water reactor uranium fuel cycle and a typical coal fuel cycle, which discharges trace amounts of naturally-occurring radioactivity. When compared on this basis the uranium fuel cycle population impacts are found to be predominately from long-lived radionuclides discharged in supporting parts of the cycle; the population impact from the coal cycle is primarily at the power plant. However, the introduction of nonradioactive carbon by coal combustion represents an offsetting factor, per unit of electricity produced, in that it reduces the environmental dose commitment of carbon-14 generated and released by the nuclear fuel cycle. On the basis of radiological impact alone, the long-term population impact of the nuclear fuel cycle appears to exceed that of the coal fuel cycle by a significant margin. (See also W75-04152) (Houser-ORNL)
W75-04181

CONDOS-A MODEL AND COMPUTER CODE TO ESTIMATE POPULATION AND INDIVIDUAL RADIATION DOSES TO MAN FROM THE DISTRIBUTION, USE AND DISPOSAL OF CONSUMER PRODUCTS THAT CONTAIN RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-04182

POPULATION EXPOSURE FROM HIGH-ENERGY ACCELERATORS,
California Univ., Berkeley. Lawrence Berkeley Lab.
L. D. Stephens, R. H. Thomas, and S. B. Thomas.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 333-346, 7 fig, 2 tab, 31 ref.

Descriptors: *Nuclear energy, Facilities, Operations, *Radioactivity, *Kinetics, *Neutron absorption, Radiation, Human population, Public health, Air pollution, Water pollution, Ion transport, Properties, Safety, Evaluation.
Identifiers: *Accelerators, *Personnel exposure, High-energy.

There is increasing interest in estimating the magnitudes of population exposure due to the operation of nuclear facilities. The population exposures that might result from high energy accelerators are described. External whole body radiation is the dominant type of radiation exposure, while exposure resulting from the leakage of radionuclides into the atmosphere or ground water is negligible. At large distances from operating accelerators, neutrons are the predominant form of radiation. The transport of high-energy neutrons through the atmosphere is not well understood at distances greater than about 1000 meters from the radiation

source. Consequently, estimates of population exposure out to distances of 80 km from high energy accelerators may be quite inaccurate. It is extremely important that health physicists and administrators be aware of the limitations of estimates of population exposure. A model is described which facilitates the estimation of population exposure due to accelerators and its limitations are discussed. Suggestions are made for experimental investigations which would improve the model. (See also W75-04152) (Houser-ORNL)
W75-04183

ESTIMATION OF THE DOSE EQUIVALENT TO THE U.S. POPULATION FROM RADON IN LIQUIFIED PETROLEUM GAS,
Texas Univ., Houston. School of Public Health.
For primary bibliographic entry see Field 5A.
W75-04184

RADIATION DOSE FROM NATURAL GAS VS. THAT FROM NUCLEAR STIMULATED NATURAL GAS,
Georgia Inst. of Tech., Atlanta. Office of Interdisciplinary Programs.
For primary bibliographic entry see Field 5A.
W75-04185

LARGE SCALE NUCLEAR GAS STIMULATION: POPULATION DOSES ESTIMATED IN THE ENVIRONMENTAL ASSESSMENT OF CARBON-14 RELEASES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-04186

PHILOSOPHY AND METHODOLOGY OF ASSESSMENT OF RADIATION DOSES TO POPULATIONS FROM COMBUSTION PRODUCTS OF PLOWSHARE NATURAL GAS,
Oak Ridge National Lab., Tenn.
C. J. Barton, R. E. Moore, and P. S. Rohwer.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 369-374, 18 ref.

Descriptors: Nuclear explosions, *Secondary recovery(Oil), *Natural gas, *Radioactivity, *Tritium, *Krypton, Carbon, *Human population, Environmental effects, Public health, Absorption, Path of pollutants, Food chains.
Identifiers: *Population exposure, Consumer products, Inhalation, Carbon-14.

Methods of assessing radiation doses (hereafter referred to as doses) to individuals and to populations that could result from exposure to compustion products of natural gas produced in wells stimulated by use of nuclear explosives have evolved from work on the Gasbuggy project, the first joint industry-AEC project to use a nuclear explosive to increase natural gas production. Tritium was identified as the radionuclide of principal concern; krypton-85 and carbon-14 are the other long-lived radionuclides present. These dose estimations are theoretical in nature, but efforts are made to make them as realistic as possible by obtaining gas usage data from gas transmission and distribution companies. Studies related to the second nuclear stimulation project, Rulison, have provided improved techniques for calculating population doses from both point and area sources through use of computer codes. The only information from the third nuclear stimulation project, Rio Blanco, that is used is wellhead radionuclide concentrations. Attention has focused primarily on tritium (HTO) inhalation and skin absorption doses which are believed to be the critical exposure pathways. Persons exposed in homes to combustion products from unvented appliances such as kitchen ranges are believed to be the critical exposure population. Some attention has been devoted to other exposure pathways, principally those involving ingestion of consumer products by people. Illustrative results are presented for each technique described. (See also W75-04152) (Houser-ORNL)
W75-04187

IRRADIATED FUEL AND CONTROL RODS TRANSPORT FROM A DECOMMISSIONED POWER REACTOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5E.
W75-04188

EXPOSURES DURING THE TRANSPORTATION OF RADIOACTIVE MATERIALS,
American Insurance Association, Washington, D.C.
S. M. Fastman.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 383-388, 1 tab.

Descriptors: *Transportation, Materials, *Radioactivity, Risks, *Insurance, Operations research, Accidents, Hazards, *Safety, Evaluation, Regulation, Standards, *Human population, Public health, Waste disposal, Nuclear powerplants.
Identifiers: Personnel exposure, *Population exposure.

Radiation exposure during the transportation of radioactive materials under normal conditions is discussed. This analysis is based on average conditions as to radiation levels outside of packages, shipping distances, exposure times, distances from shipments and the number of people exposed. The radiation risk that develops from transportation accidents involving nuclear materials also is described. The frequency of transportation accidents in general is evaluated. Projections are made to determine the frequency of accident involving radioactive materials. The limits on radiation levels from individual packages of radioactive materials as well as surface contamination restrictions on such packages are described. External radiation exposure levels for truck drivers, freight handlers, and the general public are given for the transportation of unirradiated fuel, irradiated fuel, and solid radioactive waste under normal conditions. The release of radioactivity during accident conditions is also evaluated. An evaluation is given of the consequences of transportation accidents involving shipments of nuclear fuel or solid radioactive waste. Estimates of the amount of radioactive material released in the unlikely event that a container is breached are provided, taking into account engineering assessments of a variety of package designs, actual accident experience, fuel and radioactive waste properties and experience in shipment, reactor operation and storage. (See also W75-04152) (Houser-ORNL)
W75-04189

EXPOSURES TO FIVE TARGET HEALTH HAZARDS,
Occupational Safety and Health Administration, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-04190

BIOMEDICAL EVALUATION OF LOW FREQUENCY (LONG WAVE) ELECTROMAGNETIC RADIATION ASSOCIATED WITH ELECTRIC POWER TRANSMISSION,
Illinois Univ. Medical Center, Chicago, Ill. School of Public Health.
R. S. Pogrund.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 2-24, 1974, Knoxville, Tennessee, p 395-404, 1 tab, 22 ref.

Descriptors: *Public health, *Hazards, *Electric power, Fossil fuels, Effluents, Nuclear powerplants, *Radiation, *Radioactivity, Operations, Accidents, Fallout, Air pollution, Water pollution, Gages, Inhalation, Safety, Evaluation, Risks, Radioactivity effects, Radio waves, Genetics, Biology, Biological control.
Identifiers: *Nuclear fuels.

Considerable scientific attention has focused on the possible hazards to human health from such sources of electric power as nuclear and fossil fuels. These hazards have been associated with the release of ionizing radiation during normal reactor operation or accident, as well as human inhalation of gaseous and particulate effluents during the burning of fossil fuels. The safety aspects to human health from these sources for generating electric power have and should be emphasized, but the transmission of the end product itself, electric power, deserves a more serious safety consideration. This becomes especially significant when an industrialized society requires an increasing quantity of electric power whose physical lines of transmission may emit non-ionizing electromagnetic radiation. This radiation may be characterized as extremely low frequency (well below the microwave spectrum or the RF fields generated by television, radar, or radio transmitters). Biomedical or psychophysiological data that show subtle effects upon certain populations that may be at risk due to residential proximity to transmission lines, or to genetic susceptability are reviewed. The central nervous system via electroencephalogram (EEG) is cited particularly for the involved resonant frequencies. (See also W75-04152) (Houser-ORNL)
W75-04191

AN EXAMINATION OF DESIGN PARAMETERS IN A FIELD STUDY FOR EXPOSURE EVALUATION,
Eastern Environmental Radiation Facility, Montgomery, Ala.
For primary bibliographic entry see Field 5A.
W75-04192

POPULATION EXPOSURE TO NATURAL TERRESTRIAL GAMMA RADIATION AROUND SELECTED NUCLEAR POWER PLANT SITES,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W75-04193

ASSESSMENT OF PUBLIC RADIATION EXPOSURE IN THE VICINITY OF U.S. AEC SITES,
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-04194

THERMAL POLLUTION PROBLEMS IN POLAND,
Water Economics Research Inst., Warsaw (Poland). Dept. of Water Chemistry and Biology.
J. Dojlido.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 70-75. 1 tab.

Descriptors: *Thermal pollution, *Powerplants, *Water quality, *Environmental effects, Water temperature, Water cooling, Rivers, Lakes, Ecology.
Identifiers: *Poland.

The heat discharge from power plants in Poland is considered an important source of pollution because of the large influence on surface water quality and biocenosis. In the past only a few

power plants worked with open-cooling systems that utilized surface water. Many power plants now being built and planned will use surface water for cooling and this will create an increase in local thermal discharge and in water temperature downstream. This additional heat will accentuate the existing pollution problem. Data presented showed that only one-quarter of Poland's rivers are really clean. Nearly 30% of the rivers are seriously polluted, exceeding all permissible limits, and cannot be used for any purpose unless treated in very sophisticated and expensive ways. Broad research on the influence of thermal discharge on water quality in Poland is being conducted to eliminate adverse effects and to collect a large amount of data that may be used to predict thermal effects on water quality of slow-flowing, shallow rivers. (See also W75-04213) (Humphreys-ISWS)
W75-04218

SOME BIOLOGICAL ASPECTS OF AQUATIC THERMAL DISCHARGES,
Yale Univ., New Haven, Conn. Dept. of Biology.
D. Merriman.
In: Water for the Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 154-164. 40 ref.

Descriptors: *Thermal pollution, Marine biology, *Nuclear powerplants, *Ecosystems, *Heated water, Water temperature, Thermal capacity, Biology, Eutrophication, Water properties, Temperature, Aquatic microorganisms, Environment, Environmental effects, Fish, Productivity, Ecology, Entrainment, Aquatic environment, *Connecticut River.
Identifiers: Connecticut River.

Aquatic ecology and thermal effects, industrial and natural were discussed. The specific case of the operation of the Connecticut Yankee Atomic Power Company plant was discussed as a documented pre- and post-operative study (1965-1972) of the ecosystem. Pertinent problems of entrainment and the passage of anadromous fish were outlined, and the conclusion points to the matters of plant siting and the achievement of rational balance between the desirable ecology and the necessary economy. (See also W75-04213) (Henley-ISWS)
W75-04225

THERMAL POLLUTION ASPECTS IN EUROPE,
Ente Nationale per l'Energia Elettrica, Florence (Italy). Compartimento di Firenze.
For primary bibliographic entry see Field 5B.
W75-04226

THERMAL POLLUTION OF THE GREAT LAKES -- A NON-PROBLEM,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W75-04231

REJUVENATION OF THE BUFFALO RIVER,
State Univ. Coll., Buffalo. Great Lakes Lab.
R. A. Sweeney.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 445-455. 1 fig, 4 tab, 15 ref.

Descriptors: *Pollution abatement, *Low-flow augmentation, *Phosphates, *Domestic wastes, *Detergents, Sediments, Cooling water, Stagnant water, Chemical analysis, Sampling, Oxygen, Alkalinity, Conductivity, Nitrogen, Chemical oxygen demand, Biochemical oxygen demand, Phytoplankton, Algae, Oil pollution, *New York, Ammonium salts.
Identifiers: *Benthic macroinvertebrates, *Buffalo River(NY).

The improvements observed in the quality of life in the Buffalo River during the past 7 years have exceeded the most optimistic predictions made prior to the initiation of the Buffalo River Improvement Project and the abatement of pollution by industry. The decrease in quantities of phosphates discharged to the river through the removal of phosphates from detergents sold in Erie County also has had a substantial positive impact on the Buffalo River ecosystem. The phosphate content of detergents was limited to 8.7% phosphorus sold after April 1, 1971 and 0.5% after January 1, 1972. Domestic sewage remains the pollution problem in the river. During the past 3 years, this problem has increased. While funding for the improvement of swage treatment plants was available through state and federal agencies, none was secured by the communities presently discharging to the river. Until a comprehensive sewage treatment plan is implemented in the Buffalo River watershed, the full benefits of the water pollution abatement efforts that have been initiated will not be realized. (See also W75-04213) (Schicht-ISWS)
W75-04248

NATURAL PHOSPHATE REMOVAL MECHANISMS IN SOUTH FLORIDA LAKES,
Miami Univ., Coral Gables, Fla. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-04250

THE EUTROPHICATION AND POLLUTION OF LAKE PAIJANNE, CENTRAL FINLAND,
Hydrobiological Research Inst., Jyvaskyla (Finland).
K. Granberg.
Ann Bot Fenn, Vol 10, No 4, p 267-308, 1974
Identifiers: Diversity indices, Effluents, *Eutrophication, *Finland(Lake Paijanne), Lakes, Phosphorus, *Phytoplankton, Pollution, Pulp wastes, Species, Water pollution effects.

The eutrophication and pollution of Lake Paijanne in Central Finland was examined with reference to the primary production. The value of the phytoplankton biomasses and some indicator systems for the assessment of trophic and pollutional status was compared with that of the primary production. The effect of pulp mill effluents on primary production and dark assimilation was examined. A rough model of eutrophication was constructed with the aid of species diversity indices. The saprobity system of Caspers and Karbe was applied to Lake Paijanne, and an attempt was made to estimate the bioactivity of the lake. Results showed that primary production was correlated with the correlated with the mean total P concentration of the growing season, except in those areas where production was inhibited by the pulp mill effluents. Phosphorus is still the factor limiting primary production in Lake Paijanne. The mean phytoplankton biomasses of the growing season correlate well with total P concentration, thus being an index of trophic status. According to the results, the bioactivity of a lake expresses the combined effect of eutrophication and pollution. The course of the eutrophication and pollution of Lake Paijanne was traced.--Copyright 1974, Biological Abstracts, Inc.
W75-04264

THE EFFECT OF SALINITY ON A MARINE AND A FRESHWATER ASCOMYCETE,
Wyoming Univ., Laramie. Dept. of Botany.
D. E. Davidson.
Can J Bot, Vol 52, No 3, p 553-563, 1974.
Identifiers: *Ascomycete, Biomass, Cellular, Ecology, *Lulworthia-medusa, Marine, Metabolism, *Ophiobolus-graminis, Respiration, *Salinity, Sea water, Growth rates.

Lulworthia medusa, the marine isolate, grew significantly better in seawater than in freshwater medium. The growth of Ophiobolus graminis, the freshwater isolate, was reduced by 1/2 when grown in seawater. The growth of both species was similar in natural and artificial seawater. Neither species grew under anaerobic conditions. Warburg reaction indicate that the respiration of the freshwater species is reduced in seawater. The percentage reduction is about equal to the reduced growth in seawater, as compared to freshwater. The respirational rates of L. medusa in sea and freshwater were similar. Yet growth in seawater was much greater than in freshwater. Consequently, it is proposed that the respiratory energy produced in a freshwater environment is utilized for cellular functions other than biomass increase. In contrast to the marine isolate, the metabolic processes of O. graminis are severely affected by seawater. Ecological implications of the findings are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04267

SAGINAW BAY: AN EVALUATION OF EXISTING AND HISTORICAL CONDITIONS,
Michigan Univ., Ann Arbor. Great Lakes Resource Management Program.
P. L. Freedman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 232-440, $5.75 paper copy, $2.25 microfiche. Report No. EPA-905/9-74-003, April 1974. 137 p, 19 fig, 6 tab, 111 ref, 2 append. EPA Contract No. 68-01-1577.

Descriptors: *Water quality, *Baseline studies, *Aquatic microbiology, Water pollution, *Water pollution effects, Impaired water quality, Thermal pollution, Aquatic environment, Sewage effluents, Industrial wastes, Eutrophication, Phytotoxicity, Turbidity, Sedimentation, Great Lakes, *Lake Huron, *Michigan.
Identifiers: *Saginaw Bay(Mich), Saginaw River.

The water quality in Saginaw Bay has deteriorated from its natural Lake Huron character because of man's overburdening use. Both the physical-chemical and biological characteristics indicate deteriorating conditions and trends. Existing information on Saginaw Bay was compiled and evaluated and its present status was documented. Water quality and trophic status were evaluated with regard to physical, chemical, and biological parameters. Efforts were made to identify the community structure of aquatic plant and animal populations. Further emphasis was placed on the identification and nature of water-quality variations and trends and the impact of contaminant sources on the system. (Gibb-ISWS)
W75-04278

BIOLOGICAL PROCESSES INVOLVED IN POLLUTION OF COASTAL AQUACULTURE WATERS,
Central Inland Fisheries Research Inst., Barrackpore (India).
V. Gopalakrishnan.
In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 1-7, 18 ref.

Descriptors: *Primary Productivity, *Aquaculture, *Estuaries, *Environmental Effects, *Growth Rate, Pollutants, Coastal, Metabolism, Reproduction, Estuarine Fisheries, Shellfish, Commercial Fish, Biochemical Oxygen Demand, Dissolved Oxygen, Plankton, Toxicity, Industrial Wastes, Domestic Wastes.
Identifiers: Coastal Aquaculture.

An analysis of the basic biological processes involved in the pollution of coastal zone waters is presented and the direct and indirect effects of pollution on primary production, metabolism, growth and reproduction are discussed in the context of coastal aquaculture. (Katz)
W75-04281

TOXICITY OF ZINC AND CYGON, APPLIED SINGLY AND JOINTLY, TO ZEBRAFISH EMBRYOS,
New York Univ., N.Y. Dept. of Biology.
R. R. Roales, and A. Perlmutter.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No. 4, p 475-480, October, 1974. 1 fig, 3 tab, 29 ref.

Descriptors: *Zinc, *Embryonic Growth Stage, *Toxicity, *Organophosphoris pesticides, Mortality, Pesticides, Bioassay, Laboratory tests, Lethal limits, Metals, Water pollution effects.
Identifiers: Brachydanio rerio, *Zebrafish, *Cygon, Pollutant interactions.

The interaction of zinc and Cygon, as well as their individual actions, on zebrafish embryos are examined. The 24, 48 and 72 hour median tolerance limits (Tlm) for both substances were determined and it was indicated that the embyros were more resistant to Cygon. Zinc, at low doses, was found to be antagonistic to the toxic action of Cygon on these embryos. At other levels tested, zinc and Cygon may interact additively. (Katz)
W75-04282

PHYTOPLANKTON ENRICHMENT EXPERIMENTS AND BIOASSAYS IN NATURAL COASTAL SEA WATER AND IN SEWAGE OUTFALL RECEIVING WATERS OFF SOUTHERN CALIFORNIA,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. H. Thomas, D. L. R. Seibert, and A. N. Dodson.
Estuarine and Coastal Marine Science, Vol. 2, No. 3, p 191-206, 1975 4 tab, 8 fig, 26 ref.

Descriptors: *Algae, Nutrients, *Nutrient requirements, Water analysis, *Sewage effluents, *Phytoplankton, Nitrogen, Growth rates, *Bioassay, Primary productivity, *California, On-site data collections, Laboratory tests, Surface waters, *Eutrophication, Sewage Treatment, *Fluorescence.
Identifiers: Receiving waters.

Nutrient enrichment experiments with near-shore Southern California surface water showed that nitrogen was the principal nutrient limiting phytoplankton growth. Bioassays of receiving waters taken above major sewage outfalls were carried out using representative Southern California phytoplankton cultures. The bioassays showed that the receiving waters were sometimes stimulatory, and at other times inhibitory, to algal growth. These studies were done using in vivo fluorescence to measure the growth of the algae. In cultures, cell division rates and increases in in vivo fluorescence were comparable and this indicates that fluorescence is a reasonable way of following growth. (Katz)
W75-04283

THE EFFECT OF CADMIUM ON POPULATION GROWTH IN THE GREEN ALGA SCENEDESMUS QUADRACAUDA,
State Univ. of New York, Buffalo. Dept. of Biochemistry.
E. Klass, D. W. Rowe, and E. J. Massaro.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 4, p 442-445, October 1974. 1 tab, 1 fig, 17 ref.

Descriptors: *Algae, *Cadmium, *Toxicity, *Industrial wastes, Scenedesmus, Heavy metals, Primary productivity, Laboratory Tests, Environmental effects, Water quality, Water quality control, Water pollution effects.
Identifiers: *Scenedesmus quadracauda.

As a result of industrial utilization, cadmium is present in increasing levels in the environment. This study examines the toxicity of cadmium to the freshwater alga Scenedesmus quadracauda. Results of experimentation indicate that there is no significant effect of cadmium on mean population size in concentrations below 6.10 ppb. Significant differences were observed between control media and progressive increases of Cd2+ concentrations. At 6.10 ppb, an inhibitory effect is observed. Severe growth inhibition is observed at 61 ppb; this may be due to enzyme inhibition. (Katz)
W75-04284

EFFECTS OF PHTHALATE ESTERS ON SHRIMP,
Sapporo Medical Coll. (Japan). Dept. of Public Health.
N. Sugawara.
Bulletin of Environmental Contamination and Toxicology, Vol 12 No 4 p 421-424, October, 1974. 1 fig, 1 tab, 6 ref.

Descriptors: Pollutants, *Industrial wastes, *Toxicity, *Lethal limit, Water pollution effects, Invertebrates, Immature growth stage, Mortality, Hatching, Brine shrimp, Environmental effects, *Shrimp.
Identifiers: *Phthalate esters, DEP, DMP, DBP.

Phthalate esters have become increasingly significant as pollutants with the increasing production of plastics. To estimate the toxicity of phthalate esters to freshwater invertebrates, the effect of phthalate esters on hatching of shrimp eggs and the mortality of the nauplius or larvae stage was tested. Toxic order of three tested substances was DBP much greater than DEP greater than DMP. (Katz)
W75-04285

UPTAKE OF CHLORINATED PARAFFINS AND PCB FROM SUSPENDED SOLIDS AND FOOD BY JUVENILE ATLANTIC SALMON,
Fisheries Research Board of Canada, St. Andrews (New Brunswick). Biological Station.
V. Zitko.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 4, p 406-412, October, 1974. 4 tab, 10 ref.

Descriptors: Polychlorinated biphenyls, *Bioassay, *Atlantic Salmon, *Toxicity aroclor, Laboratory tests, Suspended solids, Pesticides, Mortality, *Absorption, Water pollution effects.
Identifiers: *Bioaccumulation, *Chlorinated paraffins.

Chlorinated paraffins have been suggested as PCB substitutes in many applications. The uptake of chlorinated paraffins with 40% and 70% chlorine, and of PCB with 54% chlorine, by juvenile Atlantic Salmon was described. The preparations were administered in food and absorbed on silica. Results showed that chlorinated paraffins were significantly less accumulated by juvenile Atlantic Salmon than was PCB. Chlorinated paraffins at 10 and 100 micro g/g in food were very likely toxic to juvenile Atlantic Salmon, but additional experiments are required to confirm the conclusion. (Katz)
W75-04286

ACUTE TOXICITY OF A ZINC-POLLUTED STREAM TO FOUR SPECIES OF SALMONIDS,
Colorado Div. of Wildlife, Fort Collins. Fisheries Research Center.
R. B. Nehring, and J. P. Goette, Jr.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 4, p 464-469, October, 1974. 5 tab, 4 ref.

Descriptors: *Salmonids, *Zinc, *Toxicity, *Bioassay, *Trout, Water pollution effects, Laboratory tests, Rainbow trout, Brown trout, Brook trout, Cutthroat trout, Lethal limit, Streams, Heavy metals, Mine wastes, Water pollution sources, Methodology, Water quality.

Research was done to compare laboratory zinc bioassay results with the toxic effects of a zinc-polluted stream on rainbow trout, and to compare the relative sensitivities of rainbow, brown, cutthroat and brook trout species to zinc. Fish were exposed to different dilutions of water from a stream polluted by zinc for 14 days. The TL50 for rainbow trout was 0.41 mg zinc/liter. TL50 values determined for zinc on brown trout, cutthroat trout and brook trout were 0.64, 0.67, and 0.96 mg/1, respectively. (Katz)
W75-04287

EFFECT OF TURBIDITY ON ALGAL GROWTH,
Illinois State Water Survey, Urbana.
W-C, Wang.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 399, $3.25 in paper copy, $2.25 in microfiche. Circular 121, 1974. 12 p, 8 fig, 5 tab, 22 ref.

Descriptors: *Eutrophication, *Algae, *On-site investigations, *Laboratory tests, *Illinois, Rivers, Sampling, Surveys, Analytical techniques, Evaluation, *Turbidity, Nutrients, Testing procedures, Water analysis, Incubation, Algal control.
Identifiers: *Illinois River(Ill), *Fox River(Ill), Algal growth.

A comparative study was made to determine the effect of water turbidity on algal growth. The growth of algae in Illinois River water which is characterized by turbid conditions and generally void of algal blooms was compared with algal growth in Fox River water which is generally clear except during periods of frequent algal blooms. Biweekly water samples were taken from the Illinois River at Peoria and the Fox River at Oswego and at Dayton. Half of each sample was filtered through 0.45 micrometer membrane filter to remove all particulate matter. The filtered portion and the remaining unfiltered sample were separately inoculated, and the algal growth potential of each fraction was determined under various incubation conditions. The experimental results suggest that high turbidity conditions retard algal growth, a light-inhibition effect. In some cases, however, particulate matter appeared to stimulate algal growth. (Humphreys-ISWS)
W75-04306

EXPERIMENTAL DATA FOR HYGIENIC STANDARDIZATION OF DIHYDROPEROXIDE META-DIISOPROPYLBENZE IN SURFACE WATERS, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
A. G. Ilichkina.
Gig Sanit. Vol 38, No 3, p 108-110. 1973.
Identifiers: Bacterial studies, *Benzene compounds, Chick, Embryos, *Hygienic standards, Microorganisms, Pollution, Rabbit, Rat, Surface waters, *Chemical analysis, Organic compounds, Water quality standards, *Lethal limit, *Toxicity, *Bactericides, Water pollution effects.

Quantitative chemical analysis of dihydroperoxide meta-diisopropylbenzene (DHP-M) was done in surface waters. Stability, stimulating effect on growth of saprophytic microflora, bacteriostatic and bactericidal effects were evaluated. DHP-M had an adverse effect on the process of mineralization of N-containing organic substances. Toxicological studies were done in white rats, rabbits and chick embryos. Concentrations of DHP-M should not exceed 1 mg/l. Toxicological data was the limiting factor.--Copyright 1974, Biological Abstracts, Inc.

W75-04319

PRELIMINARY STUDY OF PHYTOPLANKTON OF LAKE ST. LOUIS, A BROADENING OF THE ST. LAWRENCE RIVER NEAR MONTREAL, QUEBEC, (IN FRENCH),
Montreal Univ., (Quebec). Dept. of Biological Sciences.
E. Alaerts-Smeesters, and E. Magnin.
Can J Bot. Vol 52, No 3, p 489-501. 1974 English summary.
Identifiers: *Canada(Quebec), Dominant species, *Phytoplankton, Rivers, Seasonal, *St. Lawrence River, *Lake St. Louis(Canada).

Samples (17) were collected at regular intervals from Sept. 1970-Dec. 1971 from 4 sites on lake St. Louis; these stations received their water either from the St. Lawrence River, the Ottawa River, or both. For each species and sample of the 178 phytoplankton entities found, the number of cells/liter was estimated. The distribution of plankton organisms at each station as well as the seasonal variation of the major systematic groups and the dominant species, were given.--Copyright 1974, Biological Abstracts, Inc.
W75-04335

MORE STREAMFLOW AFTER A BARK BEETLE EPIDEMIC,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-04342

5D. Waste Treatment Processes

IMPROVED PROCESS FOR TREATING WATER AND WASTEWATER,
P. Lin.
US Patent No 3,855,125, 7 p, 8 fig, 4 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 1204, December 17, 1974.

Descriptors: *Patents, *Neutralization, *Industrial wastes, *Waste water treatment, Pollution abatement, Water pollution control, Phosphates, Acids, Turbidity, Lime, Calcium carbonate, Calcium sulfate.
Identifiers: Thermal fracture.

A process is disclosed for neutralizing acids in industrial wastes and to remove contaminants such as phosphates, acids and turbidity in wastewater. The steps consist of mixing with the wastewater a material consisting of a core of lime having a shell of distinctly cracked calcium salt derived by heating such material to a temperature above 600 deg C for a period of two to forty minutes and suddenly quenching such material by cooling to room temperature to induce thermal fracture. The distinctly cracked calcium shell then has access channels to the core. The shell is selected from the group consisting of calcium sulphate and calcium carbonate. The next step consists of collecting and separating sludge formed as a byproduct of reaction between the lime core and the contaminants to obtain clean water. (Sinha-OEIS)
W75-03857

OXYGENATION OF WASTE WATER,
P. W. Garbo.
US Patent No 3,855,120, 5 p, 2 fig, 8 ref; Official Gazette of the United States Office, Vol 929, No 3, p 1202, December 17, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Oxygenation, *Biochemical oxygen demand, Pollution abatement, Water pollution control, Water quality control, Sands.
Identifiers: Slag, Alumina, Feldspar, Granite, Hematite, Coke, Glass.

Sewage or other waste water is passed together with oxygen-containing gas upward through a turbulent mass of solid contact particles. The randomly moving contact particles such as coarse and collide with the pollution solids and effect a fine dispersion of the oxygenating gas throughout the liquid suspension. The pollution solids are thus subjected to attrition by the turbulent mass of contact particles. The fine dispersion of oxygenating gas makes intimate contact with the suspended solids and dissolved solids of the sewage or waste water with the result that its oxygenation is accelerated. The water upflow is regulated not to exceed 500 gallons per minute per square foot of horizontal cross-section of the expanded and turbulent mass of solid contact particles. The oxygenating gas supplied to the process has an oxygen content of at least about 60% by volume, and the BOD-containing water and the oxygenating gas are maintained at elevated pressure higher than hydrostatic pressure while flowing up through the expanded and turbulent mass of solid contact particles. Water rising above the top of the expanded and turbulent mass of solid contact particles is recycled to the bottom of the mass for flow up through the mass at a rate not exceeding 20 volumes of the recycled water per volume of BOD-containing water being supplied to the process. The solid contact particles are selected from the group of materials consisting of sand, alumina, feldspar, granite, hematite, slage, coke and glass. (Sinha-OEIS)
W75-03858

PROCESS AND DEVICE FOR PURIFICATION OF EFFLUENTS CONTAINING PHENOLS AND AMMONIUM SALTS,
Societe pour l'Equipment des Industries Chimiques, Paris (France). (assignee)
P. Marecaux.
US Patent No 3,855,076, 4 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 1189, December 17, 1974.

Descriptors: *Patents, Water purification, *Phenols, *Ammonium salts, *Waste water treatment, Pollution abatement, Water pollution control, Evaporation, Effluents, Equipment.
Identifiers: *Caustic alkali, Multi-stage evaporators, Coking plants, Sodium hydroxide.

The purification of effluents containing phenols and ammonium salts especially those derived from coking plants is described. The process comprises adding sufficient caustic alkali to the effluent to convert the ammonium salts with strong acids into ammonia; partially evaporating the resulting liquid mixture to remove as vapor, ammonia and other volatile constituents; incinerating the vapor thus produced; evaporating the remaining liquid to produce vapor and a concentrate; scrubbing the vapor so obtained with a solution of caustic alkali; incinerating the concentrate; and discharging the scrubbed vapor and the products of the incineration. Since all the volatile components and especially ammonia are removed by the preliminary treatment, the liquid which is concentrated by evaporation contains only phenols as volatile products, which, when vaporized, are held back by the scrubbing with caustic alkali solution. Thus the condensate from the evaporation is only practically pure water and only the final concentrate containing the greater part of the impurities needs to be incinerated. The invention includes a device comprising an incineration furnace; a steam boiler; a column for partial evaporation to receive effluent after it has been rendered alkaline; a duct to convey the vapors from the column to the incineration furnace; a multi-stage device for evaporating the liquid, which has means for scrubbing the vapors produced by bubbling them through a solution of caustic alkali; and a duct for conveying concentrate from the multi-stage evaporation device to the incineration furnace. (Sinha-OEIS)
W75-03859

APPARATUS FOR DETERMINING ORGANIC CARBON CONTENT OF POLLUTED LIQUIDS,
For primary bibliographic entry see Field 5A.
W75-03861

PLANT FOR TREATING WATER, IN PARTICULAR SEWAGE OR SLUDGE,
Sulzer Bros. Ltd., Winterhur (Switzerland). (assignee)
E. Bosshardt.
US Patent No 3,854,875, 3 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 1135, December 17, 1974.

Descriptors: *Patents, *Sewage treatment, *Irradation, *Waste water treatment, Pollution abatement, Water pollution control, Sludge, Equipment, Microorganisms.
Identifiers: *Gamma radiation, Germs.

The water treatment plant is operated on a batch basis with sludge repeatedly circulated past a source of gamma radiation in order to destroy harmful germs in the sludge batch. After a number of circulations, the batch of sludge is flushed into a collecting vessel for subsequent removal. The sludge batch is passed by the radiation source through a large flow cross-section and at a high flow velocity. The plant achieves a uniform radiation of each batch. (Sinha-OEIS)
W75-03862

SELF-CLEANING FILTER FOR HYDROLOGICAL REGENERATION,
E. S. Perkins.
US Patent No 3,854,291, 3 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 929, No 3, p 945, December 17, 1974.

Descriptors: *Patents, Dams, *Water pollution treatment, *Filtration, Pollution abatement, Rivers, *Sewers, *Conduits, Rainfall, *Waste water treatment.

An improved dam system is described wherein polluted water is filtered and the filter is periodically cleaned by automatic backwash due to varying levels of the stream. A plurality of holding dams are mounted in a stream. Each holding dam is formed with a filter portion which receives the principal polluted liquids carried by water tight sewage conduits, which are placed under the stream bed and extend between dams. The sewer conduit supplies its output to a gravity feed filter formed in the dam between its upstream and downstream edges such that the polluted liquid pass through the filter and into conduits which deliver it into the holding pool above the upstream side of the dam. Discharge conduits extend from the holding pool on the upstream side of the dam to the dam and discharge the filtered and purified water to the downstream flow. During periods of unusually high rainfalls the water in the holding pool rises and reaches a level which will cause the discharge conduits through the dam to close and the water will continue to rise and flow over the top of the dam. As the water recedes the head in the holding pool becomes greater than that in the filter and the water passes through the filter in reverse direction, thus backwashing and cleaning the filter. An output from the filter portion of the dam is provided which connects with the underground sewer conduit for the next section of the stream. (Sinha-OEIS)
W75-03864

APPARATUS FOR SEPARATING SOLIDS FROM LIQUIDS,
Ecodyne Corp., Chicago, Ill. (assignee)
W. A. Wachsmuth, and L. Anders.
US Patent No 3,852,199, 4 p, 17 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 929, No 1, p 285, December 3, 1974.

Descriptors: *Patents, *Waste water treatment, Equipment, *Separation techniques, Solid wastes, Pollution abatement, Water pollution control.
Identifiers: *Solid-liquid separation.

A multi-tube settling device is used for separating solids from liquids. It is made from identical, extruded, planar plastic parts. Each part has a series of spaced-apart straight, parallel grooves or slots on one surface. Slots are defined by material integral with planar parts which project perpendicular to the opposite surface. Ribs are dimensioned to be received in the slots. Each rib has an enlarged terminal to fit snugly into the slot. The end ribs are offset slightly toward the center and the end projections are shortened so that the exterior of the device does not have projections which would unnecessarily take up space. Waste is substantially eliminated, and the inner surface of the tubes along which solid particles settle are substantially unobstructed so as to provide minimum interference with the downward flow of the solid particles. (Sinha-OEIS)
W75-03866

METHOD AND APPARATUS FOR USE IN WATER PURIFICATION BY REVERSE OSMOSIS,
Ultrascience, Inc., Skokie IH. (assignee).
E. L. Gibbs.
U.S. Patent No 3,846,295, 4 p, 2 fig, 16 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 262, November 5, 1974.

Descriptors: *Patents, *Water purification, *Reverse osmosis, Water quality control, Pollutants, Water pollution control, Pollution abatement, Equipment, Membranes, *Waste water treatment, Water supply.

A method of an apparatus for water purification from raw water by reverse osmosis is described. A reverse osmotic flow is created through a membrane with the concentrate water forming at the input side of the membrane being withdrawn in a pulsed flow. By pulsing the concentrate water flow, the flow is divided into periods of maximum flow and intermediate periods with at least a lesser flow, and may be reduced to no flow. The operating parameters are so determined that the periods of maximum flow involve a sufficient flow to provide adequate flow turbulence over the membrane surface with sufficient flushing to prevent excessive boundary layer formation at the membrane and to maintain particulate material suitably in suspension in the concentrate water. Intermediate periods of lesser or no concentrate flow are so dimensioned as to duration that any boundary layer formation or particulate disassociation resulting during such period is materially countered by the established flow and period duration of the maximum flow period. A very efficient unit for small operations may be produced, utilizing commercially available membrane units, in conjunction with suitable valves in the concentrate water discharge line adapted to be operated by suitable timing devices to provide desirable durations of maximum and intermediate flow periods. (Sinha-OEIS)
W75-03874

LIQUID AERATING APPARATUS,
Solem Machine Co., Rockford, Ill. (assignee).
J. R. Earhart, J. D. Crocker, and J. K. Johnson.
U. S. Paten No 3,836,130, 5 p, 6 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 926, No 3, p 912, September 17, 1974.

Descriptors: *Patents, *Waste water treatment, Pollution abatement, *Aerators, Water pollution control, Water quality control, Equipment, Aeration.

The aerator contains a throat which extends upward. It has an impeller to pump liquid upward through the throat. A diffuser directs the liquid outward in an annular spray patten. The motor is mounted above the diffuser for driving the impeller. An electrical heater extends around the outer periphery of the diffuser. It inhibits the formation of ice when the aerator is operated in freezing temperatures. The heater is in the form of a ring that overlies the upper side of the diffuser outward of the motor. (Sinha-OEIS)
W75-03875

APPARATUS FOR SOLAR DISTILLATION,
For primary bibliographic entry see Field 3A.
W75-03876

HOT BALL DESALINATION PROCESS,
Occidental Petroleum Corp., Los Angeles, Calif. (assignee).
For primary bibliographic entry see Field 3A.
W75-03878

WASTE WATER TREATMENT SYSTEM,
E. T. Armstrong.
U. S. Patent No 3,853,764, 15 p, 14 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 774, December 10, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, Pollution abatement, Water pollution control, Anaerobic bacteria, Disinfection, Aeration, Oxygenation, Activated sludge, Trickling filters, Microorganisms, Equipment, Treatment.
Identifiers: *Liquid-gas exchange, Gas disinfectants, Settling tanks.

A new concept is presented in liquid processing particularly in sewage treatment utilizing air, oxygen or a carrier fluid with some liquid or gas disinfectant as an attenuator or anaerobic biota, for generalized disinfection, for aeration, or for oxygenation. Unique designs and/or processes are incorporated into the conventional settling tanks associated with sewage treatment, as well as in the bioprocesses, activated sludge or trickling filter operations. The structural improvements in settling reduce velocity, inhibit boundary layer separation and act to suppress mixing of the sewage to greatly enhance solid and fluid separation; the key is to improve efficiency of the liquid-gas exchange whereby much better oxygen contact is achieved. The liquid-gas exchange feature utilizes a high momentum exchange under turbulent flow conditions in a hydraulic pressure gradient to achieve intimate mixing of the desired gas in the fluid so as to achieve the desired liquid-gas exchange. (Sinha-OEIS)
W75-03879

GUIDE TO WATER CLEANUP MATERIALS AND METHODS,
Arthur D. Little, Inc./Learning Systems (Cambridge, Massachusetts), 1974. 335 p.

Descriptors: Pollution abatement, *Treatment facilities, Equipment, *Waste water treatment, *Water pollution control, Planning, *Regulation, Legislation, *Legal aspects, *Instrumentation, Monitoring, Environmental control, Oil spills, Pumps, Chemicals, Additives, Publications, Management, Contracts, Barriers, Engineering structures, Water treatment, Flowmeters, Governments, Water law.

Various waste water treatment and pollution control equipment, such as booms, barriers, skimmers, separators, flowmeters, pumps, oil monitors, and analytical instruments, as well as sorbents and other chemical additives are described. Information is also provided on contingency planning, cleanup contractors, cooperatives, federal and state regulations, and environmental protection agencies. A glossary of terms, useful tables and conversion factors, and an index are appended. (Brown-IPC)
W75-03880

THE ATTEMPTS TO MODIFY THE ACTIVATED SLUDGE PROCESS IN SULPHATE PULP WASTE WATER (IN JAPANESE),
Government Industrial Research Inst., Takamatsu (Japan).
H. Kamishima, and I. Akamatsu.
Japan Tappi, Vol 27, No 9, p 449-456, Sept., 1973. 8 fig, 8 tab, 9 ref. English summary.

Descriptors: *Waste water treatment, *Bleaching wastes, *Pulp wastes, *Color, *Lignins, *Activated sludge, *Ozone, *Activated carbon, Chemical oxygen demand, Organic loading, Biochemical oxygen demand, Laboratory tests, Effluents, Industrial wastes, Pulp and paper industry, Foreign research.
Identifiers: Japan, Kraft mills, Alkaline extraction, Black liquors.

Two approaches to improved decoloring of alkaline extraction effluents from kraft mill bleach plants are reported. In one attempt, activated sludge was acclimatized to dilute black liquor at very low BOD loadings for 1 year. This did not improve the removal of lignin and of COD, while color removal amounted to ca. 20%. In the second study, the effluent was ozonized, which resulted in greatly improved removals of TOC, COD, lignin, and color bodies. Subsequent activated sludge treatment gave adequate removals of BOD components resulting from the ozone treatment. Activated carbon adsorbed very little lignin from ozonized effluents. (Brown-IPC)
W75-03882

STUDIES OF RENOVATION OF PULP MILL WASTE WATER; THE CONDITIONS OF THE PERCOLATION THROUGH ACTIVATED CARBON COLUMN FOR KRAFT PULP LIGNIN (IN JAPANESE),
Government Industrial Research Inst., Takamatsu (Japan).
H. Kabeya, T. Fujii, and Y. Kimura.
Japan Tappi, Vol 27, No 8, p 378-383, Aug, 1973. 3 fig, 5 tab, 9 ref. English summary.

Descriptors: *Waste water treatment, *Pulp wastes, *Adsorption, *Filtration, *Percolation, *Lignins, *Activated carbon, Solids contact processes, Water pollution treatment, Pollution abatement, Color, Waste water(pollution), Industrial wastes, Pulp and paper industry, Laboratory tests, Foreign research, Chemical oxygen demand, Organic loading, Deaeration.
Identifiers: Chemical consumption, Japan, Kraft mills.

The efficiency of lignin removal from kraft mill effluents by passage through fixed-bed activated carbon columns was investigated in laboratory trials. Compared at the break-through point, the weight of carbon needed for downflow operation was 15-30% higher than for upflow treatment. Among deaeration pretreatments for the porous columns, boiling water consumed only 72-75% of the carbon needed after nonboiling water flushing. A theoretical hyperbolic relationship between carbon consumption and contact time was developed and verified experimentally. Effluents collected from the columns at regular intervals were analyzed and found to contain COD/lignin and TOC/lignin ratios of 1.12:1 and 0.73:1, respectively. (Brown-IPC)
W75-03883

ON THE APPLICATION OF POLYELECTROLYTES TO WHITE WATER TREATING BY DISSOLVED-AIR FLOTATION (IN JAPANESE),
Kurita Water Industries Ltd., Osaka (Japan).
Y. Furukawa.
Japan Tappi, Vol 27, No 8, p 384-393, Aug 1973. 11 fig, 5 tab, 18 ref. English summary.

Descriptors: *Flotation, *Waste water treatment, *Pulp wastes, Water pollution sources, Pollution abatement, Water pollution treatment,

*Fibers(Plant), *Suspended solids, Chemicals, Polyelectrolytes, Polymers, Softwood, Hardwood.
Identifiers: *White waters(Paper machine effluents), Flotation aids, Fillers(Pigments), Aluminum sulfate, Polyacrylamide, Polyethylenimine.

Factors affecting the removal of suspended solids, such as pulp fines, fillers, and alum particles, from paper machine white waters were investigated in laboratory tests, using different flotation aids. The floatability of pulp fibers varied with the kind of pulp. Softwood fibers floated less readily than did hardwood fibers. Flotation rates increased when up to 50% filler (based on pulp weight) was present, but was impeded by the presence of alum (aluminum sulfate). For a given hardwood pulp, the efficiency of polyethylenimine and polyacrylamide varied with the manufacturing origin of these preparations. In the presence of filler particles, polyacrylamide was generally more effective. When alum was present, polyethylenimine was superior at alum concentrations of up to 11ppm, but inferior to the polyamide at higher alum levels. The floatability of pulp in the presence of both alum plus filler was poor. The greatest volume of clarified water was obtained with ca. 11 ppm of alum, for which polyacrylamide was a better aid than was polyethylenimine. It is concluded that aluminum sulfate significantly affects the flotation of white water solids, and that the choice of flotation aids depends on the local composition of waste waters to be treated. (Brown-IPC)
W75-03884

USE AND DISPOSAL OF SOLID WASTES FROM PULP AND PAPER PRODUCTION (VYUZITIE A LIKVIDACIA PEVNYCH ODPADOV Z VYROBY BUNICINY A PAPIERA),
Vyskumny Ustav Papier a Celulozy, Bratislava (Czechoslovakia).
R. Borisek, and J. Jaros.
Papir a Celuloza, Vol 29, No 9, p 213-214, 1974. 2 tab, 11 ref.

Descriptors: *Solid wastes, *Pulp wastes, *Waste disposal, *Wood wastes, *Sludge, Lime, Mud, Bark, Sawdust, Wastes, Disposal, Ultimate disposal, Construction materials, Fuels, Soil amendments, Fly ash, Europe, Pulp and paper industry, Yeasts, Carbohydrates, Byproducts, Organic compounds, *Waste treatment.
Identifiers: *Czechoslovakia, Furfural, Xylose, Building boards, Wood particle boards.

Tabulated data are given showing that the pulp and paper industry in Czechoslovakia generates solid waste amounting to 28% of the total pulp produced (calculated by weight). The wastes include sludges from primary and secondary treatment of effluents, lime mud, bark, sawdust, ash, and others. Chemical processing of these solid wastes can yield furfural, xylose, fodder yeast, and fodder extenders. Mechanically processed wastes can be made into particle and construction boards or soil conditioners. Generally, all organic wastes with low moisture content can be burned to generate energy. (Trubacek-IPC)
W75-03886

AN EXAMPLE OF TREATMENT OF EFFLUENTS FROM PAPERMAKING WITH A VIEW TOWARD RECYCLING (UN EXEMPLE DE TRAITEMENT DES EFFLUENTS DE PAPETERIE EN VUE DU RECYCLAGE),
B. Follea.
ATIP (Association Technique de l'Industrie Papetiere) Revue, Vol 28, No 5, p 247-252, 1974. 2 fig, 7 ref.

Descriptors: *Pulp and paper industry, *Recirculated water, *Waste water treatment, *Treatment facilities, *Water reuse, Sewage treatment, Recycling, Water purification, Flocculation, Waste treatment, Chemical precipitation, Wastes, Industrial wastes, Reclaimed water, Waste water(Pollution), Pulp wastes, Water conservation.

The waste water treatment system developed for a 320 ton/day paper mill with two paper machines and one coater is described. The system centers around a flocculator/clarifier and was specifically designed for recycling of clarified water to the mill process water. Tests carried out in developing the system are outlined. (Speckhard-IPC)
W75-03887

MICROFLOTATION, NEW-OLD WATER PURIFICATION TECHNIQUE (MIKROFLOTATION, NYGAMMAL VATTENRENINGSTEKNIK),
K. Roberts.
Kemisk Tidskrift, Vol 86, No 1/2, p 46-48, 1974. 6 fig 7 ref.

Descriptors: *Pulp wastes, *Flotation, *Water purification, *Waste water treatment, Industrial wastes, Waste treatment, Water pollution control, Water pollution sources, Water quality control, Froth flotation, Bubbles, Surfactants, Inhibitors, Supersaturation, Air, Foaming Suspended solids, Carbohydrates.
Identifiers: Xylans, Hemicelluloses.

The application of microflotation to the purification of industrial waste waters, including pulp mill effluents, is described. The process involves supersaturating the waste water with air and then feeding it into a basin at reduced pressure. Tiny bubbles are formed, which carry most of the suspended impurities to the surface. The mechanical and chemical aspects of the process are briefly considered, along with technical possibilities and advantages. Data are included showing the interference of xylan in the process in purifying pulp mill effluents and the elimination of this interference by addition of a surfactant. (Speckhard-IPC)
W75-03888

STUDIES ON THE USE OF OZONE IN WATER AND WASTE WATER PURIFICATION (UNTERSUCHUNGEN ZUR ANWENDUNG VON OZON BEI DER WASER- UND ABWASSERREINIGUNG),
U. Reicherter, and H. Sontheimer.
Vom Wasser, Vol 41, p 369-380, 1973. 3 fig, 7 tab, 19 ref.

Descriptors: *Ozone, *Pulp wastes, *Waste water treatment, *Water purification, *Organic compounds, Degradation(Decomposition), Oxidation, Calcium hydroxide, Chemical precipitation, Natural streams, Humic acids, Water pollution control, Water treatment, Oxygen.

In a study on the use of ozone in oxidative removal of organic substances from waters, a relationship was found between ozone decomposition rate and oxidizing activity. Through ozonization in the presence of calcium hydroxide, a particularly effective removal of organic materials could be obtained. This is explained as being the result of accelerated ozone decomposition in calcium hydroxide solution, as well as of precipitation of partially oxidized organic substances. The radical course of the reaction was confirmed through ozonization of individual substances and isolation of reaction products. The new method was tested on effluent from a pulp mill and on river water with a high concentration of humic acids. (Speckhard-IPC)
W75-03889

CONTROL OF REVERSE OSMOSIS MEMBRANE HYDROLYSIS WITH DYNAMICALLY FORMED WOOD CHEMICAL MEMBRANES,
Institute of Paper Chemistry, Appleton, Wis.
I. K. Bansal, and A. J. Wiley.
Tappi, Vol 57, No 11, p 129-133, Nov., 1974. 5 fig, 4 tab, 4 ref.

Descriptors: *Reverse osmosis, *Sulfite liquors, *Pulp wastes, *Waste water treatment, *Semipermeable membranes, Membranes, Hydrolysis, Tubes, Lignins, Pilot plants, Effluents, Pulp and paper industry, Water pollution control, Waste treatment, Wastes, Industrial wastes, Wood wastes, Membrane processes, Separation techniques, Dynamics.
Identifiers: Cellulose acetate.

The concept of dynamically formed wood chemical membranes was demonstrated for the purpose of extending the capability of commercially available cellulose acetate reverse osmosis modules operating at room temperatures. Two of the reverse osmosis systems employed in these trials were tubular modules, and the third had spiral-wound modules equipped with corrugated spacers. They were operated at 300-600 psig and 35-65 C. Ten tubular and four spiral wound modules had dynamic membranes formed with calcium-base sulfite liquor and were operated at 33-35 C. Data indicated no evidence of membrane hydrolysis over a continuous operation of 7-16 weeks. In a run conducted at higher temperatures, the cellulose acetate membrane in a sand matrix tubular module was periodically coated with soluble wood chemical components contained in certain types of spent pulping liquors. The module was then operated over 280 hr period at 45-65 C. No apparent deterioration in the reverse osmosis performance of the module was observed in terms of the product flux rates and chloride rejections. (Sykes-IPC)
W75-03890

USE OF WASTE CHEMICALS IN KRAFT MILL EFFLUENT TREATMENT,
Finnish Pulp and Paper Research Inst., Helsinki.
W. Jensen, and E. Meloni.
Paper, World Research and Development Number, 1974, p 46, 48-49, 52-54. 14 fig, 5 tab, 17 ref.

Descriptors: *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Wood wastes, *Chemical wastes, Chemicals, Fly ash, Effluents, Bark, Sulfite liquors, Color, Chemical oxygen demand, Costs, Sludge, Industrial wastes, Wastes, Waste treatment, Water pollution sources, Pulp and paper industry, Solid wastes, Coagulation, Chemical precipitation, Filtration, Dewatering
Identifiers: Aluminum sulfate, Ferrous sulfate.

Pine barking effluent, pine kraft pulp screening effluent, and pine kraft pulp bleaching effluent (caustic extraction stage) were treated with aluminum sulfate, ferrous sulfate, and with fly ash from the burning of spent sulfite liquor. Color reductions of about 90% and COD reductions of about 70% were attainable. Dosages to achieve these effects and cost estimates are given. Fly ash is comparable with, or superior to, lime as a treatment chemical. The volumes of sludge produced are greater than those resulting from mechanical treatments, but those from fly ash are easier to filter. Aluminum and ferrous sulfates produce voluminous sludges which are difficult to filter (Hansen-IPC)
W75-03891

POSSIBILITIES FOR PURIFYING RECYCLED OR WASTE WATERS FROM PAPER MILLS, TAKING PHYSICAL-CHEMICAL PROCESSES INTO ACCOUNT (LES POSSIBILITES D'EPURATION DES EAUX RECYCLEES OU RESIDUAIRES DES PAPETERIES, COMPTE-TENU DES PROCEDES CHIMICO-PHYSIQUES),
B. Morgeli.
ATIP (Association Technique de l'Industrie Papetiere) Revue, Vol 28, No 5, p 267-274, 1974. 17 fig.

Descriptors: *Pulp wastes, *Water purification, *Recycling, *Waste water treatment, Floccula-

tion, Filtration, Adsorption, Activated carbon, Separation techniques, Solids contact processes, Biological treatment, Economics, Industrial wastes, Wastes, Chemical oxygen demand, Waste treatment, Water pollution sources, Effluents, Pulp and paper industry.

In purifying papermaking effluents, it is advisable to use a combination of physical-chemical processes particularly suited to the materials contained in the effluents. Pilot-plant and industrial-scale tests have shown that combinations of flocculation, filtration, and activated carbon should preferably be previously freed of substances susceptible to biological elimination; otherwise, these substances will clog the surface pores of the carbon. Biological treatment realized prior to adsorption and after flocculation will increase the adsorption of COD substances on the activated carbon, giving better results and the most favorable economic solution. (Speckhard-IPC)
W75-03893

SELECTION OF COAGULANTS FOR TREATMENT OF EXCESS ACTIVATED SLUDGE (VYBOR KOAGULYANTOV DLYA OBRABOTKI IZBYTOCHNOGO AKTIVNOGO ILA),
Vsesoyuznyi-Nauchnyi Planovii Otdel'Bumazhnoi Promyshlennost, Moscow (USSR).
V. A. Fetisov, L. P. Bystrova, and V. A. Mezhevova.
Bumazhnaya Promyshlennost', No 8, p 13-14, August, 1974. 1 fig.

Descriptors: *Activated sludge, *Sludge treatment, *Sewage treatment, *Coagulation, *Chemical precipitation, *Separation techniques, Waste treatment, Wastes, Water pollution sources, Sludge, Water purification, Lime, Waste water treatment, Dewatering, Water pollution control, Filtration, Iron compounds, Aluminum, Fibers(Plant), Calcium compounds, Dewatering.
Identifiers: Coagulants, Ferric sulfate, Aluminum oxide, Titanium dioxide, Ferric chloride.

The replacement of ferric chloride by other chemicals for the coagulation of excess activated sludge was studied. The agents used in experiments, in which coagulation was carried out on sludge mixed with varying amounts of fibers and fillers (from the primary sedimentation tank), included ferric sulfate, alumina, and a mixed coagulant containing 14% ferric oxide, 4% alumina, 1.5% titanium dioxide, and 10-12% insoluble substances. These coagulants, and also ferric chloride, were used with and without CaO. The effectiveness of the coagulants was evaluated by the filtration rate and resistance to filtration of the sludge. A diagram was constructed from which a suitable coagulant and its dose can be determined. When the resistance is low, the sediment can be dewatered without coagulants. The addition of the fiber/filler mixture makes it possible to use less effective coagulants (e.g., ferric sulfate or the mixed coagulant), because such mixtures reduce the filtration resistance of the sediment. (Stapinski-IPC)
W75-03894

BIOLOGICAL PURIFICATION OF EFFLUENTS FROM BLEACHED KRAFT PULP: THE CASE OF LA CELLULOSE DES ARDENNES (EPURATION BIOLOGIQUE D'EFFLUENTS DE PATE KRAFT BLANCHIE: LE CAS DE LA CELLULOSE DES ARDENNES),
M. P. Henri-Robert, and M. Toulemonde.
ATIP (Association Technique de l'Industrie Papetiere) Revue, Vol 28, No 5, p 275-281, 1974. 3 fig, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Treatment facilities, Water pollution control, Water pollution sources, Activated sludge, Biological treatment, Water purification, Operations, Technology, Operating costs, Pulp and paper industry, Effluents, Europe, Industrial wastes, Biochemical oxygen demand, Suspended solids, Hardwood, Sludge treatment, Pulp and paper industry, Mixing, Discharge(Water).
Identifiers: *Belgium, Kraft mills.

A Belgian paper mill, originally designed for a production of 200 tons/day of bleached kraft hardwood pulp, was ordered not to discharge more than 1400 kg/day of 5-day BOD. Biological purification has always been necessary, and this effort had to be maximized upon increasing mill production to 500 tons/day. After a study, it was decided to proceed with the construction of a second effluent treatment station in parallel with the original one. Dimensions of the second plant were selected so that the combined plants would function via an activated sludge process with low discharge. The second plant differs from the first in both operation and technology. The need for obtaining a 91% yield involved modifications in activated sludge treatment. To improve control, the process includes reactivation of recycled sludge and contact basins with integral mixing. The volumetric charge retained by the two plants is 0.8 kg/cu m/day. A secondary decanter facilitates sludge thickening takes place in the special primary decanter. Suspended solids in the purified effluent average 90 mg/liter. Although biological purification gives an effective reduction in effluent BOD, there are problems connected with sludge disposal. Operating costs are substantial. (Speckhard-IPC)
W75-03895

ON THE SORPTION CAPACITY OF LIGNIN FOR THE EASY- AND DIFFICULT-TO-OXIDIZE COMPONENTS OR RESIDUAL LIQUOR FROM YEAST PRODUCTION (O SORPTSIONNOI EMKOSTI LIGNINA PO LEGKO- I TRUDNOOKISLYAEMYM KOMPONENTAM POSLEDROZHZHEVOI BRAZHKI),
Arkhangelskii Lesotekhnicheskii Institut (USSR).
A. K. Anpilogov, and E. D. Gel'fand.
Izvestiya Vysshikh Uchebnykh Zavedenii Lesnoi Zhurnal, Vol 17, No 4, p 104-106, 1974. 1 fig, 1 tab, 1 ref.

Descriptors: *Lignins, *Pulp wastes, *Waste treatment, Yeasts, Oxidation, Chemical oxygen demand, *Waste water treatment, Water pollution sources, Water pollution treatment, Pulp and paper industry, Industrial wastes, Wastes, Hydrolysis, Sorption, Solids contact processes, Yeasts, Biological treatment, Pollutants, Sulfite liquors.

The sorption capacity of hydrolysis lignin (screened and washed to remove sugars) was determined by passing the residual liquor through a column filled with lignin and analyzing the fractions collected for oxidizability and COD. From the curves of oxidizability and COD reduction as functions of the liquor ratio (flow rate to saturation of lignin), equations were derived from which the degree of liquor purification can be calculated for any initial COD, flow rate, and liquor ratio. The sorption capacity of lignin for the easily oxidized components of the liquor varied within narrow limits and avaraged 195 g oxygen/kg. The total sorption capacity ranged from 795 to 810 g oxygen/kg. The high sorption capacity of lignin for liquor pollutants that are difficult to oxidize could be utilized as an additional treatment in biological purification of residual liquors. (Stapinski-IPC)
W75-03896

TREATMENT OF RESIDUAL SLUDGES: GENERALITIES AND APPLICATIONS IN THE PAPER INDUSTRY (TRAITEMENT DES BOUES RESIDUAIRES: GENERALITES ET APPLICATIONS A L'INDUSTRIE DU PAPIER),
M. Mathian.
ATIP (Association Technique de l'Industrie Papetiere) Revue, Vol 28, No 5, p 253-265, 1974. 8 fig, 3 tab, 4 ref.

Descriptors: *Pulp wastes, *Sludge treatment, *Reviews, Dewatering, Aerobic treatment, Anaerobic digestion, Drying, Flocculation, Chemical precipitation, Heat treatment, Mechanical equipment, Filtration, Incineration, Costs, Centrifugation, Industrial wastes, Sludge digestion, Degradation(Decomposition), *Waste water treatment, Solid wastes, Operating costs, Economics.

Following a brief description of the main characteristics of sludge from waste water clarifying stages, a review is presented of the main steps in sludge treatment. Covered are thickening, aerobic and anaerobic digestion, drying on sand/gravel beds, conditioning with chemical flocculants, thermal conditioning, industrial units for mechanically dewatering (filter presses, twin-belt presses, rotary suction drum filters, and centrifuges), industrial sludge incinerators (Fluidized-bed, multi-tier, rotating-drum, and flash-drying incinerators), and cost of sludge treatment. (Speckhard-IPC)
W75-03898

MILL ACHIEVES MAXIMUM REUSE OF WATER WITH REVERSE OSMOSIS,
M. MacLeod.
Pulp and Paper, Vol 48, No 12, p 62-64, November, 1974. 3 fig.

Descriptors: *Water reuse, *Water conservation, *Pulp and paper industry, *Industrial water, Waste treatment, *Reverse osmosis, *Waste water treatment, *Wisconsin, Biochemical oxygen demand, Industrial wastes, Wastes, Effluents, Membrane processes, Separation techniques, Water pollution control, Reclaimed water.
Identifiers: Fox River(Wisconsin).

Green Bay Packaging Co. operates a tightly closed neutral sulfite semichemical corrugating medium mill at Green Bay, Wisconsin. An essentially closed white water system, liquor combustion plant, white water surge storage system, and full-scale reverse osmosis unit are integrated in such a way that steady operation is expected to result in less than 5 lb BOD/ton of pulp in the mill's discharge to the Fox River. Some difficulties with the membrane support structure have been experienced. The modules have a life expectancy of only about 2,500 hr, failures occuring especially in the 1,500 to 2,500 hr range. (Sykes-IPC)
W75-03899

NEW SCREENING CONCEPT BOOSTS WATER REUSE AT BOXBOARD MILL,
Sweco, Inc., Los Angeles, Calif. Environmental Systems Div.
W. J. Talley, Jr.
Pulp and Paper, Vol 48, No 11, p 140-141, October, 1974. 3 fig.

Descriptors: *Pulp and paper industry, *Industrial water, *Treatment facilities, *Reclaimed water, *Water reuse, *Water conservation, Cost repayment, Economic justification, Suspended solids, Effluents, Recycling, Waste water(Pollution), Pulp wastes, Equipment, Filters, Filtration, Centrifugation.
Identifiers: Centrifuges, Fiber recovery, White water, Board mills.

Sweco Inc.'s new Centrifugal Wastewater Concentrator (CWC) removes fine particles and fiber from paper machine white water and from mill effluents. Hoerner Waldorf's (St. Paul, Minnesota) paperboard mill installed a CWC in order to reuse combined waste water from felt showers and vacuum seal water on one of its cylinder machines. The cost savings achieved by water recycling, energy conservation, and fiber reuse quickly paid back the initial investment for the unit. (Sykes-IPC)
W75-03900

IMPROVED CLARIFICATION OF BOOK MILL EFFLUENT,
Kimberly-Clark Corp., Neenah, Wis.
Y. C. Wu.

Industrial Water Engineering, Vol 11, No 2, p 22-26, March/April, 1974. 7 fig, 1 tab, 8 ref.

Descriptors: *Pulp wastes, *Enzymes, *Coagulation, *Waste water treatment, Water pollution treatment, Pulp and paper industry, Industrial wastes, Wastes, Waste treatment, *Wisconsin, Hydrogen ion concentration, Polymers, Water purification, Chemicals, Biochemical oxygen demand, Suspended solids, Optical properties, Operating costs, Costs.
Identifiers: *Clarifiers, Alum, Starch.

The feasibility of improving clarifier performance by an integrated enzyme-polymer coagulation system was investigated. Effluent from Kimberly-Clark Corp.'s (Kimberly, Wisconsin) printing paper mill was filtered to remove large suspended matter, and an enzyme (alpha-amylase, beta-amylase, Amzyme TX-8, or malt) was added. After 15 minutes of enzyme reaction, a predetermined amount of alum was added and the mixture, after settling, was analyzed for suspended solids, BOD, optical density, and starch concentration. Alpha- and beta-amylases reduce the dispersing power of starch. Overall performance of an integrated enzyme-polymer coagulation system was not affected by pH and enzyme working time factors, provided the pH of the effluent was between 4.5 and 6.5, and enzyme reaction time was at least 10-minutes. A 5-10% BOD removal reduction was caused primarily by the enzyme addition. For 10 million gallons/day of effluent, the annual savings in total treatment costs are estimated at $4,000 or more, using an integrating enzyme-polymer system (Amzyme TX-8 plus alum), compared to alum alone. (Sykes-IPC)
W75-03902

OZONE: A NEW METHOD TO REMOVE COLOR IN SECONDARY EFFLUENTS,
Welsbach Ozone Systems Corp., Philadelphia, Pa.
C. Nebel, R. D. Gottschling, and H. J. O'Neill.
Pulp and Paper, Vol 48, No 10, p 142-145, September, 1974. 4 fig, 7 tab, 10 ref.

Descriptors: *Ozone, *Pulp wastes, *Water treatment, *Waste water treatment, Oxidation, Color, Chemical oxygen demand, Biochemical oxygen demand, Dissolved oxygen, Water pollution sources, Industrial wastes, Pulp and paper industry, Effluents, Wastes, Laboratory tests, Capital costs, Operating costs, Costs, Economics.
Identifiers: Board mills, Kraft(Pulp) mills.

The high oxidation potential of ozone makes it attractive for treating pulp and paper mill effluents for reduction of color, COD, and BOD. After ozone treatment, effluents are completely saturated with dissolved oxygen, thereby eliminating post-aeration. Since sludge is not generated in ozonization, secondary clarifier and dewatering equipment are not required. The experimental ozonization of effluents from several kraft pulp and board mills is reported. Estimates of daily ozone requirements, capital investments, and treatment costs (ranging from $0.028 to $0.064/1000 gal) are given. (Hansen-IPC)
W75-03903

KNOWLTON (BROTHERS INC., WATERTOWN, NEW YORK) MILL CLOSES LOOP ON WASTE TREATMENT/WATER REUSE,
Malcolm Pirnie, Inc., White Plains, N.Y.
J. R. Folchetti.
Pulp and Paper, Vol 48, No 10, p 116-118, September, 1974. 3 fig, 2 tab.

Descriptors: *Pulp wastes, *Water conservation, *Treatment facilities, *Waste water treatment, *Reclaimed water, *Water reuse, Flocculation, Chemical precipitation, Water purification, Pulp and paper industry, Water quality, Water pollution control, Water pollution sources, Filters, Filtration, Closed conduits, Industrial water.
Identifiers: Photographic paper, Filter paper.

A paper mill which manufactures filter paper and black photographic paper is successfully operating a closed system which reclaims water from mill effluent and returns it to the mill as process water. The development of the system is reviewed. The waste water is pumped to a clarifier/flocculator where chemicals and slimicides are added. The flocculated and clarified waste then flows to a traveling belt filter for polishing and then enters the mill system as reclaimed process water. A flow diagram of the system and water quality data are given. (Hansen-IPC)
W75-03904

EFFECTIVENESS OF THE PRE-AERATOR (EFFEKTIVNOST' RABOTY PRE-AERATORA),
L. B. Pomerants.
Trudy Leningradskogo Tekhnologisheskogo Instituta Tsellyulozno-Bumazhnoi Promyshlennosti, No 30, p 137-143, 1973. 3 fig, 6 ref.

Descriptors: *Pulp wastes, *Aeration, *Treatment facilities, *Waste water treatment, *Efficiencies, Performance, Biological treatment, Nutrients, Water pollution sources, Waste treatment, Microorganisms, Biochemical oxygen demand, Chemical oxygen demand, On-site tests, Bacteria, Pseudomonas, Phosphorus compounds, Nitrogen compounds, Industrial wastes, Pulp and paper industry, Effluents, Carbohydrates.
Identifiers: Baikal pulp mill(USSR).

The second biological purification plant at the Baikal pulp mill receives two types of effluents, the so-called 'black stream' consisting of effluents from the digester room, evaporation plant, yeast plant, and the experimental plant; and the 'white stream' consisting mainly of effluents from the drying plant and the purification equipment of the bleaching plant. These two streams amount to 40,000 and 120,000 cu m/day, respectively. The operation of the new plant is unconventional in that the two streams are pooled and enriched with N and P salts. The residence time in the pre-aerator is up to 20 hr compared to the usual 3 hr. To determine the efficiency of this system, a microbiological study was made of the microflora in the preaerator (which develops spontaneously), and determination were made of the 5-day BOD and the COD. The data were collected during 334 days of plant operation and include seasonal variations in pollution load. The study showed an increase in the number of saprophytic bacteria in the preaerator from an initial 3,000 to 470,000 cells/ml (with the genus Pseudomonas predominating), obviously attributable to the presence of added nutrients. The reduction of BOD in the pre-aerator was 50%, compared to 15% in conventional pre-aerators. The COD was reduced about 30%. Compared to the aeration tank proper, the consumption of N in the pre-aerator at equal reduction of BOD was about 50% lower as a result of a C:N ratio more favorable to the synthesis of non-nitrogenous compounds, such as polysaccharides. (Stapinski-IPC)
W75-03905

CORRUGATED INK AND STARCH WASTES MEET EPA STANDARDS AT ST. REGIS.
Paperboard Packaging, Vol 59, No 12, p 24, 26, 28-29, December, 1974. 7 fig, 2 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, Pollutants, *Chemical precipitation, Heavy metals, Water pollution control, Water reuse, Industrial wastes, Filtration, Separation techniques, Waste disposal, Landfills, Oil, Iron, Lead, Nickel, Zinc, Illinois, Water quality standards, Waste treatment, Effluents, Pigments, Color, Pollution abatement, Water pollution sources.
Identifiers: Corrugated boxes, Converting industry, Inks, Starch.

The waste water treatment system installed at the Bridgeview, Illinois, container plant of St. Regis Paper Co. is described. The batch system removes ink pigments, starch waste, oil contaminants, and heavy metals (Fe, Pb, Ni, and Zn) from the effluent. The pollutants are precipitated with chemicals, filtered from the water, and disposed of in a sanitary landfill. The treated water is decolorized in an activated carbon column and either reused in the container plant or discharged to the municipal waste treatment system. The treated effluent meets the State of Illinois criteria for discharge to municipal sewage plants. (Witt-IPC)
W75-03907

STATIC MIXING CONCEPT FOR AERATORS WINS ACCEPTANCE,
Kenics Corp., Danvers, Mass.
G. R. Fisette.
Pulp and Paper, Vol 48, No 10, p 70-72, September, 1974. 4 fig.

Descriptors: *Aeration, *Aerated lagoons, *Pulp wastes, Equipment, Oxygenation, Biochemical oxygen demand, *Waste water treatment, Pollution control, Pulp and paper industry, Water quality control, Waste waters(Pollution), Chemical oxygen demand, Treatment facilities.

A subsurface aeration system applicable to activated sludge and aerobic digestion processes is described. The mixing units are tubes of high-density polyethylene, 1 ft in diameter and 5 ft high, mounted vertically near the bottom of the aeration basin. Air is introduced at the bottom from a header, and helical deflectors inside the cylinders bring about intimate mixing of air and water. A zone of vertical liquid movement is established around each mixer in an array. Data on oxygen transfer rates at various air flow rates are given. In a one million gal basin with 184 aerators, uniform dispersion following the addition of a dye required only 20 minutes. Chemical oxygen demand reduction is over 96%. (Hansen-IPC)
W75-03914

STUDY OF THE SEASONAL EFFECTS ON THE MICROBIOLOGY OF A NORTHERN PULP AND PAPER MILL AERATION LAGOON,
Environmental Protection Service, Ottawa (Ontario).
A. S. Menon, and W. K. Bedford.
Canadian Department of the Environment, Environmental Protection Service Technology Development Report, No. 4-AR-73-1, 53 p, June, 1973. 8 fig, 15 tab, 12 ref, 1 append.

Descriptors: *Pulp wastes, *Aerated lagoons, *Microbiology, *Weather, *Coliforms, *Seasonal, Summer, Winter, Temperature, Nutrients, Treatment facilities, *Waste water treatment, Water pollution sources, Streptococcus, Microorganisms, Lagoons, Oxidation lagoons, Canada, Foreign countries, North America, Stabilization, Pulp and paper industry, Water purification, Biological treatment, Waste treatment, Biochemical oxygen demand, Bacteria, Aquatic bacteria.
Identifiers: Klebsiella, Ontario-Minnesota Pulp and Paper Co.

The second phase of a bacteriological study of Ontario-Minnesota Pulp and Paper Co.'s (Fort Frances, Ontario) waste treatment aeration lagoon assessed whether Klebsiellae and other coliform organisms proliferated in the lagoon and evaluated the seasonal effects on the microbial lagoon flora. The results indicated that the effluents from the separate kraft mill contained only a small number of pollution indicator organisms, but some of these organisms multiplied when entering the lagoon. Coliforms proliferated in the lagoon under both winter and summer conditions. Fecal coliform and Klebsiellae required higher temperatures and complex nutrients for regrowth. They were capable of multiplying in the lagoon only under conditions prevailing during the summer, whereas fecal streptococci did not exhibit any regrowth under either conditions. Coliform reduction in the lagoon

was closely associated with the BOD removal, indicating that coliforms disappeared because some of the readily degradable carbohydrates had been removed, and also because of their inability to compete successfully with other microflora in the lagoon for nutrients. The influence of temperature on the microbial activities in the lagoon is evident from the data showing that larger numbers of various physiological groups were found in summer than in winter. The BOD removal increased from 49 to 65% in summer, indicating that higher temperatures accelerated the microbial process. The majority of the coliforms isolated from the kraft mill effluents and lagoon were Enterobacter strains. A small number of Klebsiellae were isolated. (Witt-IPC)
W75-03916

QUALITY WATER FOR HUMAN CONSUMPTION AND INDUSTRY,
Pettigrew Engineering Co. Pty. Ltd. (Australia).
A. Pettigrew.
Australian Chemical Engineering, Vol 15, No 10, p 17-20, October 1974.

Descriptors: *Waste water treatment, *Water treatment, *Water quality, Chlorination, Filtration, Fluoridation, Ion exchange, Water softening, Water purification, Industrial water, Filters, Equipment.
Identifiers: Deionizers.

Brief notes are provided on the various types of equipment which can be used or adapted for the treatment of water either for human consumption or for industrial purposes. Included are filters, clarification reactors, softeners, ion exchange resins and deionizers, chlorination and fluoridation. (Levick-CSIRO)
W75-03941

SOLVING EFFLUENT PROBLEMS BY THE USE OF CENTRIFUGES,
Alfa-Laval Pty. Ltd. (Australia). Industrial Div.
E. Skinner.
Australian Chemical Engineering Vol 15, No 10, p 21-25, October 1974. 15 fig.

Descriptors: *Centrifugation, Filtration, Effluents, *Separation techniques, Water purification, Water treatment, *Waste water treatment.
Identifiers: *Centrifuges.

The function of the centrifuge in separation processes is effectively to increase the acceleration of particles through the continuous phase, achieving separation in less time and using less space than under gravity alone. The available types of centrifuge are described in two major classes - filtering and sedimenting. Factors in the choice of machine for a particular application are presented and discussed. (Levick-CSIRO)
W75-03942

FILTRATION - MEDIA SELECTION IS THE KEY TO SUCCESS,
Carrier Filters Pty. Ltd. (Australia).
For primary bibliographic entry see Field 5F.
W75-03943

CRITERIA FOR REGIONALIZATION OF WATER AND WASTE MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Dept. of Economics.
J. H. Sauerlender, B. V. Dall, J. G. Haltsman, J. Jansma, and S. M. Leadley.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 238, $4.25 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Research Publication Number 84, June 1974. 70 p, 2 fig, 9 tab, 12 ref, append. OWRT B-035-PA(5), 14-31-0001-3327.

Descriptors: *Planning, *Administration, *Decision making, *Pennsylvania, Financial feasibility, Economies of scale, Alternative costs, *Regional analysis.
Identifiers: Regionalization, *Waste management systems, Community leadership, Waste water plans, Community size, Regional alternatives.

Based on this investigation, the following conclusions were reached: 1. Regionalization of water and waste management systems will not be easy to implement because of Pennsylvania's approach to water management. 2. Regionalization of water management systems is not universally good, but only attractive when economies of scale outweigh added distribution costs. 3. Substantial reductions in costs of wastewater management systems are attainable through regionalization, due primarily to the economies of size encountered in construction, operation, and maintenance of larger systems. 4. The local leadership in the study communities strongly objected to the most economically viable regionalization wastewater plans. The regionalization plans which are most economically attractive are generally not within the scope of what local leaders consider appropriate for their communities. Regionalization plans are somewhat attractive to small communities with no present wastewater system and least attractive to large communities which have some type of wastewater system. 5. More than 12,000 different alternatives exist for combining the municipalities in the study region. A decision-making procedure was developed for reducing the vast number of possible regional alternatives to a manageable number which could be ordered to reflect their priorities at the community level. (Sink-Penn State)
W75-03946

CUTBACK IN COSTRUCTION FUNDING STIRS DOUBT ON WATER QUALITY GOALS.
For primary bibliographic entry see Field 5G.
W75-03999

REGIONAL MANAGEMENT OF WASTE SYSTEMS,
Maryland Environmental Service, Annapolis.
T. D. McKewen.
Journal Water Pollution Control Federation, Vol 44, No 8, p 1493-1497, August 1972.

Descriptors: *Waste water pollution, *Regional analysis, *Water treatment, *State legislation, *Water pollution control, Liquid wastes, Solid wastes, Environmental sanitation, Water treatment, Water law, Water management(Applied), Enforcement, Maryland, Environmental protection, Water resources, Water policy, Water allocation(Policy), Administration, Administrative agencies, Environmental effects, Adoption of practices, Waste water treatment, Conservation, Pollution abatement.
Identifiers: Administrative regulations, State policy.

Many advances have been instituted to deal with the problem of waste management. Agencies such as the Maryland Environmental Service (MES) have been created to facilitate progress. The creation of the federal construction grant program has broken the pattern of exclusive state control of pollution regulation. MES can provide regional waste management where it is needed, financial capability for local areas, and equitable arrangements for waste management between jurisdictions whose respective interests may differ. Maryland's pollution control activities have increased in scope in recent years. By the end of the 1960's, the state government had become an active participant in planning, financing, and operator training in addition to retaining its traditional enforcement activities. It was noted, however, that the state must directly undertake the construction and operation of liquid and solid waste facilities. In 1970, the Maryland state legislature enacted the Environmental Service Act. The Service was directed to develop river basin plans for liquid waste management and regional plans for solid waste management. After the passage of the Act, new federal regulations were promulgated that require each state to have fully developed river basin plans by July 1, 1973. The Service is contributing to local projects pending creation of new regional projects. (Sperling-Florida)
W75-04000

DETECTION OF WATER POLLUTANTS BY A CO2 LASER,
Technische Universitaet, Munich (West Germany). Physikdepartment.
For primary bibliographic entry see Field 5A.
W75-04012

PROBLEM DEFINITION STUDY: EVALUATION OF HEALTH AND HYGIENE ASPECTS OF LAND DISPOSAL OF WASTEWATER AT MILITARY INSTALLATIONS,
Army Medical Environmental Engineering Research Unit, Edgewood Arsenal, Md.
C. A. Sorber, S. A. Schaub, and K. J. Guter.
Available from the National Technical Information Service, Springfield Va 22161 as AD-752 122, $3.75 in paper copy, $2.25 in microfiche. Report Number 73-02, August, 1972. 32 p, 72 ref, 5 append.

Descriptors: *Waste water disposal, *Aerosols, Pathogenic bacteria, Microorganisms, Pre-treatment, *Public health, *Waste water treatment, *Waste disposal, Application methods, Bioindicators.
Identifiers: Land disposal.

The most important variables in the health and hygiene aspects of waste water treatment by land disposal are: the ultimate use of the contaminated waste water; the method of application; and the degree of pre-treatment. These variables have physical, biological, and chemical effects. Waste treatment by land disposal was studied and the following conclusions were made: Many detrimental health and hygiene effects of land disposal would be reduced by proper waste water pretreatment. Biological contamination of groundwater could be avoided by choosing a disposal site with five to ten feet of continuous fine soil. There exists a significant probability of inhaling pathogenic aerosals near a spray irrigation site, Chemical components of sewage can increase the viability of bacteria, virus and protozoans in aerosols; Pathogenic microorganisms may survive longer in sewage aerosols and in soil than common indicator organisms. More mosquito breeding is an effect of ponding in disposal areas. If land disposal is the first step in a water recycle program, total dissolved solids, sodium and nitrate ion build-up in the groundwater can be problems. (Orr-FIRL)
W75-04015

SOLID WASTE AND WATER QUALITY, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5B.
W75-04016

EPA'S POLLUTION CONTROL GOALS TAKE BROADSIDE IN SEATTLE.
For primary bibliographic entry see Field 5G.
W75-04023

CHARACTERIZATION AND DEWATERABILITY OF WATER TREATMENT PLANT RESIDUES,
Missouri Univ., Columbia. Dept. of Civil Engineering.
J. T. Novak.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 228, $4.25 in paper copy, $2.25 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, October 1974. 64 p, 27 fig, 4 tab, 30 ref. OWRT A-061-MO(1). 14-31-0001-3825 and 4025.

Descriptors: *Waste water treatment, *Sludge treatment, Filtration, Settling, Centrifugarion, Sludge, *Dewatering, Drainage, Water treatment, Drying, Waste identification.
Identifiers: *Chemical sludge, Sand beds, *Air drying.

A variety of water treatment residues were characterized in order to determine the influence of specific chemical constituents, process flow schemes and raw water quality on the performance of sludge dewatering processes. The use of conventional sludge characterization parameters for process selection and design was evaluated by comparing process yields to sludge characteristics. The extent of dewatering was determined for four sludge dewatering methods and the physical properties of chemical sludges at varying solids levels compared to process performance to determine which of the processes produces a 'handleable' sludge. The draining and drying rates of chemical sludges applied to sand beds were related to several sludge characteristics. The time to drain was related to the sludge specific resistance, applied depth and solids concentration. Air drying occurred in two distinct phases. The initial or slow drying phase was governed by the sludge cake depth and drained solids concentration while the rapid drying rate was found to approximate the free surface water evaporation rate. Sludges with a coefficient of compressibility less than 0.7 were found to penetrate into the sand bed.
W75-04039

SOIL ADSORPTION OF HUMIC COLOR,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
R. A. Miller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 229, $3.75 in paper copy, $2.25 in microfiche. M.S. Thesis, May 1974. 49 p, 10 fig, 5 tab, 22 ref, append. OWRT A-027-NEB(5).

Descriptors: *Color, Sands, Waste disposal, Biological treatment, *Feed lots, Runoff, Water quality, Soils, *Adsorption, *Chemical oxygen demand, Design criteria, *Waste water treatment, Farm wastes.
Identifiers: *Soil adsorption beds.

The degradation of receiving streams and lakes has prompted many studies on the treatment of feedlot runoff. Various biological treatment systems have been developed to reduce organic strength levels; however, economic color reduction has not been obtained. The main purpose of this study was to evaluate color reduction of feedlot runoff by the process of soil adsorption. Significant reductions in chemical oxygen demand were also anticipated. Conclusions are as follows: (1) color and COD removal from biologically treated feedlot runoff can be obtained by adsorption on clayey fine sand; (2) reduction of color and COD using soil beds is an effective, economical technique for disposal of biologically treated feedlot runoff; and (3) loading rates of 2 inches per day or less and depths of 5 feet or more should be used as design criteria for soil adsorption beds operating full.
W75-04043

ECONOMIC ANALYSIS OF LAND TREATMENT OF MUNICIPAL WASTEWATERS,
North Carolina State Univ., Raleigh. Dept. of Economics.
C. E. Young, and G. A. Carlson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 186, $5.25 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No. 98, October 1974. 98 p, 8 fig, 14 tab, 43 ref, 3 append. OWRT A-072-NC(1). 14-31-0001-4033.

Descriptors: *Cost analysis, *Cost comparisons, Economics, Waste treatment, *Waste water treatment, Ultimate disposal, Sewage disposal, Land management, *Water reuse, *Municipal water, Regression analysis, Waste disposal, *Southeast US, Biochemical oxygen demand.
Identifiers: Wake County(NC), *Land spreading, Land treatment.

The 1972 Water Pollution Control Act Amendments require increased treatment of municipal wastewaters. One method to obtain a high quality effluent at relatively low cost compared to other techniques is land treatment. This study compares and evaluates conventional in-plant treatment and land treatment in a cost framework and in a production efficiency framework. The major objective is to explain why more municipalities have not chosen land treatment in the past. Regression analysis was used to estimate cost functions for 125 municipal treatment plants across the southern portion of the United States. Comparison of the two types indicates that inclusion of land treatment permits higher levels of treatment per dollar of expenditure. The advantages of land treatment are greater for small plants. A .5 million gallons per day (mgd) plant will save $.07 per 1000 gallons treated to 85 percent removal of five-day biochemical oxygen demand (BOD5) if it uses land treatment, while a 10 mgd plant will save $.05 per 1000 gallons. Cost differentials are greater for treatment to 95 percent BOD5 removal. Savings could be increased by 7-15 cents more from sale of by-products from the land site depending upon site characteristics and product prices. The probability of adopting land treatment increases as maximum final BOD5 requirements are lowered, irrigation prices rise, and as stream flow and rainfall become smaller. Land purchase prices were not significant in explaining adoption of land spreading of wastes since only about 40 percent of the land treatment sites purchased land for the purpose of spreading effluent and sludge. The remainder used other public lands or sold or gave the wastes to farmers. (McJunkin-N.C. State)
W75-04047

PHOSPHORUS DETERGENT BAN-HOW EFFECTIVE,
Pieczonka Consultants, Lackawanna, N.Y.
P. Pieczonka, and N. E. Hopson.
Water and Sewage Works, Vol 121, No 7, p 52-55, July, 1974. 1 tab, 10 ref.

Descriptors: *Phosphorus, *Detergents, *Water pollution, *Sewage treatment, Domestic sewage, Effluent control, Eutrophication, Lakes, *New York, *Waste water treatment, Costs.
Identifiers: *Stannous fluoride treatment, Erie County(NY).

The eutrophication rate of a lake is greatly increased by the addition of more nutrient, such as phosphorus. A study in Erie County, New York, attempted to answer basic questions in phosphorus detergent pollution from domestic sewage. The primary questions explored were what percentage of phosphorus reduction could be expected in the influent of a sewage treatment plant treating domestic wastes, and what effect would an effective ban of phosphate detergents have on sewage treatment costs. In domestic sewage, the average phosphorus content is about 10 mg/liter. The rate limiting concentration of phosphorus is about 0.01 mg/liter. It was determined that the enactment of a ban on the detergents would not solve the problem of eutrophication. Phosphorus removal in waste water treatment plants was required. The Lackawanna Sewage Treatment Plant was investigated for further solutions. Composite grab samples were studied for total phosphorus in accordance with the Standard Methods for the Examination of Water and Wastewater. A stannous chloride technique and total phosphate determination were utilized for all phosphorus analyses. It was concluded that phosphorus detergent bans reduced phosphorus loading at a domestic sewage plant by 55.7 percent, although the banning is insufficient for fighting this pollution problem alone. (Leibowitz-FIRL)
W75-04109

OPERATIONAL ASPECTS OF URBAN SEWAGE WORKS,
Leyland Urban District Council (England).
J. Hatfield, K. Ormerod, and C. South.
Water Pollution Control, Vol 73, No 4, p 369-381, 1974. 1 fig, 2 tab.

Descriptors: *Sewage treatment, *Sewerage, *Management, *Design, Sewage districts, Sludge treatment, Sludge disposal, *Waste water treatment, Treatment, *Operations.

Sewage treatment and sewerage works of three relatively small local authorities in Great Britain and their problems of management are discussed. Included are details concerning the division of works within the three authorities, a description of the treatment units at the works, and the management of the labor force employed. It was concluded that where competent management staff are available on sewage works, they should be included in consultations with the persons responsible for the design of treatment plants. More stress needs to be placed on determining the ecologically best method of sludge disposal and on providing the most appropriate treatment method. The small works described can produce results comparable with the results of much larger units when reasonably designed and well run. Smaller works also maintain much of the team spirit and pride of achievement which often cannot be found on larger works. (Orr-FIRL)
W75-04114

PHILADELPHIA PILOTS--BUILDS OXYGEN ACTIVATED SLUDGE,
Philadelphia Water Dept., Pa.
C. F. Guarino, M. D. Nelson, and A. B. Edwards.
Journal of the Environmental Engineering Division, Vol 100, No EE4, p 919-935, August, 1974. 14 fig, 7 tab.

Descriptors: *Activated sludge, Oxygen. *Municipal wastes, *Waste water treatment, Pilot plants, *Pennsylvania, Treatment facilities, *Cost comparisons.
Identifiers: *Oxygen activated sludge. *Philadelphia(Penn).

Philadelphia, Pennsylvania, is expanding all three of its large water pollution control plants. The city has been running oxygen activated sludge pilot plants since March, 1971. UNOX pilot units were operated at each plant. Comparative cost studies between air activated and oxygen activated systems were made. The construction costs and annual costs for the oxygen system were estimated to be $11,060,000 and $1,418,000, respectively. The air system would have construction costs of $13,165,000 and annual costs of $1,506,000. Extensive pilot work indicates that the activated sludge process using pure oxygen is a feasible unit process for treating waste water. During the pilot study, high levels of treatment were consistently achieved even when the organic loading and oxygenation time varied widely. The total cost of a system using pure oxygen is less than that for one using air even though using air has a lower annual cost in the aeration part of the system. The city of Philadelphia has decided to build activated sludge facilities using pure oxygen at two of its plants. The facilities will have capacities of 150 mgd and 210 mgd. (Orr-FIRL)

W75-04115

MICROBIOLOGY OF WASTE TREATMENT, (LITERATURE REVIEW),
Pennsylvania State Univ., University Park.
R. F. Unz.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1372-1383, June, 1974. 115 refs.

Descriptors: *Reviews, *Waste water treatment, Microorganisms, Activated sludge, Bacteria, Waste treatment, *Bibliographies, *Microbiology, Viruses, Yeasts, Protozoa, Inhibition, Flocculation, Biodegradation, Nutrients, Temperature.

This literature review covers various aspects of waste water disinfection. Topics covered include: microorganisms of sanitary significance, viruses, yeasts and protozoa, microbial inhibition, filamentous microorganisms, bioflocculation and biopolymers, biodegradation, activated sludge dynamics, temperature effects, and nutrients. (Orr-FIRL)
W75-04117

MIXING IN ANAEROBIC DIGESTION,
Notre Dame Univ., Ind. Dept. of Chemical Engineering.
F. H. Verhoff, M. W. Tenney, and W. F. Echelberger.
Biotechnology and Bioengineering, Vol. 16, No 6, p 757-770, June, 1974. 6 fig, 4 ref.

Descriptors: *Anaerobic digestion, *Mixing, Thermal properties, Hydraulics, *Waste water treatment, Flow, *Indiana.
Identifiers: Hydraulic dead zones, Reaction kinetics, Fluid inflow and outflow, Thermal fluid movement.

Hydraulic dead zones are hazardous to the reaction kinetics involved in anaerobic digestion. An analysis of the significance of thermal fluid movement in the digester to those caused by fluid inflow and outflow is discussed. The principles are exemplified in a digester at the South Bend Wastewater Treatment Plant, South Bend, Indiana. The theoretical estimations are confirmed by experimental measurements. Different types of optimization can be achieved on this operation. One example is the application of this mixing to gas lift mixers. (Leibowitz-FIRL)
W75-04120

WASTEWATER TREATMENT, PHYSICAL AND CHEMICAL METHODS, (LITERATURE REVIEW),
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
F. A. DiGiane, and A. B. Scaramelli.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1109-1121, June, 1974. 1 tab, 131 ref.

Descriptors: *Reviews, *Waste water treatment, *Phosphorus, Water pollution, *Coagulation, *Adsorption, *Nutrients, Polymers, *Filtration, Ion exchange, Reverse osmosis, Disinfection, Biochemical oxygen demand, Ammonia, Solids separation, Nitrogen, Membrane processes, Ozone, Pulp wastes, *Bibliographies.
Identifiers: Physical-chemical treatment systems, Nonionic polyacrylamide polymer, Microstrainers, Sand filters, Ultra-high-rate filtration, Clarification.

Physical-chemical techniques for removing nutrients, biodegradable and nonbiodegradable organics and colloidal suspensions were reviewed. A new physical-chemical plant at Rosemount, Minnesota, consists of pretreatment, clarification, filtration, adsorption, ion exchange, and disinfection; it has a capacity to reduce BOD from 200 mg/liter to 10 mg/liter, and ammonia and phosphorus to one mg/liter. Treatments by coagulation, filtration, adsorption, ion exchange, reverse osmosis, flocculation, sedimentation, foam separation, and carbon adsorption techniques were explored. In one instance, a mobile 18-process, trailer mounted pilot plant was employed to evaluate physical-chemical treatment for effluent quality. U.S. installations where the removal of phosphorus has been achieved and European phosphorus removal by coagulation were compared. Domestic and paper mill waste treatment utilizing the low lime process was examined in both bench and pilot plant studies. Eighty-five percent removal of suspended solids, complete phosphorus removal and 60 percent removal of COD was accomplished by the addition of lime to pH 10.0 and the recarbonation to pH 8.5. Laboratory tests dealing with the removal of phosphorus from laundry wastes indicated that calcium chloride was the most effective precipitant, with optimum removal occurring at pH 10.0. (Leibowitz-FIRL)
W75-04121

FILTRATION ENGINEERING'S SYMPOSIUM ON MEMBRANE SEPARATION,
Filtration Engineering, Vol 5, No 5, p 7-8, 10-12, 14-18, 23-24, 26, 28, July/August, 1974. 7 fig, 1 tab.

Descriptors: *Membrane processes, *Filtration, *Separation techniques, Reverse osmosis, Organic matter, Oil wastes, Colloids, Centrifugation, *Waste water treatment.
Identifiers: *Membrane separation, *Ultrafiltration, Hydrocyclones, Oil emulsions.

Ultrafiltration is defined as a solvent and a solute placed in a pressure side of a membrane. A permeate flows through the membrane with a concentrated solute remaining on the same side of the membrane. The solute may be solids, colloids or various organic molecules. Pore structure and the material of the membrane influence significantly the efficiency of the separation. This is a low-energy separation process, and is an alternative to spray drying, evaporation, selective precipitation and other fine medial filtration processes. Applications of ultrafiltration cover a large range of particle sizes, ranging from ten microns on the high side to ten angstroms on the low side. On the low side the membranes are similar to reverse osmosis membranes. Ultrafiltration's basic characteristic, however, is that the osmotic pressure is extremely low in solution and operating pressures are about 50 psi, whereas reverse osmosis is closer to 500 to 1,000 psi. The flux per unit area is the same or higher than the reverse osmosis separation. Ultrafiltration is less costly than chemical treatment for the treatment of oil emulsions. It involves no chemical usage, therefore adding no pollution to the system. In the General Electric system discussed, a 2.0 percent emulsion is concentrated up to about 50 percent, at the point of combustibility. Because the membrane is only a physical barrier to the passage of oil droplets, the changes in waste characteristics have no effect on the ultrafiltration system's performance. (Leibowitz-FIRL)
W75-04122

AN OVERLOADED SLUDGE PLANT. TRY CHEMICAL TREATMENT,
Hercules Inc., Wilmington, Del.
S. C. Pearson, and R. G. Soltis.
Water and Sewage Works, Vol 121, No 7, p 56-58, July, 1974. 2 fig, 8 ref.

Descriptors: *Sludge removal, *Chemical treatment, *Flocculation, *Waste water treatment, Separation techniques, Solid wastes, Mixed liquor, Digestion, Biochemical oxygen demand.
Identifiers: *Solids transport capacity, Inorganic coagulant, Hydraulic overload, *Clarification.

The solids transport capacity is the sum of two parts, one of which, the capacity due to sludge withdrawal, is alterable by the plant operation. An increase of solids loading on the clarifier from 12 to 16 lb/sq ft/day necessitates that the sludge recycle be increased from 50 to 65 percent to prevent solids carryover. A limited activated sludge recycle capacity can influence the chemical treatment objectives to a large extent. These objectives include the reduction of solids loading on the final clarifiers and maintenance of good solids capture across the final clarifiers in the face of flow increase; both objectives depend upon the accomplishment of maximum BOD removal in the primary basin by adding an inorganic coagulant and flocculant to the raw sewage and by adding a flocculant to the mixed liquor to ensure complete clarification. A flocculant is added to the sludge thickener for the prevention of a hydraulic overload on the digesters. The experiment had three different phases, including the establishment of a baseline by operating the plant at overload with no chemical treatment; the evaluation of the potential flocculation of mixed liquor as the only form of treatment; and full chemical treatment in primary and secondary systems. (Leibowitz-FIRL)
W75-04123

HOW CHICAGO MANAGES ITS DISTRIBUTION SYSTEM,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 6C.
W75-04197

PLANNED REUSE OF POLLUTED WATERS AND WASTEWATERS,
North Carolina Univ., Chapel Hill.
D. A. Okun.
Effluent and Water Treatment Journal, Vol 14, No 7, p 373-376, July, 1974. 11 ref.

Descriptors: *Water reuse, *Waste water treatment, *Water pollution, *Water management, *Potable water, *Water treatment, Water demand, Water quality, Water pollution effects, Water supply, Quality control, Waste water, Water utilization, Water costs, Water delivery, Water pollution control, Water sources, Waste dilution, Industrial wastes, Municipal wastes, Treatment, Water resources development, Water policy, Water conservation, Conservation.
Identifiers: *Pollution, *Dual supply system, Water Act 1973(England and Wales), Regional water authorities, Regionalization.

While growing population and urbanization is exerting pressure on limited water sources, direct reuse of waste water for drinking may be dangerous. Natural benefits afforded by transit time between points of discharge and recovery, dilution by fresh water, and disinfection by sunlight, sedimentation, and natural biochemical degradation in natural water courses are not present when direct reuse is practiced. Direct reuse poses other problem, including removal of urban chemical contaminants, below-standard facility operation, unavailable technology for analysis and monitoring potable water, lack of fail-safe technology for treatment, and the public's reluctance to ingest its own wastes. One approach to meet water demand is the dual supply system, in which reclaimed waste water is used for non-potable purposes. Benefits of this system include relieving pressure on high-quality water sources, stream pollution reduction, lower costs than for developing new sources, and lower risk of ingesting contaminants. Using polluted waters and waste water for non-potable purposes seems to be the recourse for the future. In addition, water resources and water pollution control authorities must cooperate on a regional basis to plan safe and efficient water reuse. (Grden-North Carolina)
W75-04198

A WATER SEWER PLAN AND PROGRAM FOR THE YOUNGSTOWN-WARREN METROPOLITAN AREA,
Mahoning-Trumbull Council of Governments, Ohio.

September 24, 1970. 27 p, 6 fig, 1 tab, 6 maps, 2 append. HUD P-273, Ohio P-273(G).

Descriptors: *Water distribution(Applied), *Water management(Applied), *Waste water treatment, *Urban hydrology, *Sewers, *Water resources development, *Water management, *Waste water disposal, Sewerage, Ohio, Water supply, Planning, Waste water(Pollution), Sewage districts.
Identifiers: Youngstown(Ohio), Warren(Ohio), Mahoning County(Ohio), Trumbull(Ohio), Mahoning River Management Committee, Northeast Ohio Water Development Plan.

The current state of water sewer development in the Youngstown-Warren Standard Metropolitan Area preliminary to developing a regional water resources management system is described in an initial attempt to draw together hitherto fragmented efforts. The Water Sewer Plan is closely related to and coordinated with Mahoning-Trumbull COG's land use plan and housing plan in recognition of the interrelationship between these factors. Various governmental units have responsibility for water and sewer planning and facilities development. Final responsibility for action remains with individual subdivisions. Coordination for planning has come from the Mahoning-Trumbull Counties Comprehensive Transportation and Development Study which produced the first collection of water and sewer data on a regional basis and the State of Ohio Department of Natural Resources which has been preparing the Northeast Ohio Water Development Plan. An informed group of public and industrial leaders, the Mahoning River Management Committee, has begun development of 'cooperative programs in water resources management between local government and private industry.' Plan objectives include (1) pollution reduction, (2) adequate water and sewer facilities for realistic housing goals, (3) maintenance and/or improvement of existing facilities, and (4) an efficient management system with political responsiveness. The plan also incorporates a provision for citizen participation. Listings, profiles, costs, completion dates and short descriptions of some seventy water sewer projects underway, scheduled or proposed for the area, are provided. (Salzman-North Carolina)
W75-04200

SOME CHARACTERISTICS OF COUNTERJET FLOW,
Sir George Williams Univ., Montreal (Quebec).
For primary bibliographic entry see Field 5B.
W75-04217

DRY-TYPE COOLING SYSTEMS IN ELECTRIC POWER PRODUCTION,
North Dakota State Univ., Fargo. Dept. of Mechanical Engineering.
K. W. Li.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 109-119. 7 ref.

Descriptors: *Cooling towers, *Water cooling, *Thermal powerplants, Equipment, Heated water, Heat transfer, Environment, *Waste water treatment.
Identifiers: *Dry-type cooling tower.

A dry-type cooling tower (essentially a radiator) could be adopted as an alternative for removing waste heat from power plants. The principal drawbacks to using dry cooling towers were contrasted to several advantages, most significantly, the elimination of thermal discharge to natural water bodies. (See also W75-04213) (Jess-ISWS)
W75-04221

COOLING TOWERS - BEST ACHIEVABLE THERMAL POLLUTION ABATEMENT TECHNOLOGY,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
F. L. Parker, and E. B. Jernigan.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 133-141. 1 tab, 16 ref.

Descriptors: *Economics, *Powerplants, *Thermal pollution, *Cooling towers, Ecology, Environmental effects, Benefits, Costs, Nuclear powerplants, *Alabama, Water pollution, Decision making, Air pollution, Aquatic habitats, *Thermal pollution, Cost-benefit analysis.
Identifiers: Case study.

The use of benefit-cost analyses to aid in decision making is an established practice in water resources engineering. The benefits and costs of recommended technology were evaluated for a case study of Browns Ferry Nuclear Power Plant, Alabama. Economically, the estimated costs exceeded the estimated benefits by about $30,000,000. In impact upon the environment, the cooling towers were more harmful than once-through cooling. There is not enough information available to make definitive statements on the biological damages that would be caused by raising the temperatures of the reservoir approximately 10F instead of 5F. However, all available evidence tends to support the conclusion that the upset of the aquatic flora and fauna would not be devastating in any respect, that it would occur only in a relatively small area in the immediate vicinity of the plant, and that it would not involve any significant, valuable, or endangered species. If significant, unforeseen problems should develop, an off-stream cooling system could then be instituted and the reservoir would return to its original condition. Failure to apply an extensive benefit-cost analysis to the alternatives for controlling thermal releases from the Nuclear Plant clearly resulted in an incorrect and very expensive decision. Each environmental case must be considered and analyzed in its own right. (See also W75-04213) (Humphreys-ISWS)
W75-04223

A DEMONSTRATION OF WASTE HEAT USE IN AGRICULTURE,
National Environmental Research Center, Corvallis, Oreg.
A. G. Christianson, J. W. Berry, and H. H. Miller, Jr.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 142-153. 4 fig, 2 tab.

Descriptors: Agriculture, *Experimental farms, *Heated water, *On-site investigations, Irrigation, Instrumentation, Soil temperature, Field crops, Fruit crops, Nuts, Greenhouses, Frost protection, Thermal powerplants, Cooling water, Heating, Soils, *Water reuse, *Thermal pollution.

Highlights were described of a demonstration project, concluded May 31, 1973, that used warmed condenser cooling water for agricultural purposes. The project demonstrated specific methods of using the warmed water. For some applications, i.e., irrigation and plant cooling, such water does not offer significant benefits that can be attributed to its elevated temperature alone; conversely, no damage need be incurred. For frost protection, warm water offers advantages over water at normal temperatures. Warm water use for underground soil heating, in open fields and under greenhouses, shows significant potential for profitable use for selected crops which demonstrated increased yields. (See also W75-04213) (Humphreys-ISWS)
W75-04224

A COMBINED SYSTEM CONCEPT FOR POWER GENERATION AND WASTEWATER RENOVATION,
Arizona Univ., Tucson. Dept. of Nuclear Engineering.
R. A. Fazzolare, and R. A. Sierka.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 180-185. 1 fig, 1 tab, 3 ref. OWRT A-044-ARIZ(1)

Descriptors: *Waste water treatment, *Water reuse, *Cooling water, *Heated water, Thermal power, Heat exchangers, Thermal pollution, Heat transfers, Cooling towers, Condensers, Powerplants, Solid wastes, Heat transfer.

Laboratory investigations of a one-step physical-chemical waste treatment process carried out at elevated temperatures indicated performance at least equivalent to conventional secondary sewage treatment. Significantly improved floc and sludge characteristics suggested desirable design parameters for commercial application. Based on these results, a combined power plant-wastewater treatment plant was proposed as a viable engineering concept. Use of waste heat in the wastewater treatment plant was predicted to result in the generation of water for condenser cooling as well as production of additional reusable water. Final handling of the quantities of sewage sludge generated is being investigated. Possible alternatives include use as a fertilizer or for conditioning of arid soils. (See also W75-04213) (Harmeson-ISWS)
W75-04227

DESIGN OF THERMAL COOLING SYSTEMS USING THE CASCADE OF ENERGY CONCEPT,
Oklahoma Univ., Norman. Dept. of Aerospace, Mechanical and Nuclear Engineering.
D. G. Harden.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 186-193. 3 ref

Descriptors: Energy, *Energy budget, *Energy transfer, *Thermal pollution, Cooling, Thermodynamics, Entropy, Nuclear energy, Wastes, Irrigation, Irrigation water, Heat transfer, Nuclear powerplants, *Waste treatment.
Identifiers: *Energy cascade systems, *Thermal cooling systems, Conversion process, Steam powerplants.

The progress of mankind is related to his increased understanding of energy and its uses. Energy which exists in mass at potentials above the lowest corresponding potential in the surroundings is considered by man to be available or free, for he has found that with suitable devices he can obtain useful effects greater than his cost by removing the constraints on the energy and allowing it to pass through his device on its way to equalizing with the corresponding lower potential. The proposed cascade system of energy usage recognize that energy needs occur at different potential levels and attempted to maximize the useful effects for man of energy flows. An energy cascade system can be designed most logically by starting with those uses which have outlet conditions at or near the lowest naturally accessible potentials. Then

appropriate energy utilization devices can be inserted which utilize no more of the existing potential than necessary. The cascade method is the reverse of the normal design method. Several illustrations of the cascade type of design were discussed. (See also W75-04213) (Bhowmik-ISWS)
W75-04228

PREDICTION OF OXYGEN TRANSFER RATE IN AIR BUBBLE AERATION,
Institutul de Studii si Cercetari Hidrotehnice, Bucharest (Rumania).
A. G. Munteanu, and F. Briere.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 514-523. 9 fig.

Descriptors: *Aeration, *Air entrainment, *Bubbles, *Turbulence, *Oxygenation, Oxygen, Dissolved oxygen, Water quality, Water analysis, Turbulent flow, Oxygen requirements, Mechanical properties, Mixing, Analytical techniques, Mathematical studies, Instrumentation, *Waste water treatment, Diffusion.
Identifiers: *Oxygen transfers.

Water aeration experiments were conducted to establish, according to classical methodology, the variation of the overall oxygen transport coefficient from air to water in response to: (1) aeration intensity, (2) water height above the aerator, and (3) the aerator orifice diameter. The results of the experiments show that aeration intensity is the main factor controlling the rate of oxygen transport. The important part played by turbulence in the transport process was clearly demonstrated by the increase in specific transport rate per unit contact area caused by increasing aeration intensity. A description of the aerator apparatus used in the experiments was included. (See also W75-04213) (Henley-ISWS)
W75-04253

HYDROGEN PEROXIDE TREATMENT OF EFFLUENT RESULTING FROM WET AIR OXIDATION OF SHIPBOARD WASTES,
Naval Academy, Annapolis, Md. Dept. of Chemistry.
E. Koubek.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-777 096, $3.25 in paper copy, $2.25 in microfiche. Report No. USNA-EPRD-3, February 1974. 10 p, 3 tab, 10 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Sewage effluents, *Oxidation, Chemical oxygen demand, Chemicals.
Identifiers: Shipboard wastes, *Wet air oxidation, Hydrogen peroxide.

It was proposed that hydrogen peroxide could be used to oxidize or reduce the residual chemical oxygen demand of shipboard waste effluents that have been subjected to wet air oxidation treatment. Studies were made of the effects of various catalysts on the oxidation of acetic acid by hydrogen peroxide, and of acetic acid-peroxide reactions which were irradiated with ultraviolet light. An advantage was claimed for the use of hydrogen peroxide because it adds no new pollutants to the effluents that it treats. (Harmeson-ISWS)
W75-04261

INDUSTRIAL WASTEWATERS, RED RIVER ARMY DEPOT, TEXARKANA, TEXAS,
Army Construction Engineering Research Lab., Champaign, Ill.
J. E. Matherly, R. J. Fileccia, and H. A. Porte.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 162, $4.75 in paper copy, $2.25 in microfiche. Technical Report E-24, April 1974. 77 p, 5 fig, 3 tab, 16 ref, 3 append.

Descriptors: *Industrial wastes, Water pollution sources, *Waste treatment, Waste water(Pollution), Water conservation, *Waste water treatment, On-site investigations, Laboratory tests, Costs, *Texas.
Identifiers: Red River Army Depot(Tex).

The volume and character of industrial wastewaters discharged from the motorized vehicle maintenance area of the Red River Army Depot were described. Field and laboratory studies and measurements were made with regard to the character and treatment of wastewater. Design criteria were generated for an industrial wastewater treatment facility that would enable oil and grease removal, phosphate removal, and pH adjustment. This treatment would precede biological treatment in an existing secondary treatment facility at the neighboring Lone Star Army Ammunition Plant. The need for a new gravity wastewater collection system was identified and consideration was given to its congifuration. Existing industria wastewaters were classified according to treatment requirements and methods of collection. Cost estimates for proposed additions and changes to facilities were presented. (Harmeson-ISWS)
W75-04263

QUALITY CONTROL IN RIVER MANAGEMENT OF THE BRISTOL AVON,
Bristol Avon River Authority (England).
For primary bibliographic entry see Field 5G.
W75-04324

INTERFACING NEWLY DEVELOPED TECHNOLOGY WITHIN PRESENT WASTEWATER TREATMENT TRAINS,
Hebrew Univ., Jerusalem (Israel). Graduate School of Applied Science and Technology.
G. Belfort.
Journal of the American Water Works Association, Vol 66, No 8, p 504-505, August, 1974. 1 tab, 6 ref.

Descriptors: *Waste water treatment, *Membrane processes, *Water pollution, *Reverse osmosis, Pilot plants, Municipal wastes, Effluents, Economics, Biological treatment, Filtration.
Identifiers: *Pressure-driven membrane processes, Inorganic ions, Conservative constituents.

Much research and pilot plant experimentation is underway to investigate the usefulness of membrane processes for waste water treatment in the pulp and paper, mining, photographic, paint, food and pharmaceutical, textile and electronic industries. Formerly the concern has been with the evaluation of membrane performance or permeator design with different municipal effluents, and the longevity of the system. Advanced processes, being more complicated, cost more to operate, but the rate of treatment is high and land utilization is low. For conventional processes less external energy is required. Traditional biological treatment processes have lower operating and maintenance costs but higher capital investment than the advanced processes including the pressure-driven membrane processes. However, the buildup of constituents resulting from multiple recycling, will have to be considered. Dissolved inorganic ions, refractory organics, and viruses are among the conservative constituents for normal biological secondary treatment. Reverse osmosis is one of the only processes that can totally remove such conservative constituents from the effluent stream. There exist many differences in structure and operation between a specific group of advanced processes (pressure-driven membrane) and the traditional processes for waste water treatment. Research and planning can minimize or avoid potential problems associated with the integration of diverse methods. (Leibowitz-FIRL)
W75-04325

TREATMENT OF CRUDE SEWAGE IN TWO HIGH-RATE ACTIVATED-SLUDGE PLANTS OPERATED IN SERIES,
Water Pollution Research Lab., Stevenage (England).
A. G. Boon, and D. R. Burgess.
Water Pollution Control, Vol 73, No 4, p 382-395, 1974. 4 fig, 4 tab, 11 ref.

Descriptors: *Water pollution, *Effluents, *Sewage treatment, *Activated sludge, Biochemical oxygen demand, Nitrification, Sewage bacteria, Sedimentation, Aeration, *Waste water treatment.
Identifiers: *Settled domestic sewage, *Nitrosomona.

Experiments have determined that during the treatment of settled domestic sewage from Stevenage, England at a temperature of 17 degrees C the growth rate constant ranged from 0.15 to 0.59 d to the minus first power apparently as a result of different degrees of inhibition to the nitrifying bacteria under various conditions of treatment. Recently it has been shown that when treating similar sewage, nitrification is achieved consistently when the wastage rate of the activated-sludge is 0.36 d to the minus first power corresponding to a sludge age of 2.78 d, when the temperature is in the range of 16 to 21 degrees C. The implication is that the growth rate is constant for Nitrosomonas at more than 0.36 d to the minus first power. The average BOD of effluent has been attainable consistently at 50 mg/liter, maintaining at the same time a high-rate of treatment with the activated sludge settling in the final sedimentation stage. Results confirmed that when treating settled sewage in the same plant, the high quality of effluent can be achieved with short periods of aeration of sewage at high sludge loadings, as long as the rate of treatment is not limited by the concentration of dissolved oxygen in the mixed liquor. (Leibowitz-FIRL)
W75-04334

CONTAINING THE FLOW OF SEWAGE SLUDGE.
Environmental Science and Technology, Vol 8, No 8, p 702-703, August, 1974. 1 fig, 1 tab.

Descriptors: *Sewage sludge disposal, *Digestion, Water pollution, Heavy metals, Pesticides, Pathogenic bacteria, Landfills, *Sewage treatment, Florida, Pennsylvania, Fertilizer, Agriculture, Dewatering, *Incineration, *Waste water treatment.
Identifiers: *Sludge incineration, Philadelphia(Penn), Pensacola(Fla).

The Philadelphia Water Department has conducted a simple 'unit' operation for the containment of sewage sludge. The sludge is anaerobically digested and pumped to a lagoon for thickening to about 12.5 percent solids. This thickened sludge is transferred to a 2 million gallon holding barge which is towed out to sea. The discharge of the sludge occurs over a 6 mile course at approximately 30,000 gpm. No lasting harmful effects were determined by a joint study on this process. Because of an increase in ocean and outfall sludge dumping, ocean disposal regulations and restrictions have increased to such an extent that land disposal is expected to increase. Landfilling sites, however, are scarce and expensive, precipitating the old technique of land use of sludge for agricultural needs like soil conditioning and fertilizing supplementation. For example, sludge disposal takes care of 80,000 gpd near Pensacola, Florida. The optimum rate of sludge application for corn, sorghum and soy growth was estimated at 1 inch per week. Cattle fed these grains for 6 months are

to be tested for heavy metal and other toxic substances in the animal' tissues. The U.S. Department of Agriculture is investigating composting and trenching of sludge. Estimates are that primary sludge provide only 1 percent of nitrogen usable for agriculture. Allegheny County Sanitary Authority introduced vacuum filters for dewatering sludge, utilizing the maximum heat, so as to generate steam as a final product by burning a mixture of sewage solids and solid waste materials. (Leibowitz-FIRL)
W75-04336

REBIRTH OF THE SEWAGE FARM.
The Consulting Engineer, Vol 38, No 7, p 49-51, July, 1974. 2 fig.

Descriptors: *Digested sludge, Settling tanks, High-rated heated digestion, Chicago(Ill).

The Metropolitan Sanitary District of Chicago has developed a land reclamation program. Digested sludge is taken by a barge down the Illinois River to Fulton County, 200 miles from Chicago. From this location it is pumped eleven miles underground to reservoirs, then it is sprayed by sprinklers over a portion of 11,000 acres purchased by the MSD. More than 1500 M gallons of sewage is treated each day. The treatment removes 90 percent of the solids in settling tanks, and high-rate heated digestion treats the solids and accompanying liquids. The Chicago district produces approximately 1,000 dry tons of digested sludge. A new scheme of expansion includes the construction of deep tunnels and underground reservoirs for storing storm sewage awaiting treatment. The Muskegon County Wastewater Management System of Michigan is pumping sewage from ten towns through a rising main to a treatment plant north-west of Muskegon. BOD is reduced 70-90 percent by conventional primary and secondary treatment. Vast lagoons store the effluent where solids settle out. The lagoons will be dredged in five years. From the lagoons the effluent flows to an irrigation system where it is disinfected with chlorine. (Leibowitz-FIRL)
W75-04337

APPLICATION OF MICRO-CONTROLLERS MELMIC 100 TO WATER TREATMENT FACILITIES, (IN JAPANESE),
Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
Z. Moriguchi.
Mitsubishi Denki Giho, Vol 48, No 6, p 750-765, June 1974. 11 fig, 3 ref.

Descriptors: *Waste water treatment, *Water supply, *Sewage treatment, Water quality control, Treatment facilities, *Control systems, Water treatment.
Identifiers: *Micro-Controllers MELMIC 100.

City water service and sewage treatment facilities are becoming larger and more complicated with the upgrading of public welfare and municipal development. Electric equipment makes it necessary to emphasize the reliability and ease of operations. Micro-controllers MELMIC 100 has been developed and manufactured as a static sequence controller with arithmetic counting apparatus. This process promotes the serviceability of the facility. Examples of application are presented for consideration of water treatment systems. (Leibowitz-FIRL)
W75-04338

HEAT DISSIPATION FROM TURBULENT OPEN CHANNEL FLOW,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-04350

5E. Ultimate Disposal Of Wastes

USE AND DISPOSAL OF SOLID WASTES FROM PULP AND PAPER PRODUCTION (VYUZITIE A LIKVIDACIA PEVNYCH ODPADOV Z VYROBY BUNICINY A PAPIERA),
Vyskumny Ustav Papier a Celulozy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W75-03886

TREATMENT OF RESIDUAL SLUDGES: GENERALITIES AND APPLICATIONS IN THE PAPER INDUSTRY (TRAITEMENT DES BOUES RESIDUAIRES: GENERALITES ET APPLICATIONS A L'INDUSTRIE DU PAPIER),
For primary bibliographic entry see Field 5D.
W75-03898

PROBLEM DEFINITION STUDY: EVALUATION OF HEALTH AND HYGIENE ASPECTS OF LAND DISPOSAL OF WASTEWATER AT MILITARY INSTALLATIONS,
Army Medical Environmental Engineering Research Unit, Edgewood Arsenal, Md.
For primary bibliographic entry see Field 5D.
W75-04015

SOIL ADSORPTION OF HUMIC COLOR,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04043

ECONOMIC ANALYSIS OF LAND TREATMENT OF MUNICIPAL WASTEWATERS,
North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-04047

IRRADIATED FUEL AND CONTROL RODS TRANSPORT FROM A DECOMMISSIONED POWER REACTOR,
Oak Ridge National Lab., Tenn.
W. A. Pryor.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tennessee, p 375-382, 2 fig, 1 tab, 3 ref.

Descriptors: *Nuclear powerplants, *Puerto Rico, *Transportation, *Fuels, *Radioactivity, Ships, Railroads, Safety, Evaluation, Documentation, Comprehensive planning, Radioactive waste disposal.
Identifiers: Fuel elements, Fuel reprocessing, Motor freight, Casks, Shipping containers, Emergency planning, Decommissioning.

The decommissioning of the Boiling Nuclear Superheater (BONUS) Reactor in Rincon, Puerto Rico, involved the transport to the continental United States of irradiated fuel elements as well as the shim and control rods for reprocessing and disposal, respectively. The responsibility was assigned by the USAEC to the Oak Ridge Operations Office. Tasks included cask selection, cask and special equipment preparation, transportation arrangements, documentation, and shipment execution. Safety considerations were factored into each phase and Safety Analysis Reports were prepared for the cask and for the fuel and control rod baskets. Trial runs with the cask and special equipment were conducted prior to shipment to Puerto Rico. The applicable regulations of the USAEC and the Department of Transportation were followed. The completed task represented the cooperative efforts of two USAEC Operations Offices and two USAEC prime contractor organizations. (See also W75-04152) (Houser-ORNL)
W75-04188

DISPOSAL OF POLLUTED DREDGINGS FROM THE GREAT LAKES AREA,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 5B.
W75-04251

DISPOSAL/RECYCLE MANAGEMENT SYSTEM DEVELOPMENT FOR AIR FORCE WASTE PETROLEUM OILS AND LUBRICANTS.
Esso Research and Engineering Co., Linden, N.J
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 723, $5.75 in paper copy, $2.25 in microfiche. Report No. AFWL-TR-73-283, April 1974. 126 p, 14 fig, 16 tab, 46 ref, 2 append. F29601-73-C-0047.

Descriptors: *Oil wastes, *Waste disposal, *Management, Fuels, *Lubricants, *Oil pollution, Surveys, Military reservations, Unit costs, Economics, Ultimate disposal, Incineration, Recycling, Education, Organic compounds.

The problem of disposing of waste lubricants and contaminated fuels generated at Air Force bases was addressed. The nature and rates of generation of several waste petroleum products such as lubricating oils, hydraulic fluids, and contaminated jet fuel were considered. Present Air Force waste petroleum oils and lubricants (POLs) practices were reviewed including a description of operations at Kelly and Andrews Air Force Bases. Waste POLs data for other bases, generated by questionnaire, were also reviewed. Disposal/recycle options were identified and discussed. A general procedure for developing an effective waste POLs disposal system, for any Air Force installation, was presented, including disposal decision making criteria and the disposal decision making process. Hypothetical examples, illustrating the mechanics of the procedure, were presented. The importance of a carefully planned program for implementing the developed waste POLs/disposal procedure was described including education of base personnel, enforcement of waste product segregation, and management. Considerably high waste product values can be realized by the implementation of the described procedure. (Humphreys-ISWS)
W75-04268

INVESTIGATION FOR THE MARINE DISPOSAL OF EFFLUENTS,
Watson (J. D. and D. M.), London (England)
For primary bibliographic entry see Field 5B.
W75-04289

CONTAINING THE FLOW OF SEWAGE SLUDGE.
For primary bibliographic entry see Field 5D.
W75-04336

5F. Water Treatment and Quality Alteration

FURTHER OBSERVATIONS ON ENDEMIC FLUORIDE-INDUCED OSTEOPATHIES IN CHILDREN,
L.L.R.M. Medical Coll., Meerut (India). Dept. of Human Metabolism.
For primary bibliographic entry see Field 5C.
W75-03909

QUALITY WATER FOR HUMAN CONSUMPTION AND INDUSTRY,
Pettigrew Engineering Co. Pty. Ltd. (Australia).
For primary bibliographic entry see Field 5D.
W75-03941

SOLVING EFFLUENT PROBLEMS BY THE USE OF CENTRIFUGES,
Alfa-Laval Pty. Ltd. (Australia). Industrial Div.
For primary bibliographic entry see Field 5D.
W75-03942

FILTRATION - MEDIA SELECTION IS THE KEY TO SUCCESS,
Barrier Filters Pty. Ltd. (Australia).
J. Wright.
Australian Chemical Engineering, Vol 15, No 10, p 4-15, October 1974. 7 tab.

Descriptors: *Filters, *Filtration, *Water treatment, *Separation techniques, Waste water treatment.
Identifiers: Filtration media.

The materials available for use as filter media are reviewed in the course of providing a guide for engineers and plant managers. Their properties and applications are discussed in relation to the type of separation required, the type of filter employed, and the uses to which the filtered material is to be put. A glossary of filtration terms is provided. (Levick-CSIRO)
W75-03943

NATIONAL DRINKING WATER STANDARDS.
For primary bibliographic entry see Field 5G.
W75-03998

IS THE WATER SAFE TO DRINK. PART 3: WHAT YOU CAN DO,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
R. H. Harris, and E. M. Brecher.
Consumer Reports, Vol 39, No 8, p 623-627, August, 1974.

Descriptors: *Water quality standards, *Water pollution control, *Environmental control, *Potable water, Public health, United States, Water treatment, Social participation, Water purification.

There is a great need for assuring the purity of drinking water being piped into homes and businesses by some 40,000 community water systems in the United States. Methods for achieving a higher standard of water quality were discussed in two previous articles. The role of the individual citizen is now in focus. Recommendations for reducing one's heavy metal contamination intake are as follows: let water run for a minute or so after several hours of nonuse; avoid using hot water for preparing infant's formula or cooking since hot water tends to be higher in heavy metal content, although boiling is essential for water which is frequently contaminated by bacteria; and most importantly, organize citizens groups to demand the upgrading of water quality from the community supplies while being prepared to pay the price of purification. (See also W74-10897 and W75-00718) (Leibowitz-FIRL)
W75-04019

POLLUTION AND PUBLIC HEALTH: TACONITE CASE POSES MAJOR TEST,
For primary bibliographic entry see Field 5G.
W75-04326

APPLICATION OF MICRO-CONTROLLERS MELMIC 100 TO WATER TREATMENT FACILITIES, (IN JAPANESE),
Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 5D.
W75-04338

5G. Water Quality Control

INSTITUTIONAL FRAGMENTATION AND POLICY INNOVATION: THE CASE OF FEDERAL WATER POLLUTION CONTROL,
Arizona Univ., Tucson. Inst. of Government.
H. M. Ingram, S. J. Ullery, and B. A. Wright.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-239 105, $9.25 in paper copy, $2.25 in microfiche. Completion Report, January 1975. 316 p. OWRT B-034-ARIZ(1). 14-31-001-4057.

Descriptors: *Water policy, *Political aspects, *Administrative agencies, *Legislation, Institutional constraints, Instition, *Federal Water Pollution Control Act, Legal aspects, Costs, Water pollution control.
Identifiers: Institutional fragmentation, Policy innovation, *Decentralization.

This research questions the assumption that the fragmentation of institutional arrangements in water resources necessarily leads to distributive, incremental policy. It investigates the possibility that fragmentation and the miltiplicy of actors and decision centers associated with a decentralized legislative system is appropriate to innovation and responsiveness of policy. Federal Water Pollution Control Policy from 1956 to 1972 is the focus of analysis. A framework for monitoring innovations in policy content as perceived by key actors is applied to landmark bills. The study concludes that water pollution control bills have been composites of different dimensions and that policy change has occurred unevenly through time. The patterns of legislation-building and consent-building on the 1956, 1965 and 1972 bills are described in detail. The report concludes that the fragmented, decentralized - Congress is especially well suited to innovations in complex, multidimensional legislation.
W75-03851

PUMPING APPARATUS FOR SKIMMING AND RECOVERING AN OIL LAYER FROM A BODY OF WATER,
Patents and Developments A/S, Nesttun (Norway). (assignee)
F. Mohn.
US Patent No 3,853,767, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 775, December 10, 1974.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, *Separation techniques, Pumping, Equipment.

An oil pump is surrounded by a bowl or disc, the periphery of which is adapted to be positioned exactly at the plane of separation between water and oil. This precise adjustment can be done by means of the adjustable floats. The periphery of the disc will then, when correctly positioned, effect the first separation of oil from water. The oil pump is disposed in the center of the bowl or disc and, in order further to separate the oil from the water also at the center portion of the bowl, a chamber may be provided having inlets which are aligned with or somewhat lower than the periphery of the bowl, the oil concentration over the central portion of the bowl being substantially greater than that outside. In order that the oil-covered water can be brought to the bowl in large amounts, a plate is arranged beneath the bowl which is provided at its center with a powerful pump for circulation of the water. When this pump is in operation, large amounts of surface water will be drawn toward the bowl and the plate and, on flowing over the plate to the pump, the oil will trickle over the periphery of the bowl together with very small amounts to water. The water is drained from the central portion of the bowl through channels which open toward the plate. (Sinha-OEIS)
W75-03865

USE OF SULFUR FOR COMBATTING OIL SPILLS,
Amoco Production Co., Tulsa, Okla. (assignee)
L. W. Jones.
US Patent No 3,844,941, 5 p, 11 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2093, October 29, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, *Water pollution control, *Sulfur, *Separation techniques, Gravity.
Identifiers: Gravity separation.

A system is described for combatting the problems which occur when oil is spilled upon a body of water. Sulfur is spread over the spilled oil to hold the oil mass together to permit it to be easily removed from the body of water. Molten sulfur is sprayed as very fine strands over and around the periphery of an oil spill to enmesh the oil in a sulfur web and keep it confined. In another embodiment, sulfur powder is spread over the oil and tends to hold it together. In those cases where sinking of the oil is the most practical solution to the oil spill problem, greater amounts of powdered yellow sulfur, e.g., at least about three parts by weight of sulfur to one part crude oil, is applied. The oil captured by the sulfur is easily recovered with the sulfur and separation of the oil and sulfur is easily obtained by heating and gravity separation. (Sinha-OEIS)
W75-03869

SKIMMING APPARATUS,
L. Bagnulo.
US Patent No 3,853,768, 4 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 776, December 10, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, *Skimming, Flotsam, Equipment, Separation techniques.

A chamber is adapted to be partly submerged in a body of liquid. Means are provided for admitting liquid into the lower zone and the liquid in the chamber is maintained at a height sufficient so as to allow substances flowing on the admitted liquid to rise into the float inside the upper zone. Skimmed liquid is discharged at a lower portion of the lower zone and the floating substances are removed from the upper portion. (Sinha-OEIS)
W75-03870

APPARATUS AND METHOD FOR EFFECTING SEPARATIONS,
L. Mercuri.
U.S. Patent No 3,844,944, 4 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2094, October 29, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Water pollution control, Water quality control, *Separation techniques, Gravity, Equipment, Pollution abatement.
Identifiers: *Gravity separation, Immiscible liquids.

A series of separation chambers is provided each of which, in a downstream fashion, is shorter in height or is at a lower point relative to gravity than its preceding separation chamber. Separations occur in a given chamber and water which has been treated is passed from it to the next lower chamber for further treatment. At each stage the pollutant is removed until potable or pollutant-free water is obtained. The removal of oil or other pollutant is effected by allowing it to flow into the hold of a ship or by passing it to some other reservoir. The water that emerges at the final stage contains little or no oil or other pollutant, and is allowed to flow directly back into the sea, lake or river in a continuous fashion. The method and apparatus provides the separation of oil and water

without the use of any counterflowing processes or turbulence effects. The flow of the liquids is in effect in a straight continuous line. There are no reversals of flow nor are any tortuous paths of liquid travel needed. The separation containers are of sufficient size to accommodate large quantities of liquids, and the filling of the initial container and the continuous pumping of materials into it can be at a rate that is commensurate with the separations that are occurring in the successive containers. Visual gauges can be place on each of the containers to allow ready observation of the status of the mixture in each container. (Sinha-OEIS)
W75-03872

GUIDE TO WATER CLEANUP MATERIALS AND METHODS,
For primary bibliographic entry see Field 5D.
W75-03880

STUDIES ON THE USE OF OZONE IN WATER AND WASTE WATER PURIFICATION (UNTERSUCHUNGEN ZUR ANWENDUNG VON OZON BEI DER WASER- UND ABWASSER-REINIGUNG),
For primary bibliographic entry see Field 5D.
W75-03889

AN ALARMING SYSTEM FOR HIGH-SOLIDS WHITE WATER,
M. MacLeod.
Pulp and Paper, Vol 48, No 11, 116-120, October, 1974. 8 fig.

Descriptors: *Pulp wastes, *Monitoring, Discharge(Water), Water pollution sources, *Wisconsin, Effluents, Pulp and paper industry, Conductivity, Pollution abatement, Waste water(Pollution), Water pollution control, Dissolved solids, Closed conduits, Sewers, Instrumentation.
Identifiers: *White water.

Green Bay Packaging Co. (Green Bay, Wisconsin) produces about 200 tons/day of neutral sulfite semichemical pulp which is combined with recycled waste paper to make about 300 tons/day of corrugating medium. A monitoring and information system has been installed to indicate when and where process upsets occur in a closed mill system. Conductivity sensors in the monitoring system will detect the intrusion of high dissolved solids white water into the clean sewers, since conductivity has been found to correlate well with dissolved solids in the mill's effluent stream. A leak of white water into a clean sewer will be discovered by one of the six strategically located conductivity sensors which will then set off an alarm on the annunciator panel in the paper tester's laboratory. (Sykes-IPC)
W75-03901

HOW TO REDUCE BOD LEVELS FROM SIZE-PRESS STARCHES,
National Starch and Chemical Corp., New York.
K. Bristol.
Pulp and Paper, Vol 48, No 10, p 98-99, September, 1974. 2 tab, 2 ref.

Descriptors: *Pulp wastes, *Pollution abatement, *Biochemical oxygen demand, *Water pollution sources, Hydrogen bonding, Water pollution control, Pulp and paper industry, Chemicals, Additives, Costs, Economics.
Identifiers: *Starch, Sizing agents, Size-press(Paper machine).

In paper mills using starch at the size-press, a significant amount of the starch can return to the wet-end with recycled broke. Anionic or nonionic starches are not retained on the fibers on repulping, but are dispersed in the white water and eventually leave the mill in the liquid effluents, contributing to BOD. Cationic starches, which bond to fibers electrochemically, rather than by hydrogen bonding, tend to stay with the repulped fibers and contribute substantially less BOD to mill effluents. Cases are cited illustrating this effect, as well as cost reductions in secondary treatment attributable to the use of cationic starches. (Hansen-IPC)
W75-03906

SPILL PREVENTION AND CONTROL ASPECTS OF PAPER INDUSTRY WASTE WATER MANAGEMENT PROGRAMS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
G. Gove, and J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No 276, 72 p, August, 1974. 8 fig, 3 tab, 18 ref, 3 appendices.

Descriptors: *Pulp and paper industry, *Water management(Applied), *Oil spills, *Chemical wastes, Chemicals, Accidents, Disasters, Water pollution sources, Legislation, Federal Water Pollution Control Act, Water Quality Act, Water pollution, Hazards, Management, Planning.

Discussed are: general planning for spill prevention, control, and containment; special aspects of oil storage and handling; storage and spill prevention of process chemicals in the pulp and paper industry; and spill control planning strategy. Current EPA regulations covering oil spills, excerpts from the Federal Water Pollution Control Act Amendments (1972) covering hazardous substance liability, and proposed EPA rules covering the designation and removability determination of hazardous substances are included. (Buchanan-IPC)
W75-03912

WATER POLLUTION AND CONTROL,
Rivers House, Glasgow, (Scotland).
For primary bibliographic entry see Field 5B.
W75-03915

CRITERIA FOR REGIONALIZATION OF WATER AND WASTE MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-03946

PROTECTING CREEKSHEDS: DEVELOPMENT AND EVALUATION OF A METHOD TO MANAGE SMALL, URBANIZING WATERSHEDS THROUGH LOCAL GOVERNMENT ACTIONS,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03947

PROTECTING CREEKSHEDS, ANALYSIS AND ACTION,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03948

UNITED STATES V. REPUBLIC STEEL CORPORATION (PROSECUTION FOR UNLAWFUL DISCHARGE OF COAL TAR INTO A RIVER).
491 F 2d 315 (6th Cir 1974).

Descriptors: *Ohio, *Judicial decisions, *Rivers and Harbors Act, *Water quality control, Law enforcement, Legal aspects, Water law, Legislation, Legal review, Water Quality Act, Federal government, Federal jurisdiction, Non-structural alternatives, Water pollution, Water quality, Water pollution sources, Water pollution control, Water policy, Adjudication procedure.
Identifiers: *Water Quality Improvement Act, *Hazardous substances(Pollution), Evidence.

The United States government charged the defendant corporation with violation of the Rivers and Harbors Act by making a discharge of coal tar into a river. Immediately after the discharge had occurred, the defendant had notified the Coast Guard, pursuant to its obligation under the Water Quality Improvement Act of 1970. The government filed a criminal information against the defendant, based upon facts contained in the notification and facts obtained during subsequent investigation. The defendant moved to suppress this evidence, relying upon section 11 of the Water Quality Improvement Act, which provides that information derived from notification made pursuant to statute by any 'person in charge' shall not be used against 'such person' in prosecution for violation of antipollution laws. The United States District Court granted the motion and dismissed the case. The Sixth Circuit Court of Appeals affirmed the lower court's holding, and ruled that the statutory safeguard applied to corporations as well as natural persons. The court added, however, that any prosecution based on evidence other than the notification or information acquired by exploration of such notification was not excluded by the statutory safeguard. (Deckert-Florida)
W75-03992

UNITED STATES V. KENNEBEC LOG DRIVING CO. ET AL. (SUIT BY GOVERNMENT TO ENJOIN LOG-DRIVING ACTIVITIES ON UPPER KENNEBEC RIVER).
For primary bibliographic entry see Field 6E.
W75-03996

NATIONAL DRINKING WATER STANDARDS.
Journal Water Pollution Control Federation, Vol 45, No 8, p 1637-1638, August 1973.

Descriptors: *Water Pollution Control Act, *Federal legislation, *Water quality control, *Water quality standards, Water requirements, Enforcement, Water control, Maintenance, Water pollution control, Administrative agencies, Water resources development, Adoption of practices.
Identifiers: *Safe Drinking Water Act of 1973.

After passing the Water Pollution Control Act Amendments in 1972, Congress began considering the question of national drinking water standards. Several states have adopted standards established in 1914 by the Public Health Service for drinking water quality. These standards have been updated several times, the latest revision was in 1962. Drinking water is contaminated by various sources, and contamination has been found in many regions. On June 22, 1973, the Senate passed the Safe Drinking Water Act of 1973 which gives the Environmental Protection Agency (EPA) the power to set maximum limits on the level of contaminants permitted in drinking water and to enforce those standards if the states fail to do so. The bill also directs the EPA to develop rules for the operation and maintenance of drinking water systems. The EPA administrator will be required to propose nationwide primary and secondary drinking water standards within 180 days of the law's enactment. Enforcement of standards will be the responsibility of the individual states. EPA may step in if states fail to act. Federal funding is provided to assist the states in establishing and maintaining their programs and to support research. Penalties for violations are set forth (Sperling-Florida)
W75-03998

CUTBACK IN COSTRUCTION FUNDING STIRS DOUBT ON WATER QUALITY GOALS.
Journal Water Pollution Control Federation, Vol 45, No 2, p 199-202, February 1973. 1 fig.

Descriptors: *Water pollution, Abatement, *Impaired water quality, *Water pollution control, *Pollution abatement, *Navigable waters, Wildlife management, Fish resources, Waste treatment, Aquatic environment, Legislation, Water law, Water quality control, Research, Technology, Water resources development, Waste water treatment, Conservation, Wildlife resources, Environmental effects, Water policy, Adoption of practices.

President Nixon vetoed the $25 billion water pollution control bill. After Congress overrode the veto, the President impounded $6 billion of the $11 billion authorized by Congress for water pollution control grants in the next two fiscal years. The bill provides for the elimination of the discharge of pollutants into navigable waters by 1985; protection of fish, wildlife, and recreation; application of technology to achieve secondary treatment for publicly owned treatment works; and the application of technology to produce the best practicable waste treatment. Expenditures for contract grant authority are set forth in the act. State allocations will be made on the basis of need rather than population. The impoundment of funds has given rise to a difference of opinion concerning its possible effects on the water pollution control effort. One side feels that the decrease in funding will have little effect on the purposes of the act while the other side feels that without funding, the entire law becomes useless. Spokesmen from various states agree that the allocation of money is the controlling factor in the Nation's ability to control water pollution adequately. (Sperling-Florida)
W75-03999

REGIONAL MANAGEMENT OF WASTE SYSTEMS,
Maryland Environmental Service, Annapolis.
For primary bibliographic entry see Field 5D.
W75-04000

THE PHILOSOPHY OF S.2770,
Senate, Washington, D.C.
E. S. Muskie.
Journal Water Pollution Control Federation, Vol 44, No 3, p 522, March 1972.

Descriptors: *Legislation, *Water pollution control, *Water quality standards, *State governments, Ecology, Federal government, Effluents, Conservation, Water quality control, Water quality, Water pollution sources, Waste water disposal, Waste water treatment, Legal aspects, Water Quality Act, Permits, Waste water disposal, Regulation, Specifications, Water law, Political aspects, Environmental sanitation.
Identifiers: *Federal Water Pollution Control Act Ammendments of 1972.

The Federal Water Pollution Control Act Amendments of 1972 propose a major change from water quality standards to effluent limits for the federal water pollution control system. It is virtually impossible to establish a precise relationship between an effluent and water quality except where a single source of pollution contributes the entire waste load to the receiving water. The Refuse Act of 1899 provides a convenient way to take polluters to court for discharging without permits. The most effective way to stop pollution of the waterways is to stop the discharge of pollutants into receiving waters. The Senate recommends this goal be reached by 1985. Critics say there are technical and economic limits on the degree to which the discharge of pollutants may be stopped. Reasonable costs is the basic test under this law, for eliminating discharges. The target date is intended to spark the research and development of the technology now lacking. The law gives the states an opportunity to take the lead in setting effluent limits within the context of a national law that insures against capricious and uneven application of that law. (Sperling-Florida)
W75-04001

UNITED STATES V. HOLLAND (ACTION TO ENJOIN UNLAWFUL FILLING OPERATIONS).
For primary bibliographic entry see Field 6E.
W75-04005

WPCF ADOPTS RESOLUTIONS AIMED AT EASING PROBLEMS OF WATER LAW.
Soap and Detergent Association, New York.
Water in the News, Soap and Detergent Association, New York. p 1-2, November-December 1974.

Descriptors: *Water pollution, *Water treatment, *Water law, *Administration, *Federal government, State governments, Water policy, Water pollution control, Water quality standards, Government finance, Cost-benefit analysis, Construction, Planning, Administrative agencies, Permits, Industrial wastes, Governmental interrelations, Evaluation, Long-term planning.
Identifiers: Environmental policy, Effluent limitations.

At the forty-seventh annual conference of the Water Pollution Control Federation recommendations were made for more effectively dealing with problems of water law and administration. It was suggested that primary authority be shifted from the federal government to the states. Policy in regard to secondary treatment standard and effluent limitation should be revised to insure that local conditions and cost effectiveness be considered. Federal funding for construction grants and state programs need to be at adequate levels and as such the commitments need to be long term without vacillations in funding. Among administrative recommendations are that funds commensurate with documented needs for research, manpower, and training be sought and utilized, and that the use of delegating mechanisms be broadened to reduce staggering paperwork demands. The administrator of the Environmental Protection Agency reported that the bulk of major permits for both municipal and industrial dischargers will be issued by the end of the year. (Sperling-Florida)
W75-04009

GUIDELINES FOR PREPARATION OF ENVIRONMENTAL STATEMENTS FOR REVIEWING AND COMMENTING ON ENVIRONMENTAL STATEMENTS BY OTHER FEDERAL AGENCIES.
Environmental Protection Agency, Seattle, Wash. Region X.
For primary bibliographic entry see Field 6G.
W75-04010

EFFECT OF A KILLED SOD MULCH ON NITRATE MOVEMENT AND CORN YIELD,
Kentucky Univ., Lexington.
For primary bibliographic entry see Field 3F.
W75-04013

STANDARDS, ADMINISTRATION, AND SURVEYS, (LITERATURE REVIEW),
Delaware River Basin Commission, Trenton, N.J.
R. Porges, and S. P. Gross.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1625-1643, June, 1974. 216 ref.

Descriptors: *Water pollution control, *Federal Water Pollution Control Act, Standards, Administration, Surveys, Water quality standards, Biota, Wildlife, *Bibliographies, *Reviews.

Water quality standard guidelines for revision and general development under the Federal Water Pollution Act Amendments of 1972, as applied to interstate and intrastate waters were published by EPA. Objectives, goals, policy guidelines, legislative requirements and other salient issues were examined. Revised water quality standards were proposed for the naviagable waters of Illinois, West Virginia, Puerto Rico, New Jersey, and New York. The National Academy of Sciences-National Academy of Engineering's Environmental Studies Board has completed a revision of 'Water Quality Criteria' issued in 1968. Criteria for six classes of water uses, such as recreation and aesthetics, public water supplies, both fresh and marine water aquatic life and wildlife, agricultural use and industrial supplies, were established. Criteria were presented in numerical and verbal form for the physical, chemical, biological and esthetic determinants of water quality for the six uses. The Federal Act required the EPA to publish criteria for water quality and information for restoration and maintenance of aquatic integrity, and water measurement and classification. The development of effluent limitation guidelines is examined. Level I technology was based on the average of the best performance by plants of different sizes, ages, and unit processes in each industrial category. (Leibowitz-FIRL)
W75-04014

POLLUTION CONTROL IN JAPAN-A SURVEY.
Process Biochemistry, Vol 9, No 5, p 15, 34, June, 1974. 1 tab.

Descriptors: *Water pollution, Water pollution sources, Pollution abatement, *Water pollution control, Equipment, Foreign countries, *Legislation, Planning, Water resources development, *Regulation, Water quality standards.
Identifiers: *Japan.

The overall picture of water pollution in Japan is very serious, in both Japan's fresh and marine waters. The Anti-pollution Act of 1970 is one of the most comprehensive environmental protection laws. It is a framework of definitions and plans of action. The two series of effluent standards set for water quality are for protection of health and for environmental preservation. The pollution control market is one of the fastest growing areas in the Japanese economy. The market has been mainly concerned with solving existing problems, developing, purchasing and marketing the existing technology. However, the development of preventive measures is becoming more important. The developments are in three areas: new recovery techniques; the detailed application of these and existing technology to specific industrial problems; and the redesign of processes to avoid initial pollution. (Orr-FIRL)
W75-04017

PROGRESS IN SATISFYING ENVIRONMENTAL REQUIREMENTS,
Ebasco Services, Inc., New York.
W. D. Patterson.
Public Utilities Fortnightly, Vol 94, No 3, p 13-27, August 1, 1974. 9 fig, 4 tab.

Descriptors: *Environmental control, *Legislation, Clean Air Act, Federal Water Pollution Control Act, Industrial wastes, Chemical pollution, Waste water treatment, Water quality control, *Regulation, Water requirements.
Identifiers: *National Environmental Policy Act.

Legislative and regulatory developments at the Federal level concerning environmental control are reviewed. The Clean Air Act Amendments of 1970 gave the EPA authority to establish safe ground level concentrations of air pollutants, and to enforce achievement of such levels through the application of controls. EPA has promulgated two sets of ambient air quality standards, specifying maximum acceptable ground level concentrations of pollutants. Primary standards are those strict enough to protect public health. These standards are to be reached nationally by 1975, regardless of expense. Secondary standards represent the protection of the public welfare. These standards specify levels necessary to protect vegetation, animals, and materials from hazardous contamination; national attainment is expected sometime between 1978 and 1980. State ambient air quality standards will also have to be met, and in some

cases, with greater rigidity. Since the enactment of NEPA, significant progress has been made. Legislation now pending should provide a basis for effective land-use control. New equipment and technology has had a significant impact on industrial waste quality, evidenced in increased expenditures since 1970. The power facility siting process is an indication of progress in the environmental area. Development of a national land-use policy and more specific interpretations of existing regulations would enhance environmental protection. (Leibowitz-FIRL)
W75-04018

IS THE WATER SAFE TO DRINK. PART 3: WHAT YOU CAN DO,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
For primary bibliographic entry see Field 5F.
W75-04019

LAW, (LITERATURE REVIEW),
Georgia Univ., Athens. Inst. of Government.
J. O. Smith.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1618-1625, June, 1974. 70 ref.

Descriptors: *Law enforcement, *Federal Water Pollution Control Act, Water pollution, Water quality control, Waste water treatment, Effluent control, Groundwater, Management, *Bibliographies, *Reviews.
Identifiers: Citizen suits, Federal water quality legislation(Pre-1972).

The amendments of 1972 to the Federal Water Pollution Control Act dominated the literature concerning federal efforts in water quality control. The inadequacies of past federal efforts in this area and the important parts of the new amendments were discussed by McMahon. Rasmussen and Kuchenbacker concluded that the improved enforcement procedures, including citizen suits, the right to enter and monitor effluent discharge, and the new permit program, should have a significantly positive effect on the curbing of water pollution. Coleman, on the other hand, criticized the new amendments, considering the possibility of the development of problems like those imputed to the Clean Air Act, such as alleged blackmailing of the states by the EPA. The amendments use of technologically-based standards was criticized by Rauch, who then concluded that this policy, and its cost factors, would perpetuate a negative incentive for the technological development necessary to meet the final goal. Finnell examined the Florida Environmental Land and Management Act of 1972. The trust doctrine of Virginia's new constitution dealing with natural resources was examined by Brion. (Leibowitz-FIRL)
W75-04020

EPA'S POLLUTION CONTROL GOALS TAKE BROADSIDE IN SEATTLE.
Engineering News Record, Vol 193, No 5, p 15, July 25, 1974.

Descriptors: *Water quality control, *Water pollution control, *Waste water treatment, Economics, Pacific Coast region, Water policy, Biochemical oxygen demand, Water quality standards, Tertiary treatment.

The federal water pollution control program came under fire in Seattle from public officials. John D. Parkhurst of the Water Pollution Control Federation attacked what he claimed was the 'economic madness' of the EPA's standard for secondary treatment. The general manager of the Los Angeles County Sanitation District predicted the secondary treatment would cost more than $100 billion. Richard S. Page, executive director of the Municipality of Metropolitan Seattle, claimed that the 85% removal of BOD required by the EPA would produce no significant benefit to the quality of water on the Pacific Coast. The director asserted that $650 million would be needed to meet this requirement on the Pacific Coast alone. (Leibowitz-FIRL)
W75-04023

ON POLLUTION CONTROL.
New Civil Engineer Special Review, Vol 95, p 53, May, 1974.

Descriptors: *Water pollution control, *Oil spills, *Oil pollution, Legislation, Water quality control, Pacific Coast region, Regulation, Continental shelf, Atlantic Ocean.
Identifiers: Santa Barbara channel(Calif), North Sea, Continental Shelf Act of 1964, Petroleum Regulations of 1966, Prevention of Oil Pollution Act of 1971.

California waters suffered from an excess of pollution in 1969. In the Santa Barbara channel 100,000 barrels of crude oil were spilled due to a blowout. Further eruptions necessitated the sealing of the fissure in March, with continued seepage following for longer than a year. In December, a 120 sq km oil slick developed from a Union Oil pipeline break. A ban on oil drilling was then instituted by the state of California. Because of environmental protest, not much more than seismic surveys have been done in the U.S. Atlantic or Pacific continental shelves. Legislation covering pollution control in the UK sector of the North Sea is the Continental Shelf Act of 1964, which makes the discharge of oil from drilling and production operations in that area an offense, with a license dependent upon the operator's liability for control of any such discharge. The Petroleum Regulations of 1966 recommend that oil escape into licensed waters be avoided by all necessary preventive measures. Relevant legislation was later added in the form of the Prevention of Oil Pollution Act of 1971. (Leibowitz-FIRL)
W75-04024

WHITHER WATER.,
For primary bibliographic entry see Field 6B.
W75-04025

SOLID WASTE DISPOSAL BY LAND BURIAL IN SOUTHERN INDIANA,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 5B.
W75-04035

ADDITIONAL STUDIES OF THE EFFECTS OF SALT MARSH IMPOUNDMENTS ON MOSQUITO POPULATIONS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
J. C. Dukes, R. Axtell, and K. L. Knight.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 235, $3.75 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No. 102, December 1974. 38 p, 15 fig, 14 tab, append. OWRT B-057-NC(2). 14-31-0001-3919.

Descriptors: *Mosquitoes, *Mosquito control, Impoundments, Public health, *Salt marshes, Flooding, Water level fluctuations, *North Carolina, Vegetation, Water pollution control.
Identifiers: Carteret County(NC), *Aedes sollicitans, Juncus marsh, *Anopheles mosquitoes.

A comparative study of three adjacent areas (a natural marsh, a partially completed impoundment, and a completed mosquito control impoundment) evaluated the effectiveness of an impoundment for salt marsh mosquito control. Potential mosquito producing sites in both the natural marsh and the partially completed impoundment were comparable in vegetative cover. Neither area produced mosquitoes - the natural marsh was inundated by tides too often; in the partially completed impoundment, the dikes eliminated normal tidal flooding. Within the impounded marsh, Juncus roemerianus Scheele (black needlerush) remained in several large stands. However, in vast areas, only stumps of Juncus remained. Most of these and other marginal areas had been invaded by Typha spp. (cattail). Numerous patches of Spartina patens (Aiton) and Distichlis spicata (L.) were still thriving around the perimeter of the dike and on high ground within the interior. Only two larvae of the salt marsh species Aedes sollicitans (Walker) were recovered within the impoundment. Anopheles mosquito larvae were collected in small numbers from areas containing thick mats of vegetation (Spartina patens, D. spicata and B. monnieri) and flooded with less than six inches of water. During summer months, the water level dropped 6 inches due to evaporation, causing most mosquito breeding sites to become unproductive. Areas in deeper water, or where the vegetation was submerged, were not mosquito producers. Salinity within the impoundment was 0 parts per thousand throughout the entire research period. (McJunkin-N.C. State)
W75-04048

PHOSPHORUS DETERGENT BAN-HOW EFFECTIVE,
Pieczonka Consultants, Lackawanna, N.Y.
For primary bibliographic entry see Field 5D.
W75-04109

SETTING UP A SPECIAL COLLECTION ON WATER POLLUTION IN A UNIVERSITY LIBRARY,
Case Western Reserve Univ., Cleveland, Ohio. Sears Library.
J. Friedlander.
Special Libraries, Vol 65, No 7, p 291-296, July, 1974. 12 ref.

Descriptors: *Libraries, *Classification, *Information exchange, *Water pollution, *Lake Erie, *Data collections, Environmental control, Documentation, Publications, Great Lakes.

The Cleveland area has three interdisciplinary research teams which are studying the pollution of Lake Erie. Water pollution library materials are distributed in various locations and with varying subject classifications. A special library collection was established in the university library, and the complexity of identifying and collecting reports in the field of environment, along with locating other water pollution agencies and recording locations of other local collections of data are elucidated. The functions of the Lake Erie Study Collection as a special library are considered in relation to the project members' research. (Leibowitz-FIRL)
W75-04118

CONSIDERATION OF BACKGROUND IN DEVELOPMENT OF ENVIRONMENTAL STANDARDS,
Georgia Inst. of Tech., Atlants. Office of Interdisciplinary Programs.
A. A. Moghissi, and M. W. Carter.
In: CONF. 741018, Proceedings of the Eighth Midyear Topical Symposium of the Health Physics Society, October 21-24, 1974, Knoxville, Tenn., p 17-22, 1 tab, 1 ref.

Descriptors: *Radioactivity, Environment, *Human population, *Standards, *Safety, Evaluation, Assessment, Background radiation, Geographical Regions, Geology.
Identifiers: *Environmental standards.

Environmental standards for a class or for individual pollutants are usually derived from animal and human biological effects and kinetics data and/or in comparison with background levels. Once such standards are adopted they are applied to the entire nation without considering the signifi-

cant differences in background levels in various geographical locations. Fallacies of this approach are identified and described using the example of environmental radiation standards. (See also W75-04152) (Houser-ORNL)
W75-04155

EXPOSURES DURING THE TRANSPORTATION OF RADIOACTIVE MATERIALS,
American Insurance Association, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-04189

FUNCTIONAL PLAN FOR WATER SUPPLY AND WASTE WATER DISPOSAL FOR THE SANTEE-WATEREE PLANNING DISTRICT,
LBC and W Consultants, Columbia, S.C.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-226 790, $4.75 in paper copy, $2.25 in microfiche. Prepared for Santee-Wateree Regional Planning Council, Sumter, S.C. June, 1973. 84 p, 8 fig, 5 append. HUD SC-04-12-1003.

Descriptors: *Water utilization, *Costs, *Water supply, *Water management(Applied), *Sewage systems, *Waste treatment, *Waste water disposal, Optimum development plans, Standards, Water allocation, Water distribution, Water resources, Sewage, Development, South Carolina.
Identifiers: Santee-Wateree Planning District(SC), Clarendon Co.(SC), Kershaw Co.(SC), Lee Co.(SC), Sumter Co.(SC).

This functional plan supplements the Water and Sewer Plan and Program prepared in May 1972 and is designed to provide a flexible guide for the development of water supply and waste water treatment facilities to meet the needs of Clarendon, Kershaw, Lee, and Sumter Counties. Purposes of report are to update inventory data; to scrutinize systems proposed to meet future needs; to prepare cost estimates for proposed systems and indicate priorities; and to present recommended procedures to serve as a guide for orderly development. Prime consideration was given to cost minimization and optimization of water resource uses. Based on established system design and water supply planning standards, an inventory of water supply and sewerage facilities is detailed including maps, short and long range plans, water usage data, population predictions, and future programs. A section on the relation of water and sewer systems capacity to area development summarizes the ability of the counties to absorb increased growth without adverse effects. (Salzman-North Carolina)
W75-04195

WATER AND SEWER MANAGEMENT STUDY, ALTAMAHA GEORGIA SOUTHERN AREA.
Altamaha Georgia Southern Area Planning and Development Commission, Baxley, Ga.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-232 219, $4.25 in paper copy, $2.25 in microfiche. Final report. May 1974. 121 p, 27 fig, 5 tab, 2ref, 2 append. CPA-GA-04-06-1022.

Descriptors: *Waste water treatment, *Sewerage, *Sewage treatment, *Water management(Applied), *Water distribution, *Water supply development, Planning, Management, Administration, Costs, Sewage disposal, Georgia, Waste water.
Identifiers: *Altahama Georgia Southern Area, Intergovernmental Coordination of Water and Sewer Services, Improved fiscal policies for water and sewer management, Audits, Fiscal policies.

Prepared to provide governing bodies in southern Georgia responsible for the development and operation of public water and sewer systems with a guide for improving operation and management, this study applies to Appling, Bulloch, Candler, Evans, Jeff Davis, Tattnall, Toombs, and Wayne counties. Present administrative, management, and operation methods are analyzed. Alternative methods for the provisions of more efficient administration and management are evaluated for economic feasibility. Recommendations for short range (5 year) and long range (20 year) improvements include: intergovernmental coordination of services with engineering feasibility studies of consolidation of Lyons-Santa Claus water and sewer systems, supplying water service to Higgston from Vidalia system, and establishment of a water supply authority to consolidate administration, management and operations; improved fiscal policies with annual budget and audit plus biennial rate review; upgrading skills in water and sewer administration through programs offered by Georgia's Institute of Government; and certification of all operators of water and sewer services. (Salzman-North Carolina)
W75-04196

PLANNING FOR WATER QUALITY IN THE VIRGIN RIVER SYSTEM IN THE STATE OF UTAH: A PROGRAM FOR DEVELOPING A COMPREHENSIVE WATER QUALITY MANAGEMENT PLAN.
Utah Water Research Lab., Logan.
Prepared for State of Utah Bureau of Environmental Health. PRWG-142-2, March, 1974. 88 p, 11 fig, 8 tab, 27 ref.

Descriptors: *Water quality, *Planning, *Management, *Water pollution control, *Baseline studies, *River basins, *Analytical techniques, Federal Water Pollution Control Act, Data collections, Data processing, Hydrologic data, Political aspects, Utah, Dissolved oxygen, Heated water.
Identifiers: *Virgin River(Utah), *Demographic activities, Effluent limitations.

Baseline information is developed which will allow water quality management planning for the Virgin River system. An initial source of background information and data is provided to facilitate the participation of local public officials, community leaders and citizens in water quality planning for the basin. The Physical, chemical, economic, political, and demographic activities which have an impact upon water quality within the basin are presented. Water quality standards applied to the Virgin River system, as described by the Utah State Division of Health and accepted by the Environmental Protection Agency are defined as class 'C' Water Quality Requirements. Specific reaches have been further classified for thermal discharge to prevent undue heating of the water and to limit the minimum level of dissolved oxygen in the stream. The program design, initial analysis of available data, and priority listing of water pollution problems presented provide a functional basis for developing comprehensive water quality management plans for the basin pursuant to the objectives of the Federal Water Pollution Control Act, including 1972 amendments. These plans will be an important part of implementing point source control and achieving the desired water quality programs. (See also W75-04207) (Diefendorf-North Carolina)
W75-04206

PLANNING FOR WATER QUALITY IN THE SEVIER RIVER SYSTEM IN THE STATE OF UTAH: A PROGRAM FOR DEVELOPING A COMPREHENSIVE WATER QUALITY MANAGEMENT PLAN.
Utah Water Research Lab., Logan.
Prepared for State of Utah Bureau of Environmental Health. PRWG-142-3, March, 1974. 96 p, 11 fig, 8 tab, 52 ref.

Descriptors: *Water quality standards, *Water quality, *Planning, *Management, *Water pollution control, *River basins, *Data collections, Federal Water Pollution Control Act, Baseline studies, Data processing, Analytical techniques, Hydrologic data, Political aspects, Utah, Dissolved oxygen.
Identifiers: *Sevier Lake(Utah), *Sevier River(Utah), Effluent limitations, Demographic activities, Environmental Protection Agency, Thermal discharge.

A functional planning program is presented to aid in the development of comprehensive water quality management plans for the Sevier River system. According to the Utah Division of Water Resources the Sevier River is the most completely utilized river in the U.S. The approximately 94% utilization of its water results in very little flowing into Sevier Lake which is normally dry. In Utah, water quality standards are primarily effluent standards oriented toward the effect of designated effluents on streams. Application of standards to waste effluents and to streams and lakes will lead to their improvement only if monitoring of the waters occurs and if standards are enforced. The Utah State Division of Health has described standards which have been applied to the Sevier River system and which are at least as strict as those proposed by the Environmental Protection Agency. These standards are defined as the class 'C' Water Quality Requirements. In addition, specific reaches of the Sevier system have been further classified for thermal discharge and minimal level of dissolved oxygen. The program design, initial analysis of available data, and priority listing of water pollution problems necessary for a basin plan presented here are consistent with the objectives of the Federal Water Pollution Control Act, including the 1972 amendments. (See also W75-04206) (Diefendorf-North Carolina)
W75-04207

COOLING TOWERS - BEST ACHIEVABLE THERMAL POLLUTION ABATEMENT TECHNOLOGY,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5D.
W75-04223

APPLICATIONS OF SYSTEMS ANALYSIS TO INTERNATIONAL WATER RESOURCES PROJECTS,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W75-04232

A POSITIVE LOOK AT ACHIEVEMENTS IN WATER QUALITY ENHANCEMENT,
Howard, Needles, Tammen, and Bergendoff, Alexandria, Va. Dept. of Environmental Quality and Conservation.
C. F. Zirzow.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 441-444. 5 ref.

Descriptors: *Water quality, *Water pollution control, *Water purification, *Environmental control, *Public health, Water chemistry, Quality control, Lake Erie, Great Lakes, Surface waters, Salmon, Fish, Environment, Water treatment, Pollution abatement.

The more engineers and scientists can demonstrate to the public that progress is being made in cleaning up the environment, the more likely the public is to accept the expense of finishing the job in the years ahead. It must be shown that the public's investment in environmental quality is already yielding positive returns. By noting the significance of what has already been accomplished,

new hope can be offered for the future. (See also W75-04213) (Henley-ISWS)
W75-04247

NATURAL PHOSPHATE REMOVAL MECHANISMS IN SOUTH FLORIDA LAKES,
Miami Univ., Coral Gables, Fla. Dept. of Civil Engineering.
T. D. Waite, and W. J. Fogarty.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 472-481. 11 fig, 10 ref.

Descriptors: *Phosphates, *Nutrient removal, *Phosphorus compounds, *Fertilizers, *Eutrophication, *Florida, Lakes, Environmental effects, Water pollution sources, Productivity, Nitrates, Nitrogen compounds, Water quality, Plankton, Algae, Primary productivity, Chemicals, Fertilization, Phytoplankton, Agriculture, Drainage, Analytical techniques, Chemical analysis.

Two small lakes in the South Florida area were artificially fertilized with phosphate, and the rate of phosphate removal from the water column was determined. The removal rate was correlated with plant productivity and loss to the sediments. Chemical oxygen demand measurements were run on the lake water to obtain a qualitative indication of phytoplankton biomass. While all organic matter present in the lake water exerted a demand, the values were compared with productivity data for algae biomass fluctuations. After 120 days the lake was fertilized again, and the removal rate constant increased to 0.136 mg PO4/1/day. At this same time a second lake was artificially enriched and its removal rate constant was 0.137 mg/1 PO4/day. The more rapid loss of PO4 from the water during the second set of tests was attributed to an increase in groundwater flow. During all the analyses the NO3-N concentration = 0.03 - 0.3 mg/1, alkalinity = 100-150 mg/1 CaCO3, and NH3-N=.05-.01 mg/1. Plant productivity analyses on the benthic macrophytes and phytoplankton were performed during the second fertilization experiments. Results indicated that in one lake macrophyte growth represented 25-50% of the phosphate removal while 0.5-9% was removed by the phytoplankton. In the second test lake macrophyte growth accounted for 9-23% of the phosphate uptake, while 2-5% was utilized by the phytoplankton. These data indicate that greater than 50% of the phosphate added to the experimental lakes was removed by chemical precipitation. This was verified by phosphate concentrations in sediment core samples which reflected an increase after fertilization. (See also W75-04213) (Henley-ISWS)
W75-04250

AN ANALYSIS OF OIL OUTFLOWS DUE TO TANKER ACCIDENTS, 1971-1972.
Henry (J.J.) Co., Inc., Moorestown, N.J.
For primary bibliographic entry see Field 5B.
W75-04260

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY; VOLUME I: MAIN TEXT,
Green Associates, Inc., Towson, Md.
R. Reikenis, V. Elias, and E. F. Drabkowski.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 750, $8.75 in paper copy, $2.25 in microfiche. U.S. Army Engineer Waterways Experiment Station Contract Report D-74-2, May 1974. 269 p, 9 fig, 33 tab, 138 ref. DACW 39-73-C-0141.

Descriptors: *Dredging, *Landfills, *Construction materials, Dikes, *Disposal, Sites, Surveys, Planning, Regional analysis, Data collections.
Identifiers: Hydraulic fill, Diked disposal area.

A survey of the regional needs for landfill and construction material indicated that such needs vary substantially due to population shifts and economic growth of specific regions. Generally, regional needs were determined to be in excess of available volumes of dredged material, particularly in low-lying coastal areas. The survey also revealed that there were problems to overcome before dredged material was accepted for such usage. Regional investigations indicated that, given the projected quantities of dredged material, there could be large-scale disposal of dredged material on land sites. Desirable solutions to the dredged material disposal problem could be achieved by a detailed inventory of all identified future development projects, adoption of methodologies for selection of disposal sites, development of techniques to decrease time of sediment consolidation, and identification of the most economical application of present techniques or development of new techniques. (Roberts-ISWS)
W75-04266

U.S. V. ROHM AND HAAS CO. (CONTINUOUS DISCHARGE POLLUTION ACTION UNDER REFUSE ACT).
For primary bibliographic entry see Field 6E.
W75-04290

U.S. V. LEBEOUF BROS. TOWING CO., INC. (GOVERNMENT ACTION TO RECOVER PENALTY IMPOSED BY COAST GUARD FOR GASOLINE SPILL IN OCEAN).
For primary bibliographic entry see Field 6E.
W75-04292

FREEMAN COAL MINING CORP. V. ILLINOIS POLLUTION CONTROL BOARD (APPEAL FROM OF POLLUTION CONTROL BOARD HOLDING THAT DEFENDANT MADE ILLEGAL DISCHARGES).
For primary bibliographic entry see Field 6E.
W75-04295

RESERVE MINING CO. ET. AL. V. UNITED STATES (MOTION FOR STAY OF INJUNCTION).
For primary bibliographic entry see Field 6E.
W75-04296

UNITED STATES V. BOYD (DISCHARGE OF OIL INTO NAVIGABLE WATERS).
For primary bibliographic entry see Field 6E.
W75-04298

VERMONT V. NEW YORK, ET AL. (PROPOSED CONSENT DECREE DISAPPROVED).
For primary bibliographic entry see Field 6E.
W75-04299

UNITED STATES V. IRA. S. BUSHEY AND SONS, INC. (DISCHARGE OF REFUSE INTO NAVIGABLE WATERS--OIL SPILLS),
For primary bibliographic entry see Field 6E.
W75-04300

COURTS BACK STATE'S POWER TO HALT ACID MINE DRAINAGE,
Pollution Control Guide, Vol 3, paragraph 19704, p 19181-19182, 1974.

Descriptors: *Judicial decisions, *Pennsylvania, *Legal aspects, *Acid mine water, Waste water treatment, Administrative agencies, Drainage systems, Waste water pollution, Permits, Pumping, Waste water disposal, Safety, Regulation, Water quality control, Water law, Water pollution control.
Identifiers: *State policy, Nuisance(Legal aspects), Injunctive relief.

Pennsylvanials Department of Environmental Resources has won two legal battles to curb acid mine drainage, the major cause of water pollution in the state. As a result mine operators can be required to treat all water discharged from their operations, even if the mine operator was not responsible for the pollution of the discharged water. The Department's rule that 'if you pump it out you have to treat it' had been challenged. Since pumping the drainage from the abandoned mine was essential to the safe operation of the active mine, the court concluded that it is a vital part of the complete drainage plan and therefore subject to regulation. Mine drainage does not cease to be mine drainage once mining has ceased in the mine from which it continues to drain. Mine drainage is simply waters polluted from the operation of a mine. The department could not get injunctive relief under the statutory provisions, but could get such relief under either theory of statutory or common law public nuisance. (Sperling-Florida)
W75-04301

SENATE SUBCOMMITTEE HEARS COMPLAINTS ON EPA WATER PROGRAMS.
Pollution Control Gudie, Vol 3, paragraph 19860, p 19603-19607, 1974. 5 p.

Descriptors: *Oregon, *Federal Water Pollution Control Act, *Environmental sanitation, *Environmental effects, *Administration, Administrative agencies, Coordination, Planning, Water quality control, Economic aspects, Legal aspects, Regulation, Standards, Industrial wastes, State governments, Permits, Water quality standards, Adoption of practices, Water law, Water policy.
Identifiers: *FWPCA Amendments of 1972, *Administrative regulations, Environmental policy.

The Direcetor of the Oregon Department of Environmental Quality states that in order to improve the environment people must have the desire for a high quality environment, and they must be willing to spend the money needed to improve the environment. Secondly the state's municipalities, industries, and other regulated and regulating agencies must not only support, but respect environmental programs. All aspects of the environment and their interrelation must be considered. The Federal Water Pollution Control Act and the 1972 Amendments will be the most influential basis for establishing present and future environmental programs. The Act does not, however, permit a state agency to approach environmental problems on an integrated basis. Instead the Act establishes arbitrary effluent standards that must be met by arbitrary deadlines, regardless of impacts on air quality, solid waste disposal, noise, or aesthetics. Another problem arises when permits, which are required to be issued immediately, must contain schedules to meet guidelines that have not yet been adopted. (Sperling-Florida)
W75-04302

NON-TRANSPORTATION OIL SPILL REGULATIONS.
Pollution Control Guide, Vol 3, paragraph 19936, p 19795-19797, 1973. 3 p.

Descriptors: *Regulation, *Federal Water Pollution Control Act, *Oily wastes, *Navigable waters, Transportation, Waste water disposal, Oil industry, United States, Water quality control, Adoption of practices, Planning, Administration, Administrative agencies, Industrial waste, Water pollution, Water law, Water quality, Water quality control, Oil pollution.

Identifiers: Notice, *Administrative regulations, State policy, *Environmental policy.

Notice of proposed rule-making was published pursuant to the Federal Water Pollution Control Act to prevent discharges of oil into the navigable waters of the United States and to contain such discharges if they occur. The regulations will prevent such spills by establishing procedures, methods, and equipment requirements of owners or operators of facilities engages in drilling, producing, storing, refining, distributing, or consuming oil. New facilities could achieve a higher level of spill prevention than older facilities by the use of fail-safe design concepts and innovative spill prevention methods and procedures. Older facilities could develop strong spill contingency plans and commit manpower, oil containment devices and removal equipment to compensate for existing weaknesses in the spill prevention equipment. No single standard or design could be prescribed for all non-transportation related facilities due to the varying factors of age, function and location. (Sperling-Florida)
W75-04303

WATER REUSE...SAFE DRINKING ACT...HOW SOON...HOW GOOD.
C. Heckroth.
Water and Wastes Engineering, Vol 11, No 8, p 32, 34, 36-37, August, 1974.

Descriptors: *Water pollution, *Water reuse, *Water laws, *Federal government, *State governments, Chlorination, Chemical treatment, Water purification, Toxicity, Heavy metals, *Potable water.
Identifiers: *Safe Drinking Water Act.

The 1974 American Water Works Association annual meeting considered the rising problems in the area of water use, reuse, master planning, dual systems, and the Safe Drinking Water Act. Representative Peter Kyros of Maine explained that the delay of the Act was due in part to the need for funds. Studies and adequate monitoring are needed, and these 'deficiencies give rise to technical uncertainty, which in turn impacts on our concern about having the EPA make judgments which will cause state and local governments to pour out large sums of money to clean up water supplies.' Congressmen are unsure as to whether enforcement, monitoring and reporting should rest with the states with no power of coercion or the federal government if the states should fail to take proper measures. They are also unsure as to whether standards should be set for tap water without providing operation and maintenance requirements. There is some question as to the availability of state funds to meet federal regulations. The administration's bill makes no provision to control underground injection of contaminants. Water supply administrators were seriously criticized. It was claimed that the most difficult metals to remove are arsenic, lead, cadmium and barium. Metal removal appears to function according to the efficiency of the activated sludge system nitrification. An increase in some metals has been attributed to chemical treatment. (Leibowitz-FIRL)
W75-04322

CONTROL OF WATER POLLUTION: MISCELLANEOUS PROVISIONS.
International Digest of Health Legislation, Vol 25, No 1, p 50-60, 1974.

Descriptors: *Water laws, *Public health, *Water pollution control, *Water quality, Management, Suspended solids, Toxicity, Wildlife, Birds, Aquatic life, Industrial wastes, Sewage, Discharge, Radioactivity, *Canada.
Identifiers: *Saskatchewan water resources, The Water Resources Management Act, The Department of the Environment Act(Canada).

The Water Resources Management Act of 1972 and the Department of the Environment Act of 1972 are expected to become laws in Canada simultaneously. The latter act repeals the Water Resources Commission Act as amended. Pollution is defined as any change in the temperature, taste, or odor of Saskatchewan waters; the addition or removal of any liquid, solid, radioactive, gaseous, or other substance that will be harmful to the public health or that is unsafe for domestic, municipal, industrial, agricultural, recreational, or other lawful usage or that is detrimental to wildlife, birds, or aquatic life, or sewage containing animal, vegetable or mineral matter in suspension or solution, including rainwater resulting from melted snow or ice which has entered the sewage works. The Minister of the Environment is made responsible for administering the water resources of Saskatchewan and supervising all pollution matters. The Minister is also responsible for the general supervision, control, and regulation of all matters concerning waterworks, sewage, water quality, and its impairment. The municipality's medical health officer is to advise the Minister on matters of public health relating to water and sewage. (Leibowitz-FIRL)
W75-04323

QUALITY CONTROL IN RIVER MANAGEMENT OF THE BRISTOL AVON,
Bristol Avon River Authority (England).
G. S. N. Ingham.
Water Pollution Control, Vol 73, No 4, p 425-432, 1974.

Descriptors: *Water quality control, Management, *Water pollution control, *Industrial wastes, Waste water treatment, Rivers, Flow characteristics, Effluent control, Water reuse, Self-purification, *Quality control, Regulation.
Identifiers: *Bristol Avon River Authority(UK), Pollution Prevention Acts, Rivers Act(1961).

The River Avon and its tributaries receive 200 x 1000 cu m of sewage effluent, 335 x 1000 cu m of industrial waste water, and an unknown volume of effluent from about 4000 farms roughly estimated at 15 x 1000 cu m daily. The river system carries an estimated effluent load of 550 x 1000 cu m/d DWF. Quality control is required on a closely detailed scale, since each section of the river receives direct effluent, influencing the next downstream section, and being itself influenced by its adjoining upstream stretch. Quality control necessitates flow and quality data at or near the source of every river and tributary; flow and quality data at strategic points down the river or tributary to its confluence; flow and quality data of all important effluents discharged into each river; and, the locations and quantities of abstractions. From such data the following becomes available: maximum, minimum, mean and median for flow and quality parameters, and the standard deviation of all parameter values; effluent effects and their location; recovery rate; pollution load carried; maximum pollution load safety carriable; extent to which overloading occurs; extent to which effluent regulations are applicable; identification of lengths where there are unknown discharges; abstraction effects; extent of abstraction restrictions needed; and, the extent to which abstraction is possible. (Leibowitz-FIRL)
W75-04324

POLLUTION AND PUBLIC HEALTH: TACONITE CASE POSES MAJOR TEST,
L. J. Carter.
Science, Vol 186, No 4158, p 31-34, 36, October 4, 1974. 1 fig.

Descriptors: *Lake Superior, *Water pollution, *Public health, Mining, *Mine wastes, *Asbestos, Benthos, Potable water, Human diseases, Water supply, Industrial wastes, Municipal water.
Identifiers: *Taconite tailings, Cancer, Green water phenomenon.

Lake Superior has for the past 18 years been polluted by the wastes of the Reserve Mining Company. The Lake, which was once considered of such purity that Duluth, Minnesota, among other cities, used its water for drinking, is the largest body of freshwater on earth - 350 miles long, 160 miles across at its widest, and up to 1333 feet deep. The lake, however, is not large enough to assimilate the Reserve's discharge of taconite tailings; the discharge is fivefold greater than the 12,000 tons of solids estimated to enter naturally each day from the inflow of about 200 rivers and the erosion of miles of shoreline. The tailings have despoiled some 200 square miles of the west end of the lake. The tailings delta extends 4000 feet offshore from the discharge point, and is nearly a mile wide. The tailings have settled at the bottom over large areas, smothering benthic organisms and harming the ecology of the lake. The green water phenomenon occurs over many miles of the lake when large quantities of light-reflective tailings surface. Last year it was determined that tailing fibers indistinguishable from amphiobole asbestos fibers were present in Duluth drinking water. A high incidence of cancer occurs among persons exposed to asbestos in their jobs and in the environment, giving a federal suit against the Reserve new impetus. (Leibowitz-FIRL)
W75-04326

HYDRODYNAMIC EFFECTS OF OIL SLICK MECHANICAL CONTROL DEVICES,
Texas A and M Research Foundation, College Station.
L. A. Hale.
Available from the National Technical Information Service Springfield, Va. 22161 as AD-777 926, $4.75 paper copy, and $2.25 microfiche. Report No CG-D-64-74, February 1974. 84 p, 60 fig, 5 tab. DOT-CG-23357-A.

Descriptors: *Oil spills, *Model studies, *Laboratory tests, *Oil, Pollution, Hydraulic models, Energy dissipation, Theoretical analysis, Hydrodynamics, Flow, Mechanical control, Equipment, Velocity, Flumes, *Water pollution control.
Identifiers: *Oil slicks, Two-phase flow.

A section of a research program conducted by the U.S. Coast Guard was summarized. The objective was to investigate the behavior of an oil slick under the influence of various mechanical control devices. Four types of slick control mechanisms were investigated: (a) oil slick energy dissipation, (b) oil slick shields, (c) rapid removal of oil by lifting mechanisms, (d) oil slick submersion devices. The tests were conducted in a 150-foot tilting flume. Three test oils were used: (a) No. 2 diesel oil, (b) SAE 30 lubricating oil, (c) SAE 140 lubricating oil. The results showed that devices or systems using energy dissipation elements could capture and hold a significant volume of oil at current velocities significantly greater than those causing the failure of conventional containment barriers. Slick shield devices, operated as a secondary element of an energy dissipation system, served a valuable function in protecting a quiet oil pool from the direct action of a high velocity current. Surface penetrating blades appear to have merit only for smooth surface operations. If further testing is to be performed it is felt that the entire blade system should be moved relative to still water to minimize surface irregularity problems. Under high current situations, the flow near the surface of submersion devices was dominated by inertial effects so that the viscous effects, significant to the boundary layer phenomena associated with the moving surfaces, were negligable. No features of the flow of the slick under the influence of submersion devices were considered to be advantageous for the control of slicks under high current situations. (Humphreys-ISWS)
W75-04327

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

INTEGRATED SYSTEM IDENTIFICATION AND OPTIMIZATION FOR CONJUNCTIVE USE OF GROUND AND SURFACE WATER, PHASE II,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
For primary bibliographic entry see Field 4B.
W75-03853

METHODOLOGIES FOR OPERATING RESERVOIRS FOR SHORT-TERM FLOOD CONTROL,
Cornell Univ., Ithaca, N.Y. Dept. of Operations Research.
For primary bibliographic entry see Field 4A.
W75-03855

ELKHORN RIVER BASIN SCREENING MODEL, A REPORT TO THE MISSOURI RIVER BASIN COMMISSION,
Nebraska Univ., Lincoln. Water Resources Research Inst.
W. Viessman, Jr., G. L. Lewis, I. Yomtovian, and J. Envoldsen.
May 1974. 335 p, 94 fig, 146 tab, 9 ref, 5 append.

Descriptors: Surface water, Watersheds(Basins), *Water policy, *Multiple-purpose projects, *Linear programming, *Reservoirs, *Flood control, *Investment, *River basin commissions, *Model studies, Alternative planning, Optimization, Simulation analysis, Constraints, Evaluation, Management, Annual, Costs, Flood damage, Irrigation, Recreation, Storage, Equations, *Nebraska, Water resources development.
Identifiers: *Elkhorn River Subbasin(Neb), Screening models, Water uses, Sensitivity analysis, Cost minimization, Benefit maximization.

Investment and management decision making for basin-wide surface water systems is considered and a linear programming investment screening model is described. The general model consists of a set of constraints defining possible investment and operating policy alternatives and an objective function for evaluating these. Surface water uses in the Elkhorn River Subbasin include irrigation, recreation, fish and wildlife enhancement, and flood control. The Elkhorn Basin preliminary screening model is described in detail. For each site in the basin, a set of equations which represents average annual costs and benefits to be gained from various activities is formulated. Objectives used in evaluating alternatives include both cost minimization and benefit maximization. A constraint set assures inclusion of pertinent physical, institutional, or legal restrictions. The model structure for flood control is elaborated, and a flood-event simulation and routing model to be used extensively in conjunction with the optimization model is described. The model develops benefit functions and functional relationships between flood peaks and various reservoir capacities. A description and an analysis of model runs on seven watersheds in the Elkhorn River Subbasin are presented. Appendices give: list of variables; agency data for reservoirs and data for flood damage sites; screening model schematics; and optimization run tabulations. (Bell-Cornell)
W75-03921

EVALUATION OF INTERREGIONAL INPUT-OUTPUT MODELS FOR POTENTIAL USE IN THE MCCLELLAN-KERR ARKANSAS RIVER MULTIPLE PURPOSE PROJECT IMPACT STUDY,
Catholic Univ. of America, Washington, D.C. Inst. of Social and Behavioral Research.
For primary bibliographic entry see Field 4A.
W75-03923

DATA REDUCTION METHODS FOR HYDROLOGIC ANALYSES,
Los Angeles County Sanitation Districts, Whittier, Calif.
For primary bibliographic entry see Field 7C.
W75-03929

DESIGN OF A CONDUIT SYSTEM WITH DIVERGING BRANCHES,
North Carolina State Univ., Raleigh. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 8A.
W75-03930

EVALUATING MULTIRESERVOIR OPERATING RULES,
Ecole Polytechnique, Montreal (Quebec).
For primary bibliographic entry see Field 4A.
W75-03932

APPRAISAL OF IRRIGATION PROJECTS AND RELATED POLICIES AND INVESTMENTS,
Ministry of the Presidency, Mexico City.
For primary bibliographic entry see Field 3F.
W75-03933

CHANCE-CONSTRAINED DYNAMIC PROGRAMING AND THE OPTIMIZATION OF WATER RESOURCE SYSTEMS,
New South Wales Univ., Kensington (Australia).
For primary bibliographic entry see Field 4A.
W75-03934

OPTIMIZATION OF REAL TIME OPERATION OF A MULTIPLE-RESERVOIR SYSTEM,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 4A.
W75-03935

APPLICATION OF ANALOG TECHNIQUES TO WATER MANAGEMENT,
Nevada Univ., Reno. Desert Research Inst.
H. A. Shamberger, and P. A. Domenico.
Presented at A.S.C.E. Fourteenth Hydraulics Division Conference, August, 25, 1965, University of Arizona, Tucson, p 1-22, 12 fig.

Descriptors: *Ground water availability, *Water management, *Analog models, *Aquifer management, *Ground water, *Artesian aquifers, *Nevada, Model studies, Computer models, Resistance networks, Aquifers, Aquifer systems, Water sources, Water yield, Permeability, Porosity, Water supply, Water demand, Water resources, Water resources development, Water table, Subsurface waters, Water wells, Ground water resources, Watersheds(Basins), Urbanization.
Identifiers: *Electric analog models, *Las Vegas Valley(Nevada), Ground water development, Lake Mead(Nevada), Physical analog.

Effects of vague natural phenomenon can be measured through use of systems which are of similar but more predictable performance. In Las Vegas Valley, Nevada, rapidly declining water pressure levels are of concern. Ground water reservoir depletion has been tolerated because it was hoped that Lake Mead would provide a large portion of the water supply. An electrical analog of the Valley applies the time-variant or transient flow of ground water as simulated by the time varying flow of electrical current. The resistance of the model changes the potential of the flow as the aquifer permeability reduces the potential of moving fluid; voltage and current become analogous, to head and flow of water. By measuring these voltages and currents, the aquifer's response to pumping can be determined. Factors revealed in the study include: (1) acceleration of ground water production will not result in excess development of the Valley; (2) if surface water is imported, pumping facilities can be developed; and (3) local problems with shallow domestic wells may arise before importation facilities are completed. The analog is being used to aid ground water management in the state. (Grden-North Carolina)
W75-04202

MORE RESPONSIVE WATER PLANNING IS POSSIBLE,
Washington State Univ., Pullman. R. L. Albrook Hydraulic Lab.
H. D. Copp.
Prepared for Washington State Department of Ecology through the State of Washington Water Research Center. Engineering Extension Service, Pullman, Washington, Bulletin 330, March 1973. 81 p, 6 fig, 12 tab, 37 ref, 3 append.

Descriptors: *Water resources, *Washington, *Water policy, *Planning, Water resources development, Regional development, Water allocation(Policy), Legislation.
Identifiers: SOLAR(Store Abstracts and Provide On Line Automatic Retrieval), *Water Resources Act of 1971(Washington), *Public participation.

After three years of inquiry efforts and study of water planning and management activities in Washington, the success was assessed of present policy and procedures, along with the possibility of improvement through new methodologies. Assuming that failure of past water resource planning stemmed from the public not being given appropriate opportunity to participate in planning and decision-making, a planning process to be implemented by planners in response to public demand is outlined. In-accessibility to information creates a hindrance to water resource planning which can be eliminated by the establishment of a water resource archive patterned after a similar retrieval system such as SOLAR (Store Abstracts and Provide On Line Automatic Retrieval). Preplanning organizational effort allows for responsible decision-making. The planner formulates alternatives representing public preference and attempts to implement changes through control and guidance. Innovative and flexible planning procedures include: (1) objectives and techniques for public participation, (2) implementation of public involvement programs, (3) definition of planning areas, (4) organization of local sponsoring groups to conduct information programs, (5) initiation of public needs, (6) selection of a local contact group (7 to 10 persons) to act as liaison, (7) creation of public workshops to serve as a forum, (8) a planning commitment to public involvement programs and (9) an awareness of political influence and ability to cope with it. Realizing planning has been costly, inefficient and excessive in overlap, Washington State enacted a Water Resources Act of 1971 which would provide framework for this prescribed program. (Salzman-North Carolina)
W75-04203

PLANNING FOR WATER QUALITY IN THE VIRGIN RIVER SYSTEM IN THE STATE OF UTAH: A PROGRAM FOR DEVELOPING A COMPREHENSIVE WATER QUALITY MANAGEMENT PLAN.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W75-04206

PLANNING FOR WATER QUALITY IN THE SEVIER RIVER SYSTEM IN THE STATE OF UTAH: A PROGRAM FOR DEVELOPING A COMPREHENSIVE WATER QUALITY MANAGEMENT PLAN.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W75-04207

APPLICATIONS OF SYSTEMS ANALYSIS TO INTERNATIONAL WATER RESOURCES PROJECTS,
California Univ., Davis. Dept. of Civil Engineering.
G. T. Orlob.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 227-237. 1 fig, 2 ref.

Descriptors: *Water resources, *Systems analysis, *Mathematical models, *Water quality, Simulation analysis, Optimization, Water management(Applied), Hydrology, Hydraulics, Urban hydrology, Monte Carlo Method, Foreign countries, Europe.
Identifiers: Risk theory, Poland(Vistula River), Germany(Hamburg), Romania(Mures and Arges River).

Examples of experience in developing and applying systems analysis in international water resources projects were reviewed and problems encountered were discussed. The present state of the art in Europe was described and some indicated trends were high lighted. Specific projects in Poland, West Germany, and Romania were discussed. (See also W75-04213) (Terstriep-ISWS)
W75-04232

ENHANCING WATER RESOURCE PLANNING EFFECTIVENESS: A SIMULATION GAMING APPROACH,
Stanford Univ., Calif.
J. M. Johnson, M. H. Whithed, and G. P. Johnson.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 238-248. 2 tab, 24 ref.

Descriptors: *Water resources, *Planning, *Simulation analysis, *Comprehensive planning, Multiple purpose, Multiple purpose projects, Optimization, Cultures.
Identifiers: Planning style, Simulation games, Cognitive information, Affective information, Nuerland, Validation approach.

The role of the planner and of multiple objective planning in the expanding technology of modern society was discussed. The orientation and attitudes associated with considerations of who benefits from a plan, whose objectives are included, and who participates in planning decisions were defined as major elements of planning style. The simulation game was explored as a technique for making major aspects of planning style more explicit. Both cognitive and affective information can be derived from the application of simulation games to planning. Both of these areas of information were discussed. (See also W75-04213) (Terstriep-ISWS)
W75-04233

SENSITIVITY ANALYSIS OF THE OPTIMUM DESIGN FLOOD EVALUATED BY AN OPTIMIZATION PROCEDURE,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 4A.
W75-04234

THE APPROXIMATE PROBABILITY DENSITY FUNCTION OF RANGE AND ADJUSTED RANGE,
National Energy Authority, Bangkok (Thailand).
P. Sutabutr.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 427-438. 3 fig, 2 tab, 10 ref.

Descriptors: *Markov processes, *Probability, *Statistics, Mathematics, Mathematical studies, Statistical Methods, Synthetic hydrology, Systems analysis.
Identifiers: *Approximate probability density function, Random processes.

The objectives were to develop the general expression approximately for probability density function and probability distribution function for the random variable range of both the independent random normal variable and dependent random normal variable of the first and second order Markov linear model. By using the four basic parameters (mean, variance, skew, and excess coefficients) obtained by generation and by applying the basic criteria set by Pearson, the approximate probability density function of range was obtained as one of the best fitted from his family of curves. The parameters of this probability density function can then be computed by using the exact and approximate expression for the expected value and variance of the maximum range of the independent normal variable or dependent normal variable of the first and second order Markov linear model derived previously by others. (See also W75-04213) (Jess-ISWS)
W75-04246

TOWARD A SCIENCE POLICY FOR COMPUTERS IN WATER RESOURCES: TRENDS AND ISSUES,
Illinois Univerity, Chicago. Dept. of Engineering.
G. Bugliarello, and F. J. Gunther.
In: Water for the Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 277-283. 6 ref. OWRT X-113(No 3422)(1).

Descriptors: *Computers, *Water resources, *Systems analysis, Computer programs, Programming languages, Research equipment, Methodology, Technology, Management, Planning.

An overview is provided of the most critical issues that have emerged and are likely to emerge in the future as a result of the development of computer technology. Consideration of these issues should be fundamental to policy generation by both governmental agencies and users organizations. The following pivotal issues were discussed and recommendations for appropriate action made: (1) the establishment of computer utilities; (2) the introduction and diffusion of minicomputers; (3) the development of intimately connected computer-instrument packages; (4) the factors influencing the application of hybrid systems; (5) the upgrading of software engineering and management; (6) facilitation of the user's approach to the computer and modes of communication; (7) continued development of appropriate schemes for the analysis, planning, design, and operation of water resources systems; and (8) consideration of the establishment of master computer programs with compatible flexibility as a viable alternative to 'ad hoc' approaches to problem solution. (See also W75-04213) (Scott-ISWS)
W75-04257

THE MEASUREMENT OF IMPACTS IN SMALL WATERSHEDS FOR FLOOD CONTROL,
New South Wales Inst. of Technology, Kensington (Australia). Dept. of Economics.
For primary bibliographic entry see Field 4A.
W75-04341

RESERVOIR OPERATION THROUGH OBJECTIVE TRADE-OFFS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 4A.
W75-04345

6B. Evaluation Process

SOME POLITICAL AND ECONOMIC ASPECTS OF MANAGING CALIFORNIA WATER DISTRICTS,
California Univ., Los Angeles. Inst. of Government and Public Affairs.
J. B. Jamieson, S. Sonenblum, W. Z. Hirsch, M. R. Goodall, and H. Jaffee.
Available from The Institute of Government and Public Affairs University of California, Los Angeles, 90024 as Report No 190 for $8.00; Also available from the National Technical Information Service, Springfield, Va 22161, as PB-239 147, $8.75 in paper copy, $2.25 in microfiche. Completion Report No 190, 1974. 291 p, 2 fig, 95 tab. OWRT C-3289(No 3714)(1).

Descriptors: *California, *Water districts, *Decision making, Management, *Cost-benefit analysis, *Water policy, Local governments.
Identifiers: *Voting.

A study was made of those special districts in California which promote, protect, and guide the administration of water resources. The history of water districts is explored with special attention paid to the districts' authorities and powers derived from statutes as well as court decisions. The performance of Local Agency Formation Commissions, as agencies that authorize and control water districts, is assessed. Leadership of district governing bodies is studies; socio-economic data about these leaders are presented as well as information concerning their tenure and motivations for serving. The decision-making process in water districts is examined and particular attention is given to the electroal process. The study also examines certain economic effects of water board decisions relating to water pricing, land assessment, and water delivery. As more districts were formed to meet urban water needs, they were formed under enabling acts that required property qualifications for voting and permitted weighted voting. This system of voting enables individuals with large land-holdings to control some districts. There is also evidence that this system of voting not only results in infrequent elections but also low voter turnout when elections are held. Also enormous subsidies accrue to large landowners under the special provisions of Reclamation Law.
W75-03856

ELKHORN RIVER BASIN SCREENING MODEL, A REPORT TO THE MISSOURI RIVER BASIN COMMISSION,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 6A.
W75-03921

CHANGING WATER USE IN SELECTED MANUFACTURING INDUSTRIES,
National Bureau of Economic Research, Washington, D.C.
R. A. Leone, J. R. Ginn, and A-L. Lin.
IWR Contract Report 74-10, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., October 1974. 152 p, 12 fig, 30 tab, 33 equ, 15 ref, append. DACW 31-72-C-0044.

Descriptors: *Industries, *Industrial water, *Water utilization, *Water costs, Technology, Decision making, *Water quality, Recirculated water, Transportation, Water demand, Data collections, Water policy, Methodology, Regression analysis, Estimating, Surveys, Cost analysis,

Least squares method, Equations, Mathematical models, Systems analysis, *Sites.
Identifiers: Manufacturing, Process design, Price elasticity, Trends, Urban water supply.

Empirical evidence regarding shifts in industrial water use is presented to provide greater understanding of the impact of changes in the cost and quality of water on technological changes in process design and plant location decisions. The ways in which water enters industrial processes are identified. An historical perspective on the scope and dynamics of water use in manufacturing is provided. Both industry and regional (including temporal) variations in water use and reuse in selected industries are examined to determine the extent to which water use technology has been changing. Next, the location decisions of water-using firms are examined. Considered are shifting employment patterns and the effects of water pollution controls. The a cross-section model of industry response to water costs is presented. Demand equations for gross water and intake water are specified and then estimated using cross-section plant data for the paper, chemical, petroleum, and steel industries. Results show a statistically significant relationship between water cost and water demand, with demand elasticities on the order of .5 to 1.0. Rising water costs are decreasing the importance of water for processing as a criterion for discriminating between location sites. (Bell-Cornell)
W75-03922

APPRAISAL OF IRRIGATION PROJECTS AND RELATED POLICIES AND INVESTMENTS,
Ministry of the Presidency, Mexico City.
For primary bibliographic entry see Field 3F.
W75-03933

PROTECTING CREEKSHEDS: DEVELOPMENT AND EVALUATION OF A METHOD TO MANAGE SMALL, URBANIZING WATERSHEDS THROUGH LOCAL GOVERNMENT ACTIONS,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03947

PROTECTING CREEKSHEDS, ANALYSIS AND ACTION,
Huron River Watershed Council, Ann Arbor, Mich.
For primary bibliographic entry see Field 4D.
W75-03948

SOME SOCIO-AGRICULTURAL CHANGES AS A RESULT OF INTRODUCTION OF IRRIGATION IN A DESERT REGION,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 3F.
W75-03951

IS THE WATER SAFE TO DRINK. PART 3: WHAT YOU CAN DO,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
For primary bibliographic entry see Field 5F.
W75-04019

WHITHER WATER.,
J. Gribbin.
Nature, Vol 250, No 5464, p 276-277, June, 1974. 1 fig, 2 tab.

Descriptors: *Water resources development, *Water supply development, *Comprehensive planning, Groundwater resources, Legislation, Water supply, Projections, Water resources, Desalination.
Identifiers: *United Kingdom.

The future plans for water resources in Britain are discussed. River management, water supply, and sewage disposal are under the control of new regional water authorities. A Central Water Planning Unit assists with the issues on a national basis, at the government level and at the regional level. The possibility that a new weather pattern is developing is also discussed. Proposals for climatic research are under consideration. The CWPU would like to develop a 'national water grid' involving transfers from region to region and the extension of the present system of river regulation. There are plans to develop groundwater abstraction. Desalination is also being considered but does not appear to be feasible. (Orr-FIRL)
W75-04025

THE DEVELOPMENT OF SUPPLEMENTAL WATER: RESOURCE FLEXIBILITY AND FARM MANAGEMENT OPTIONS,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 3F.
W75-04031

MANAGEMENT OF WATER RESOURCES FOR URBAN ENVIRONMENTAL ENHANCEMENT,
Environments for Tomorrow, Inc., McLean, Va.
M. Wendell, and H. O. Banks.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 301, $8.75 in paper copy, $2.25 in microfiche. Completion Report, July 1974. 273 p, 14 fig, 11 tab, 142 ref. OWRT C-3012(No 3672)(1).

Descriptors: Water resources development, Planning, Environment, Ecology, Recreational facilities, Attitudes, *Management, *Urban sociology, *City planning, *Urbanization, *Benefits, Water utilization, Legal aspects, Human population, *Community development.
Identifiers: *Urban environmental enhancement, Water-oriented amenities, Governmental structure, Community attitudes.

Natural and man-made water bodies and facilities are resources that can be managed to enhance urban environments. While such water-oriented amenities may be more desirable in sparsely populated areas, recreation and esthetic enjoyment can be provided in most places. Such urban water management may provide social benefits including diminution of tensions and better balanced communities. Specific metropolitan areas were studied including Harrisburg, Pennsylvania; Waterloo, Iowa; Houston, San Antonio, and Flower Mound, Texas; Sacramento, California; Minneapolis-St. Paul, Minnesota; and Columbia, Maryland. These studies show how different areas have approached or neglected the use of water for urban enhancement. Governmental structure, community attitudes, and the water resources available are important factors. Federal, state, and local governments all have responsibilities in water management for environmental improvement. Recommendations are presented in general terms and in relation to the several case studies.
W75-04151

PLANNED REUSE OF POLLUTED WATERS AND WASTEWATERS,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 5D.
W75-04198

APPLICATION OF ANALOG TECHNIQUES TO WATER MANAGEMENT,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 6A.
W75-04202

THE NEXT TEN YEARS: SOME RECOMMENDATIONS TO THE DELAWARE RIVER BASIN COMMISSION,
Pennsylvania Univ. Philadelphia. Inst. for Environmental Studies.
A. L. Strong, J. C. Keene, and J. Hillsberg.
April, 1971. 23 p.

Descriptors: *Water management, *Delaware River Basin Commission, *Interstate commissions, *River basin commission, *Water pollution, Abatement, Delaware, Delaware River, Maryland, New York, New Jersey, River basins, Water resources, Water pollution treatment, Water pollution sources, Water pollution effects, Water policy, Water demand, Water supply, Watershed management, Water quality standards, Water resources development, Comprehensive planning.
Identifiers: Citizen's Advisory Committee.

In its first ten years, the Delaware River Basin Commission (DRBC) implemented a pollution abatement and regulation program. Now DRBC must consider long-range needs; recommendations for improving programs and procedures are specified. DRBC should place high priority on protecting flood plains and other wetlands; and proposals to preserve and enhance water-related natural, historic, and scenic areas; and incorporate policies allocating water for use, consumption, and waste assimilation. It is also recommended that DRBC seek more grants and appropriations from the federal government and the 4 states, use its power to charge for its services although a study or risks and benefits involved by various possible charges is suggested prior to initiation, and change tax laws to better serve objectives. To enforce water quality standards, waste discharges should be monitored by DRBC and should bear the monitoring costs. The Commission should also create an ombudsman position, provide more public interest protection in advance of hearings, and strengthen the role of technically-qualified persons at hearings. Changes recommended in organizational structure include appointment of full-time commissioners, development of a Citizen's Advisory Committee, and establishment of a deputy director. (Grden-North Carolina)
W75-04210

COOLING TOWERS - BEST ACHIEVABLE THERMAL POLLUTION ABATEMENT TECHNOLOGY,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5D.
W75-04223

THERMAL POLLUTION OF THE GREAT LAKES -- A NON-PROBLEM,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W75-04231

ENHANCING WATER RESOURCE PLANNING EFFECTIVENESS: A SIMULATION GAMING APPROACH,
Stanford Univ., Calif.
For primary bibliographic entry see Field 6A.
W75-04233

A POSITIVE LOOK AT ACHIEVEMENTS IN WATER QUALITY ENHANCEMENT,
Howard, Needles, Tammen, and Bergendoff Alexandria, Va. Dept. of Environmental Quality and Conservation.
For primary bibliographic entry see Field 5G.
W75-04247

THE ELEMENTS OF CARRYING CAPACITY IN THE RECREATION UTILIZATION OF RESERVOIRS,
Bureau of Reclamation, Denver, Colo. Lower Missouri Region.

R. A. Crysdale.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 459-471. 35 ref.

Descriptors: *Recreation, *Recreation demand, *Reservoirs, Social needs, Economics, Use rates, Psychological aspects, Water skiing, Fishing, Boating, Recreation facilities, Administration.

The literature generated by universities, governmental agencies, professional organizations, and water sport experts provides a cross section of specialized disciplinary viewpoints on the concept of recreation carrying capacity of water bodies. Administrative, biological, physical, social, and temporal elements interacting with each other influence the degree reservoirs are utilized for various water recreation activities. An understanding of each element and its relationships to the other elements provides recreation planners, developers, and managers insight to the inherent and dynamic complexity of carrying capacity of reservoirs. However, the recreation carrying capacity of water resources is an artificial concept. It is also the only concept available and, therefore, must be used with caution for water resources planning, development, and management. (See also W75-04213) (Gibb-ISWS)
W75-04249

A MODEL STUDY FOR THE PROJECTED INCREASE IN WATER USE IN KANE COUNTY, ILLINOIS, U.S.A.,
Northeastern Illinois University, Chicago, Illinois.
K. O. Thomsen, and M. Y. Qutub.
In: Water for the Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 377-387. 8 fig, 2 ref.

Descriptors: *Water resources development, *Hydrogeology, *Model studies, *Illinois, Groundwater resources, Groundwater, Water demand, Planning, Management, City planning, Recharge.
Identifiers: Kane County(Ill).

Kane County is located in northeastern Illinois, 60 miles west of Chicago. Currently, the county is on the edge of Chicago's outward urban expansion, with three major developments in the planning stages, including two new towns. Kane County primarily relies on groundwater resources. The projected increase in population, industry, and commerce will increase the demand for water. This will require better water resources management. A projected model for future water use was discussed. (See also W75-04213) (Scott-ISWS)
W75-04258

THE MEASUREMENT OF IMPACTS IN SMALL WATERSHEDS FOR FLOOD CONTROL,
New South Wales Inst. of Technology, Kensington (Australia). Dept. of Economics.
For primary bibliographic entry see Field 4A.
W75-04341

RESERVOIR OPERATION THROUGH OBJECTIVE TRADE-OFFS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 4A.
W75-04345

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

CHANGING WATER USE IN SELECTED MANUFACTURING INDUSTRIES,
National Bureau of Economic Research, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-03922

PRICING IRRIGATION WATER IN IRAN,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 3F.
W75-03936

CRITERIA FOR REGIONALIZATION OF WATER AND WASTE MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-03946

ECONOMIC ANALYSIS OF LAND TREATMENT OF MUNICIPAL WASTEWATERS,
North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-04047

PHOSPHORUS DETERGENT BAN-HOW EFFECTIVE,
Pieczonka Consultants, Lackawanna, N.Y.
For primary bibliographic entry see Field 5D.
W75-04109

PHILADELPHIA PILOTS--BUILDS OXYGEN ACTIVATED SLUDGE,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 5D.
W75-04115

HOW CHICAGO MANAGES ITS DISTRIBUTION SYSTEM,
Chicago Dept. of Water and Sewers, Ill.
J. D. Starr.
Journal of the American Water Works Association, Vol 66, No 6, p 328-331, June, 1974.

Descriptors: *Water management, *Water policy, *Water distribution, *Water delivery, *Water works, Illinois, Water demand, Water supply, Water requirements, Water utilization, Water supply development, Water costs, Water users, Water control, Municipal water, Beneficial use, Water quality.
Identifiers: *Chicago(Illinois), *Department of Water and Sewers, *Bureau of Water, *Water Distribution Division, Bureau of Sewers, Water use, Water system.

The operations and capital improvements programs of the Chicago Department of Water and Sewers are supported by the water fund which must be completely self-supporting--receiving no tax monies of any kind. Revenue is derived from water charges and funds borrowed through the sale of water bonds. The Department is divided into the Bureau of Water and the Bureau of Sewers. One of the five divisions of the Water Bureau, the Water Distribution Division, having the most employees and the largest budget is discussed. It has five sections: (1) administrative which coordinates preparation of annual budget, develops specifications for pipe and appurtenances and maintains a 365 day-a-year complaint-and-information center; (2) engineering which continually plans for current requirements and future needs. Sound-level metering devices are used to detect leaks keeping water loss to a minimum; (3) plumbing inspection where all new and remodeling work performed by contractors is checked ro compliance with plumbing code. Continual house-to-house inspection of non-metered properties to detect leaks is carried on; (4) district field sections which perform construction and maintenance with strong emphasis on safe work practices; (5) machinery; (6) garage; (7) inventory and controls; and (8) tapping. A Students-as-Trainees and a job rotation program for newly employed engineers have been effective in increasing efficient operation. Even though the Department of Water and Sewers is operating under strict financial controls, the water system effectively furnishes water to the community at a cost ranking among the lowest of any metropolitan area in the country, costing about 6 1/2 cents per ton in Chicago. (Grden-North Carolina)
W75-04197

ATTITUDES TOWARD PAYMENT FOR RESOURCE USE: THE CASE OF DOMESTIC WATER CONSUMPTION,
Haifa Univ. (Israel).
C. S. Kamen, and P. Darr (Dalinsky).
Journal of Environmental Systems, Vol 4, No 1, Spring, 1974. p 1-21, 1 fig, 9 tab, 20 ref.

Descriptors: *Behavior, *Psychological aspects, *Domestic water, *Domestic use, *Water consumption, Water utilization, Potable water, Water quality.
Identifiers: Israel.

The interrelationships among socio-economic variables, attitudes and domestic water consumption are examined for a sample of 1,892 Israeli urban households. In Israel, the increased demand for domestic water is accompanied by quality deterioration due to pollution of water sources and possible expense of large-scale desalination of sea water. The analysis focuses on willingness to pay more for household water under various conditions, in an attempt to identify factors affecting individual readiness to pay for use of natural resources. The findings dealt with reported water use, limitation of use due to price, willingness to pay more for water, attitudes toward water quality, perception of water as commodity, effects of different systems of charges and relationship between social-psychological variable and measured consumption. Analysis reveals that willingness to pay depends both on the price demanded and on the purpose of the payment, that the equitability of the system of charges has an effect on willingness to pay, and that particular charge systems are not necessarily effective in attaining their intended ends. Although no relationship is found between attitudes toward water use and actual consumption, the analysis shows that social-psychological variables are important in determining individual readiness to undertake additional expenses which must be incurred as part of efforts to maintain environmental quality. (Salzman-North Carolina)
W75-04201

COST OF IMPORTING DEEP SANDSTONE WATER TO ELIMINATE GROUNDWATER DEFICITS IN NORTHEASTERN ILLINOIS,
Illinois State Water Survey, Urbana.
D. W. Beaver.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 300, $3.25 in paper copy, $2.25 in microfiche. Circular 120, 1974. 17 p, 4 fig, 8 tab, 5 ref.

Descriptors: *Costs, *Groundwater, *Economics, *Water resources development, Decision making, Water costs, Pipelines, Unit costs, Aquifers, Water supply, Water supply development, Groundwater resources, Water treatment, *Illinois, *Water importing, *Water transfer.
Identifiers: Kane County(Ill), McHenry County(Ill), Lake County(Ill), Du Page County(Ill), Cook County(Ill), Will County(Ill), Townships.

The cost of importing groundwater to eliminate projected deficits was estimated for deficient townships within the 6-county area of northeastern Illinois. The sole source of imported water was assumed to be deep sandstone water from neighboring townships. The total cost of water at a given deficient township consisted of the raw water cost and the treatment cost. The raw water cost consisted of the cost of locally produced raw water and the cost of imported raw water needed to satisfy the deficit. The cost of imported raw water consisted of the production cost at the source township and the transmission cost to bring the water to the deficient township. Transmission costs were calculated from published data and formulas assuming that the water was transmitted along portions of an idealized network based on the existing system of highways, streets, and railways. The total deficit at a given township was assumed to be met with water imported from a single source township. The least expensive source of water for importation was determined separately for each deficient township. The total cost of production and transmission was charged to the deficient township. Treatment of imported raw water was assumed to take place at the deficient township. The treatment cost was found to be the most significant cost component, accounting for nearly 60% of the total cost. The transmission cost was a relatively small cost component, accounting for 10 to 18% of the raw water cost and only 4 to 8% of the total cost. It was concluded that the groundwater resources available in northeastern Illinois should be adequate to meet the demands of the area until 2020, if mining of water from the deep sandstone aquifers is continued. (Humphreys-ISWS)
W75-04305

6D. Water Demand

USE OF WATER IN GEORGIA, 1970, WITH PROJECTIONS TO 1990,
Geological Survey, Atlanta, Ga.
R. F. Carter, and A. M. F. Johnson.
Georgia Water Resources Survey, Earth and Water Division Hydrologic Report 2, 1974. 74p, 9 fig, 7 tab, 20 ref.

Descriptors: *Water resources, *Water utilization, *Water uses, *Water demand, *Georgia, Data collections, Hydrologic data, Groundwater, Surface waters, Water supply, Water yield, Forecasting, Projections, Municipal water, Industrial water, Domestic water, Livestock, Cooling water.

Estimates of water use in Georgia in 1970 indicate that an average of about 5,560 mgd (21.0 cu hm/d) was withdrawn for four principal off-channel uses, which are (1) public supply (for domestic, commercial, and industrial uses), (2) rural (domestic, livestock, and irrigation), (3) self-supplied industrial, and (4) thermoelectric power. The fifth principal withdrawal use, hydroelectric power (an in-channel use), amounted to about 52,000 mgd (197 cu hm/d). In computing total withdrawals, recirculation (reuse) by a user is not counted, but withdrawal of the same water (cumulative withdrawal) by a downstream user is counted. Estimates of water withdrawal from the principal sources for off-channel use include 690 mgd (2.61 cu hm/d) from groundwater and 4,870 mgd (18.4 cu hm/d) from surface water. Consumptive use of water is projected to increase by slightly more than 100% by 1990, the increase being from 318 mgd (1.20 cu hm/d) to 760 mgd (2.88 cu hm/d). A large part of the increase will be due to evaporation from cooling towers of thermoelectric plants. (Woodard-USGS)
W75-03983

WATER RESOURCES EVALUATION OF THE SOUTHERN HIGH PLAINS OF NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4B.
W75-04042

HOW CHICAGO MANAGES ITS DISTRIBUTION SYSTEM,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 6C.
W75-04197

THE ELEMENTS OF CARRYING CAPACITY IN THE RECREATION UTILIZATION OF RESERVOIRS,
Bureau of Reclamation, Denver, Colo. Lower Missouri Region.
For primary bibliographic entry see Field 6B.
W75-04249

6E. Water Law and Institutions

INSTITUTIONAL FRAGMENTATION AND POLICY INNOVATION: THE CASE OF FEDERAL WATER POLLUTION CONTROL,
Arizona Univ., Tucson. Inst. of Government.
For primary bibliographic entry see Field 5G.
W75-03851

SOME POLITICAL AND ECONOMIC ASPECTS OF MANAGING CALIFORNIA WATER DISTRICTS,
California Univ., Los Angeles. Inst. of Government and Public Affairs.
For primary bibliographic entry see Field 6B.
W75-03856

UNITED STATES V. REPUBLIC STEEL CORPORATION (PROSECUTION FOR UNLAWFUL DISCHARGE OF COAL TAR INTO A RIVER).
For primary bibliographic entry see Field 5G.
W75-03992

UNITED STATES V. 21.54 ACRES OF LAND, MARSHALL COUNTY, WEST VIRGINIA (CONDEMNATION CASE FOR FLOWAGE EASEMENTS NEAR DAM SITE).
491 F 2d 301 (4th Cir W Va 1973).

Descriptors: United States, *Condemnation, *Easements, *Eminent domain, *High water mark, Legal aspects, Jurisdiction, Compensation, Navigable waters, Boundaries(Property), Dams, Contours, Elevation, Ohio River, Water level, Property values, Floods, Federal jurisdiction, Judicial decisions, Adjudication procedure, Dam construction, Flooding, Depreciation, *West Virginia.
Identifiers: *Inverse condemnation, Dam effects.

Appellee United States acquired flowage easements through condemnation for a dam project. An issue arose over the accuracy of the declaration for the extent of taking. Appellant landowners contended that appellee erred in determining the location of the ordinary high water mark on fish creek. This would have meant that the extent of the taking was in error and that the landowners would have to be compensated for the land located between the ordinary high water mark and the highest elevation of the land to be acquired. The trial judge refused to determine the location of the high water mark on the grounds that he did not have jurisdiction to do so. The appellate court decided that the trial judge had erred and did have jurisdiction to find as fact the actual location of the ordinary high water mark. This failure of the trial judge resulted in possible prejudice to the landowners the court stated. Thereupon the decision of the trial court was vacated and the case remanded with instructions to the United States District Court. (Chennault-Florida)
W75-03993

WINEMAN V. SHANNON BROTHERS LUMBER CO., INC. (ACTION BETWEEN COTERMINOUS RIPARIAN LANDOWNERS TO DETERMINE ACCRETION APPORTIONMENT).
368 F Supp 652 (N D Miss 1973).

Descriptors: *Mississippi, *Judicial decisions, *Accretion(Legal aspects), *Equitable apportionment, *Boundary disputes, Legal aspects, Water law, Boundaries(Property), Federal jurisdiction, Land tenure, Real property, Shores, Thalweg, Adjacent landowners, Adverse possession, Common law, Equity, Riparian land, Mississippi River, Adjudication procedure.
Identifiers: Liability(Legal aspects).

This suit is between coterminous riparian landowners to determine the apportionment of accretions. The plaintiffs also sought damages for the wrongful cutting of timber by the defendant corporation on the disputed portion of the accretions. The plaintiffs contended that the accretions should have been apportioned according to the thalweg or right angle rule. The defendant argued that the accretions should have been divided by extending the boundary between the two properties which had been established in a similar apportionment suit in 1919. In addition, the defendant contended that this extended boundary had been recognized as the dividing line between the properties by the parties and their predecessors in title under such circumstances as to have given the defendant superior title to the disputed accretions by reason of adverse possession. Finding that the evidence failed to establish adverse possession, the Federal District Court held that the thalweg or right angle rule applied in the instant case established the same diversion as the application of the general rule of apportionment and resulted in the more equitable diversion of the accretion. The court awarded the plaintiffs compensatory damages for the cut timber, but finding that the defendant acted in good faith, declined to impose any statutory penalty. (Deckert-Florida)
W75-03994

THE EMERGING RIGHT OF PHYSICAL ENFORCEMENT OF FISHERIES MEASURES BEYOND TERRITORIAL LIMITS,
Wisconsin Univ., Madison. School of Law.
R. B. Bilder.
University of Wisconsin Sea Grant College Program, Technical Report No 222, July 1974. 28 p, 24 ref.

Descriptors: *Law of the sea, *International law, *Fisheries, *Regulation, *Jurisdiction, Commercial fishing, Conservation, Fish management, Fish harvest, Boundary disputes(Legal aspects), Legal aspects, Adoption of practices, Governments, Oceans, Natural resources, Fisheries, Law enforcement, Marine fisheries.
Identifiers: Coastal waters, Contiguous zone, Territorial seas(Jurisdiction), International agreements, Territorial waters.

It is fairly likely that the Caracas Law of the Sea Conference will couple agreement on a fairly narrow territorial sea, probably twelve miles, with recognition of the rights of coastal states to regulate fishing in adjacent areas. The emergence of a regime of extensive coastal state fisheries jurisdiction has been presaged by the general trend toward establishment of broader fishery limits during the past several decades. A number of coastal states have made it clear that they will press vigorously for very broad coastal state regulatory authority over adjacent fisheries, ranging in some proposals out to two hundred miles. Some proposals appear virtually equivalent to an extended territorial sea. Others would establish an exclusive fishery zone. Others would grant the coastal states limited regulatory or managerial powers for special conservation and other purposes. Whatever form is followed, it is likely that traditional concepts of freedom to fish on the high seas will be significantly changed. (Sperling-Florida)

W75-03995

UNITED STATES V. KENNEBEC LOG DRIVING CO. ET AL. (SUIT BY GOVERNMENT TO ENJOIN LOG-DRIVING ACTIVITIES ON UPPER KENNEBEC RIVER).
491 F 2d 562 (1st Cir Maine 1973).

Descriptors: United States, *Navigable waters, *Rivers and Harbors Act, *Water pollution, *Maine. Lumbering, Wastes, Federal Water Pollution Control Act, Navigation, Channels, Legislation, Permits, Downstream, Rivers, Regulation, Watercourses, Environment, Environmental effects, Water pollution control, Waste disposal, Water resources, Water pollution sources, Water pollution effects, Water management(Applied).
Identifiers: *Refuse Act of 1899, *Navigation obstructions, Kennebec River(ME).

Appellant, United States, brought suit under the Rivers and Harbors Act of 1899 to enjoin the log driving by appellee, company, on the Kennebec River. Appellant claimed these activities violated sections 10 and 13 of the Act which respectively prohibited obstructing navigation and depositing refuse in navigable waters of the United States. On cross motions as to summary Judgment, the lower court found that the Act created an exception from the applicable sections for logging booms on rivers where log driving is the principal form of navigation. The log driving activities of the company were legal despite the lack of a permit. The motion of the government was denied and that of appellees granted. The government appealed. The court of appeals held that the sections of the Rivers and Harbors Act pertaining to obstruction of navigable waters did not apply to log driving on Kennebec River but that the section relating to deposit of refuse did apply. The judgement of the district court was vacated and the case remanded for further consideration. (Chennault-Florida)
W75-03996

KELSO V. C.B.K. AGRONOMICS, INC. (ACTION BY UPSTREAM LANDOWNERS FOR DAMAGES DUE TO CONSTRUCTION OF CONCRETE STRUCTURE ACROSS RIVER BY DOWNSTREAM OWNERS).
510 SW 2d 709 (Mo Ct App 1974).

Descriptors: *Missouri, *Judicial decisions, *Flood damage, *Watercourses, *Bridge construction, Bridges, Dams, Rivers, Legal aspects, Negligence, Floods, Riparian land, Natural flow, Construction, Water law, Adjudication procedure.
Identifiers: *Liability(Legal aspects), Proximate causation, Dam effects.

Owners of upstream real estate brought an action for damages to their farm and real estate caused by the construction of a concrete structure utilized by defendant as a bridge across the river. The defendant's bridge was located one mile downstream from the plaintiff. The structure rose about nine feet from the river bed, and it had four forty-eight inch tubes through it. The Missouri Court of Appeals held that because the structure acted like a dam the case was submissible to the jury on the theory of negligence and proximate cause of damage to the plaintiff's property by reason of longer periods of flooding. Where a permanent structure in a natural watercourse causes only transient damage or injury dependent upon the season and the terrain affected, the upstream owner might be entitled to prospective damages in addition to those accured, providing proof is present that the damage is certain to recur. (Sperling-Florida)
W75-03997

NATIONAL DRINKING WATER STANDARDS.
For primary bibliographic entry see Field 5G.
W75-03998

CUTBACK IN COSTRUCTION FUNDING STIRS DOUBT ON WATER QUALITY GOALS.
For primary bibliographic entry see Field 5G.
W75-03999

REGIONAL MANAGEMENT OF WASTE SYSTEMS,
Maryland Environmental Service, Annapolis.
For primary bibliographic entry see Field 5D.
W75-04000

THE PHILOSOPHY OF S.2770,
Senate, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04001

LEGAL CONSIDERATIONS OF EGYPTIAN RESTRICTION OF FREE PASSAGE IN THE STRAITS OF TIRAN AND THE GULF OF AQABA,
North Carolina State Univ., Raleigh. Sea Grant Program.
J. E. Slate, Jr.
In: Current Aspects of Sea Law, Sea Grant Publication UNC-SG-74-03, p 50-56, March 1974. 35 ref.

Descriptors: *International waters, *Internal waters(Jurisdiction), *International law, *Waterways, Straits, Gulfs, Bays, Channels, Shoreline, Navigable waters, Legal aspects, Law of the sea, United Nations, Harbor, Ocean, Coasts, Shores.
Identifiers: Territorial seas(Jurisdiction), *Territorial waters, Littoral states, Waters.

Egypt advanced the argument that the Strait of Tiran and Gulf of Aqaba are not international waters. The Strait of Tiran is the entrance to the Gulf of Aqaba, and the sole non-Mediterranean access to the high seas for Israel. Egypt, Saudi Arabia, Jordan, and Israel are littoral states on the Gulf. However, the one navigable channel into the Gulf forms part of the territorial waters of Egypt. On this basis Egypt has closed these waters to Israeli shipping. Egypt refuses to accept that Israel is a littoral state on the Gulf and claims Israel occupies the littoral position by virtue of armed aggression. The waters of the Gulf of Aqaba are historically the territorial waters of its littoral states and Israel is not an historic littoral state. Egypt further argues that the Arab States consider themselves at war with Israel and this entitles them to exercise belligerency rights. Finally, Egypt asserts that the Strait of Tiran does not join two portions of the high seas, or two international waters, and therefore is not an international waterway. (Chennault-Florida)
W75-04002

LEMMONS V. UNITED STATES (ACTION FOR DAMAGES FOR REVOCATION OF DREDGE PERMIT).
496 F 2d 864 (Ct Cl 1974).

Descriptors: *Ohio River, *Judicial decisions, *Mineral industry, *Leases, Sands, Gravels, Dredging, Excavating, Mining, Industries, Industrial production, Legal aspects, Navigable waters, Water demand, Water law, Water resources development, Industrial plants, Economic aspects, Rivers, Federal government, Contracts, Contract administration, Permits.
Identifiers: Licenses, Navigation obstructions.

Action was brought by the lessee under a sand and gravel lease to recover damages in the form of just compensation for the alleged taking of sand and gravel tipple and for the value of the leasehold interest. Plaintiff, a sand and gravel company, received a permit from the Army Corps of Engineers to allow sand and gravel dredging operations in the Ohio River. This permit was later revoked in an effort to improve river navigation. Plaintiff did not remove the tipple following the revocation of the permit. The plaintiff asserted that the tipple was annexed to the leasehold and must be considered a part of the realty. The court of claims held that the tipple did not constitute real property. Since the lessee indicated an intent to abandon the tipple, the lessee could not recover its value. The court held that the parties considered the lease as terminated. There was, therfore, no leasehold interest in existence which could be the subject of an illegal taking. (Proctor-Florida)
W75-04003

MARINE CONSERVATION COMMISSION (AS AMENDED).
Mississippi General Acts, No 10, Ch 572, H.B. No 1243, p 19-30, approved April 23, 1974 (1974).

Descriptors: *Mississippi, Legislation, *Jurisdiction, *Oysters, *Shellfish farming, Regulation, Commercial shellfish, Adoption of practices, State governments, Economic aspects, Decision making, Administrative agencies, Fishing, Administration, Commercial fishing, Shellfish, Administrative decisions, Water resources development, Enforcement.
Identifiers: Administrative regulations, State policy, Coastal zone management.

Any shells of marine organisms which are under or upon the tidewaters within the territorial jurisdiction of the state of Mississippi are the property of the state and under the jurisdiction of the Mississippi Marine Conservation Commission. The commission is to manage, control, supervise, and direct any matters pertaining to marine life not otherwise delegated to another agency. The commission will open, close and regulate fishing seasons for the taking of shrimp, oysters, fish taken for commercial purposes and crabs. With a permit issued by the Mississippi Marine Resources Council, the commission is authorized to support projects in the nature of digging or constructing canals in order to bring additional water to existing oyster reefs or beds, or to establish new reefs or beds. Fifty percent of all the oyster shells produced from the oysters processed within the state are declared to be the nontransferable property of Mississippi. Anyone taking oysters from the public reefs will deliver to the commission fifty percent of the shells, or the commission can, at its option, set reasonable compensation. (Sperling-Florida)
W75-04004

UNITED STATES V. HOLLAND (ACTION TO ENJOIN UNLAWFUL FILLING OPERATIONS).
373 F Supp 665 (MD Fla 1974).

Descriptors: *Judicial decisions, *Land development, *Federal Water Pollution Control Act, *Water pollution, Water pollution sources, Land resources, Water management(Applied), Land use, *Florida, Land management, Fisheries, Jurisdiction, Navigable waters, Permits, Enforcement, Legislation, Water resources development, Water law, Adjudication procedure, Administrative decisions.
Identifiers: Injunctive relief, FWPCA Amendments of 1972, Fill permits, Navigability tests.

Action was brought by the United States to enjoin allegedly unlawful land-filling operations in Florida. The government contended that the defendants, land developers, had begun filling the waters of the bayou with sand, dredged spoil and organic materials without permits required by the Federal Water Pollution Control Act (FWPCA). The plaintiff alleged that continued discharge would result in irreparable injury, loss and damage to aquatic ecosystems of the area and to commercial and sport fisheries. The court held that the facts established acts of sufficient scope to warrant federal jurisdiction under the FWPCA, and issued a temporary injunction. The Court reasoned that Congress is not limited by the 'navigable

waters' test in its authority to control pollution under the commerce clause. It determined that the defendants' filling activities on land periodically inundated by tidal waters constituted discharges entering waters of the United States. Since this activity was done without permits, it was in violation of the statute. (Proctor-Florida)
W75-04005

BOATS AND RIPARIAN RIGHTS,
M. C. Leonard.
Women Lawyers Journal, Vol 47, p 9-12, 1961.

Descriptors: *Navigable waters, *Riparian rights, *Competing uses, *Public rights, Common law, Civil law, Legal aspects, Legislation, Water law, Governments, Navigation, Recreation, Water utilization, Riparian waters, Natural use, Riparian land, Public access, Connecticut, Shore protection, Regulation, Environmental control, Wetlands, State governments.
Identifiers: Environmental policy, State policy, Public trust doctrine, Navigability tests, Water rights(Non-riparians).

In the United States, a stream is navigable in law if it is navigable in fact. The law is well settled that lands underlying navigable waters within a state belong to the sovereign and may be used or disposed of as it sees fit--subject to the power of Congress under the commerce clause. In addition to the rights common to the public, the riparian owner has the right of access from his property to the navigable part of the stream. This right is subordinate to the public right of navigation and subject to rules and regulations imposed for the protection of the public right. When there is a conflict between these interests, antiquated laws impede solutions. There is no uniform law on this subject in the United States. This should force states to review their laws and follow the lead of Connecticut in preserving shorelines for the use of the general public. In Connecticut, the public owns the shores of navigable waters. The land between the high and low water mark is held in trust by the state. (Proctor-Florida)
W75-04006

EXPLOITATION OF DEEP OCEAN MINERALS: REGULATORY MECHANISMS AND UNITED STATES POLICY,
University of Southern California, Los Angeles.
R. D. Eckert.
The Journal of Law and Economics, Vol 17, p 143-177, April 1974. 87 ref.

Descriptors: *Minerals, *United States, *Regulation, *International law, Oceans, Governments, Legal aspects, Adoption of practices, Cost-benefit analysis, Economic aspects, Natural resources, Water rights, Mining, Mineral industry, Engineering, Research.
Identifiers: United Nations, International agreements, Territorial waters, Coastal waters.

Valuable minerals lie on the ocean bed at great depths. Rising prices for metals and improvements in the techniques of ocean mining have made seabed mining economically feasible. Unregulated competition to mine seabeds could lead to international conflict. The policy of the United States favors international agreements as the best means to insure both world stability and United States access. Investment in discovery and mining equipment would be discouraged without the creation of property rights to specific deposits. A United Nations of the Sea Conference of more than one hundred and fifty nations has been mandated to reach agreement on an international regime to control access to deep sea minerals. Cost-benefit analysis is used to analyze information on current seabed mining practices and the effects future regulation will provide for their efficient exploration. (Sperling-Florida)
W75-04007

SCATTERING FORK DRAINAGE DISTRICT, COUNTY OF DOUGLAS V. OGILVIE (SUIT CHALLENGING LEGALITY OF PROPOSED CONSRUCTION OF WATER RESERVOIR PROJECT).
311 NE 2d 203 (111 app 1974).

Descriptors: *Illinois, *Judicial decisions, *Jurisdiction, *Governmental interrelations, *Administrative agencies, Drainage districts, State jurisdiction, Control, Water law, Legal aspects, Reservoirs, Environmental control, Damages, Constitutional law, Reservoir construction, Legislation, State governments, Federal government, Local governments, Water management(Applied), Regulation, Administration, Multiple-purpose reservoirs, Adjudication procedure.
Identifiers: Injunctive relief, Environmental policy.

The plaintiff drainage district, joined by two private citizens, sought an injunction restraining the defendants, state officials, from entering into certain agreements with the United States Corps of Engineers relative to the proposed construction of the Lincoln Reservoir Project. The plaintiffs alleged (1) that the defendants were obliged, before entering into such agreements, to obtain the consent of the plaintiffs to secure a court adjudication establishing their authority to so act; (2) that water damage which was compensable under state law would not be fully compensated for under the proposed agreements; (3) that the proposed action violated property owners' constitutional right to a healthful environment; and (4) that the proposed actions violated provisions of the Environmental Protection Act. The lower court dismissed the plaintiffs complaint, with prejudice, ruling that the plaintiffs failed to state a claim upon which relief could be granted. The Appellate Court of Illinois affirmed. The court found no authority to support the plaintiffs' first three contentions and ruled that the complaint failed to sufficiently allege any violation of the Environmental Protection Act. (Deckert-Florida)
W75-04008

WPCF ADOPTS RESOLUTIONS AIMED AT EASING PROBLEMS OF WATER LAW.
Soap and Detergent Association, New York.
For primary bibliographic entry see Field 5G.
W75-04009

GUIDELINES FOR PREPARATION OF ENVIRONMENTAL STATEMENTS FOR REVIEWING AND COMMENTING ON ENVIRONMENTAL STATEMENTS BY OTHER FEDERAL AGENCIES.
Environmental Protection Agency, Seattle, Wash. Region X.
For primary bibliographic entry see Field 6G.
W75-04010

STANDARDS, ADMINISTRATION, AND SURVEYS, (LITERATURE REVIEW),
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 5G.
W75-04014

POLLUTION CONTROL IN JAPAN-A SURVEY.
For primary bibliographic entry see Field 5G.
W75-04017

PROGRESS IN SATISFYING ENVIRONMENTAL REQUIREMENTS,
Ebasco Services, Inc., New York.
For primary bibliographic entry see Field 5G.
W75-04018

LAW, (LITERATURE REVIEW),
Georgia Univ., Athens. Inst. of Government.
For primary bibliographic entry see Field 5G.
W75-04020

EPA'S POLLUTION CONTROL GOALS TAKE BROADSIDE IN SEATTLE.
For primary bibliographic entry see Field 5G.
W75-04023

ON POLLUTION CONTROL.
For primary bibliographic entry see Field 5G.
W75-04024

WHITHER WATER.,
For primary bibliographic entry see Field 6B.
W75-04025

REPORT ON: ARIZONA INDIAN WATER RIGHTS CONFERENCE,
W. Anderson, and C. Pattea.
Arizona Commission of Indian Affairs, August, 1973. 73 p.

Descriptors: *Water rights, *Arizona, *Water requirements, Water demand, Irrigation water, Irrigable land.
Identifiers: *Arizona Indians, Indian reservations.

The purpose of this conference was to gather information and promote an understanding of Indian water rights in Arizona. Suggestions and recommendations were made by federal, state, and Indian tribal members in order to promote understanding and provide the means for handling water rights problems on the Indian reservations. Included in this report are the complete statements of federal, state, and Indian agency representatives present at this conference having expertise or jurisdiction over water rights on Arizona Indian lands. (Mastic-Arizona)
W75-04143

THE MODEL WATER CODE, THE WISE ADMINISTRATOR AND THE GODDAM BUREAUCRAT,
Wyoming Uni., Laramie.
F. J. Trelease.
Natural Resources Journal, Vol 14, No 2, April, 1974. p 207-229.

Descriptors: *Water management(Applied), *Water permits, *Riparian rights, *Planning, *Water quality administration, *Water law, *Water rights, Water utilization, Water requirements, Water policy, Water distribution, Water users.
Identifiers: Model Water Code.

Designed for an easterner seeking a new water law for his state, the Model Water Code developed by Frank Maloney, Richard C. Ausness, and J. Scott Morris places all waters under a single rule of law and a single administration. 'A State Water Resources Board sits above three divisions concerned with water use, water quality, and weather modification' with supervisory authority over as many management districts as are needed to adequately cover the state. Trelease focuses on the code chapter dealing with water use permits and the administrator's role. A permit is issued for a 'reasonable-beneficial' use consistent with the public interest, providing it does not interfere with existing uses and the state water plan. The fundamental problem is the choice between property rights and administrative distribution. The administrator is expected to exercise discretion in dealing with reduction, restriction, changes in permits, suspension of permits, apportionment , rotation, limitation or prohibition and can take direct actions in an emergency situation. The Administrator may well assume the role of a bureaucrat 'juggling equality, equity, economic efficiency, public health and safety, protection of investment and protection of workers' jobs and farmers' livelihoods.' 'The Code's solution to the legal uncertainties of riparian rights is the substitution of these administrative uncertainties.' Duration of permits, shifts of use, priorities and shortages.

perpetual rights and flexibility, evils of prior appropriation are each discussed in terms of the Model Code which neglects to deal with the disparity between east and west water needs and does not address the need for equitable and qualitative distribution of water resources and their uses. (Salzman-North Carolina)
W75-04199

MORE RESPONSIVE WATER PLANNING IS POSSIBLE,
Washington State Univ., Pullman. R. L. Albrook Hydraulic Lab.
For primary bibliographic entry see Field 6A.
W75-04203

THE NEXT TEN YEARS: SOME RECOMMENDATIONS TO THE DELAWARE RIVER BASIN COMMISSION,
Pennsylvania Univ. Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04210

CONSERVATION AND FLOODING EASEMENTS: A CASE STUDY,
Pennsylvania Univ., Philadelphia. Inst. of Environmental Studies.
S. K. Slade.
December 1970. 21 p, 15 append. Federal Water Quality Administration, No. 16090 EDC.

Descriptors: *Water quality control, *Planning, *Water management(Applied), *Easements, *Water resources development, *Comprehensive planning, Water supply, Legal aspects, Eminent domain, Legislation, Local governments, Pennsylvania, Conservation, Administration.
Identifiers: *Bucks County(Penn), Neshaminy Creek(Penn), Neshaminy Water Resources Authority.

Although Pennsylvania possesses one of the strongest clean streams laws, the Commonwealth has not evolved any master plan for sewage disposal or water supply. Yet Bucks County by creating the Neshaminy Water Resources Authority has planned and acquired phases of a program for integrated water supply, water quality control, conservation, recreation and flood control on Neshaminy Creek. This study shows that planning coupled with knowledge of political realities and communication with the public brought this program into being and insured its success. Key factors in the program are affirmative approach to program; recognition of need to preserve quality of environment; assembly of competent planners and, most important, commitment of a large sum of money for land acquisition, engineering and construction costs, and contracts for scientific studies and tests. By undertaking the financial burdens, the County was able to acquire land through a planning program which encompassed appraisal, negotiating, condemnation and administrative (surveys, leasing policy) processes. The Neshaminy Program affords an excellent illustration of the implementation and problems in conducting an easement acquisition program. (Salzman-North Carolina)
W75-04211

WATER FOR THE HUMAN ENVIRONMENT, VOLUME IV, SPECIAL SESSIONS.
For primary bibliographic entry see Field 5B.
W75-04213

TOWARD A SCIENCE POLICY FOR COMPUTERS IN WATER RESOURCES: TRENDS AND ISSUES,
Illinois Univerity, Chicago. Dept. of Engineering.
For primary bibliographic entry see Field 6A.
W75-04257

A MODEL STUDY FOR THE PROJECTED INCREASE IN WATER USE IN KANE COUNTY, ILLINOIS, U.S.A.,
Northeastern Illinois University, Chicago, Illinois.
For primary bibliographic entry see Field 6B.
W75-04258

U.S. V. ROHM AND HAAS CO. (CONTINUOUS DISCHARGE POLLUTION ACTION UNDER REFUSE ACT).
500 F.2d 167 (5th Cir. 1974).

Descriptors: *Judicial decisions, *Legal aspects, *United States, *Texas, *Rivers and Harbors Act, Federal Water Pollution Control Act, Waste water discharge, Channels, Navigable waters, Water pollution, Water pollution sources, Permits, Adoption of practices, Legislation, Decision making, Administrative agencies, Administration, Pollution abatement, Water pollution control.
Identifiers: FWPCA Amendments of 1972, Injunctive relief, Liability(Legal aspects).

The United States brought action against the operator of a chemical plant in Texas under the Refuse Act. The district court entered an injunctive order setting limitations on the amount of various pollutants the defendant could discharge into the channel and totally enjoining the defendant from barging such wastes out to sea. The Court of Appeals held that the action, which was instituted prior to the 1972 Amendments of the Federal Water Pollution Control Act, was within the saving clause of the 1972 Amendments which provided that where a permit for discharge had been applied for there could be no violation of the Refuse Act until December 31, 1974. The injunctive order was modified to govern the operators conduct only before the permit had been issued, and eliminated entirely the restriction on the barging of wastes to sea, since this was outside the scope of the Refuse Act. A polluter discharging wastes in accordance with terms and conditions of a permit is not in violation of the Refuse Act. (Sperling-Florida)
W75-04290

BIDERMAN V. MORTON (SEEKING INJUNCTION TO RESTRAIN CONSTRUCTION ON FIRE ISLAND PENDING ENVIRONMENTAL IMPACT STATEMENT).
497 F.2d 1141 (2d Cir 1974).

Descriptors: *Legislation, *Decision making, *Judicial decisions, *Federal government, *Adoption of practices, Permits, Construction, Administrative agencies, Government finance, Local governments, Environmental effects, Planning, Regulation, Water law, Administration, New York, Zoning, Federal jurisdiction, Environmental control, Adjudication procedure.
Identifiers: Injunctive relief, National Environmental Policy Act, Environmental impact statement, Environmental policy.

Action was brought against federal and nonfederal government officials seeking an injunction to restrain the issuance of construction permits and the granting of zoning variances on Fire Island pending the completion of an environmental impact statement. Preliminary injunctive relief was denied, and this denial was upheld on appeal. The Court of Appeals said such relief was inappropriate under the circumstances, noting that congressional funding of the Fire Island National Seashore Act had been essentially exhausted. Furthermore relief against the municipal defendants was barred by the failure of plaintiffs to identify a discernible basis for the exercise of federal injunctive power over these nonfederal officials. The Fire Island National Seashore Act does not prohibit any zoning action by the various local governments located on the seashore. (Sperling-Florida)
W75-04291

U.S. V. LEBEOUF BROS. TOWING CO., INC. (GOVERNMENT ACTION TO RECOVER PENALTY IMPOSED BY COAST GUARD FOR GASOLINE SPILL IN OCEAN).
377 F. Supp. 558 (ED Louisiana 1974).

Descriptors: *Judicial decisions, *United States, *Penalties(Legal), *Oil spills, Boats, Water pollution, Water pollution sources, Water pollution control, Adoption of practices, Federal Water Pollution Control Act, Economic aspects, Navigable waters, Regulation, Legal aspects, Water law, Adjudication procedure, Legislation, Oil pollution, Administration.
Identifiers: Evidence.

Action was brought by the United States to recover a penalty which had been imposed by the Coast Guard against a towing company. One of the towing company's vessels had spilled gasoline into the ocean. The district court held that the penalty was criminal in nature, despite the fact that the statute denominated it a civil penalty. This being so, a provision of the Federal Water Pollution Control Act, providing that reports of oil spills which were required to be made upon pain of criminal liability could not be used against one making the report in any criminal proceeding, applied in the instant case. The imposition of a penalty upon one who discharges oil upon navigable waters may be enforced only if it is supported by information derived independently from a report filed pursuant to the Act. The test for whether a statutory penalty is civil or criminal is whether the legislative aim was to punish the party for engaging in the activity or to regulate the activity. (Sperling-Florida)
W75-04292

MINNESOTA PUBLIC INTEREST RESEARCH GROUP V. BUTZ (ACTION FOR INJUNCTIONS AGAINST LOGGING IN BOUNDARY WATERS CANOE AREA).
498 F.2d 1314 (8th Cir 1974).

Descriptors: *Judicial decisions, *Adjudication procedure, *Administrative decisions, *Public lands, Federal government, Water law, Forest management, Legislation, Regulation, Environmental effects, Environment, Evaluation, Environmental control, Legal review, Land management.
Identifiers: *National Environmental Policy Act, Environmental impact statements, Wilderness areas, Wilderness Act.

Action was brought in the United States Court of Appeals by a nonprofit corporation seeking temporary and permanent injunction against logging in the Boundary Waters Canoe Area (BWCA) until the Forest Service complied with the requirements of the National Environmental Policy Act (NEPA). Plaintiffs allege that timber cutting authorized by the Forest Service constitutes a major federal action requiring compliance with NEPA. The plaintiffs contend that the logging activities should be banned in BWCA because they are incompatible with the requirements of the wilderness system of which BWCA is integral. The defendants argue that logging is specifically provided for in the BWCA by the Wilderness Act. The Court affirmed the judgment of the lower court, holding that the activities of the Forest Service in relation to timber sales constitutes major federal action significantly affecting the quality of the human environment. As a result the Court concluded that an environmental impact statement must be made. The appellate court also sustained lower court's grant of injunction not constituting an abuse of discretions. (Proctor-Florida)
W75-04293

OPINION OF THE JUSTICES TO THE HOUSE OF REPRESENTATIVES (RELATING TO THE CONSTITUTIONALITY OF A BILL CREATING

A PUBLIC 'ON-FOOT FREE RIGHT-OF-PASSAGE' ALONG SHORE OF COASTLINE).
313 N.E.2d 561 (Mass 1974).

Descriptors: *Right-of-way, *Legal aspects, *Public access, Judicial decisions, Real property, Eminent domain, Navigable waters, Shores, Constitutional law, Common law, Public rights, Water law, Water resources development, State governments, Massachusetts, Legal review, Adjudication procedure, Legislation, Compensation, Public benefits, Riparian rights.
Identifiers: *State policy, *Declaratory judgments, *Water rights(Non-riparians).

A question was propounded by the House of Representatives to the Justices of the Supreme Judicial Court of Massachusetts relating to the constitutionality of a bill creating a 'public on-foot free right-of-passage' along the shore of the coastline between the mean high water line and the extreme water line subject to certain restrictions. The right-of-way stemming from the reserved interests of the public in the land is only to be exercised after sunrise and is not to be exercised in those areas designated by the Commissioner of the Department of Natural Resources as being of critical ecological significance. The court was of the opinion that if enacted, the ordinance would violate the provisions of the Constitutions of the Commonwealth of Massachusetts and the United States. The bill would amount to a taking of private property for public purposes without due compensation and would therefore be violative of the 'due process' strictures of the state and federal constitutions. (Proctor-Florida)
W75-04294

FREEMAN COAL MINING CORP. V. ILLINOIS POLLUTION CONTROL BOARD (APPEAL FROM OF POLLUTION CONTROL BOARD HOLDING THAT DEFENDANT MADE ILLEGAL DISCHARGES).
313 N.E.2d 616 (Ill App 1974).

Descriptors: *Water pollution, *Water pollution sources, *Acid mine water, *Water pollution control, *Pollution abatement, *Judicial decisions, Mining, Mining wastes, Coal mines, Water quality, Water quality control, Waste treatment, Damages, Discharge(Water), Water law, Water resources development, Illinois, Administrative decisions, Adjudication procedure, Treatment facilities, Environmental control, Legal review.
Identifiers: *Effluent limitations, *Liability(Legal aspects).

An appeal was made to the Illinois Appellate Court from an order of the Pollution Control Board requiring a coal mining corporation to desist from polluting water in violation of the State Water Pollution Regulations, and to maintaiits water treatment facility in a condition sufficient to meet effluent criteria promulgated by the Pollution Control Board. The petitioner argues that it should not be liable for the discharges because such discharges result from rainwater, a natural force beyond the control of petitioner, interacting with mining sludge, which was created prior to the enactment of the regulations. The Court found that the mine owner, by building a treatment facility for the acid runoff water and by making subsequent improvements, had intended to control the discharges. Therefore, petitioner was estopped from using a defense of lack of control over the discharge. Petitioner's intentions go only to the mitigation of damages. The court also held that even though the treatment to prevent pollution discharges imposed a financial burden on the petitioner, this was no defense and does not excuse petitioner from the responsibility to treat the discharges. (Proctor-Florida)
W75-04295

RESERVE MINING CO. ET. AL. V. UNITED STATES (MOTION FOR STAY OF INJUNCTION).
498 F2d 1073 (8th Cir 1974).

Descriptors: *Minnesota, *Judicial decisions, *Legal aspects, *Pollution abatement, Public health, Water law, Federal jurisdiction, Water pollution, Water pollution sources, Water pollution control, Water pollution effects, Water quality control, Federal government, State governments, Governmental interrelations, Federal Water Pollution Control Act, Air pollution, Air pollution effects, Asbestos, Industrial wastes, Pollutants, Waste disposal, Lake Superior, Mineral industry, Iron, Adjudication procedure, Legal review, Legal aspects, Planning.
Identifiers: Evidence, Injunctive relief, *Hazardous substances, Nuisance(Legal aspects), Refuse Act of 1899.

The federal government, joined by several state governments and environmental groups, brought action seeking an injunction barring the corporate defendants from continuing operation of their taconite ore processing plant located at Silver Bay, Minnesota. The plaintiffs contended that the plant's discharge of asbestiform particles into the air and Lake Superior violated federal and state pollution standards and presented an immediate public health hazard. A Federal District Court ordered the plant closed and the defendants appealed. The defendants moved for a stay of the injunction pending their appeal, contending that the evidence did not support the lower court finding that their operations constituted a public health hazard. The Eighth Circuit Court of Appeals held that evidence showing that the discharges might result in a health hazard did not support a ruling that such hazard did indeed exist. The court stayed the injunction, conditioned upon the defendants taking prompt steps to abate the discharges and submitting their plans for on-land disposal and control of air emissions to the court for review. (Deckert-Florida)
W75-04296

FORD MOTOR CO. V. DALLAS POWER AND LIGHT CO. (ACTION FOR PROPERTY DAMAGE RESULTING FROM RELEASE OF WATERS FROM DAM DURING TIME OF FLOODING).
499 F2d 400 (5th Cir 1974).

Descriptors: *Judicial decisions, *Texas, *Surface runoff, *Dams, Electric powerplants, Legal aspects, Economic aspects, Flooding, Legislation, Water law, Flood damage, Natural flow, Water resources, Water rights, Legal review, Floodwater, Discharge(Water), Water injury, Overflow, Negligence, Adjudication procedure.
Identifiers: *Liability(Legal aspects).

A case in the Fifth Circuit Court of Appeal concerned personal property damage resulting from the defendant power company's release, during a time of flooding, of waters through the power company's dam. The district court in Texas narrowed the case to one based on negligence and denied recovery on answers of contributory negligence. The fifth circuit reversed holding that interrogatories were improperly refused which attempted to base liability on a theory similar to strict liability. Under Texas law, negligence is not a critical factor in assessing liability for water damage where there has been a violation of the Texas Surface Water Act. Under this act liability results when there is a diversion of surface water from its place of natural flow, resulting in an injury to the owner of a lower estate. Under Texas law where a substantial invasion of land of another through the interference with the flow of surface water is intentional, liability depends on whether the invasion is unreasonable. (Sperling-Florida)
W75-04297

UNITED STATES V. BOYD (DISCHARGE OF OIL INTO NAVIGABLE WATERS).
1 Pollution Control Guide, Vol 3, paragraph 15067, p 15487-15491, June 3, 1974.

Descriptors: *Federal Water Pollution Control Act, *Oil spills, *Navigable waters, *Control, *Judicial decisions, United States, Legislation, Water quality standards, Administrative agencies, Environment, Regulation, Public health, Water quality, Ships, Shores, Protection, Oil pollution, Administration, Water quality control, Federal government, Pollution abatement.
Identifiers: *Federal Water Quality Improvement Act, Standing(Legal), Hazardous substances(Pollution), Evidence.

Defendant ship captain appealed from the decision of the federal district court in a criminal action brought by plaintiff United States charging defendant with discharging oil into navigable waters of the United States and not immediately notifying the appropriate federal agency pursuant to the Federal Water Pollution Control Act. The main issue was whether defendant had discharged oil in harmful quantities (sheen test). The district court convicted defendant, suspended sentence, and placed him on one year probation. On appeal defendant primarily contended that the sheen test improperly defined as harmful a broader class of oil discharges than Congress intended and was, therefore, invalid. Defendant next contended that the sheen test was devised to achieve workable administration, thereby subverting Congressional intent. Defendant further contended that the exception to the sheen test--discharges of oil from a properly functioning vessel engine--demonstrated the irrationality of the test. Finally defendant contended that the Act unconstitutionally denied him due process because, when coupled with the sheen test, it was too vague. The Court of Appeals rejected these contentions. It ruled that the sheen test was not unreasonable, vague, or unconstitutional and, thereupon, ordered the judgement of the district court affirmed. (Chennault-Florida)
W75-04298

VERMONT V. NEW YORK, ET AL. (PROPOSED CONSENT DECREE DISAPPROVED).
1 Pollution Control Guide, Vol 3, paragraph 15069, p 15499-154503, June 10, 1974. 7 ref.

Descriptors: *Water pollution control, *Discharge(Water), *Judicial decisions, *Adjudication procedure, Sludge, Sediments, Waste water, Interstate compact, Jurisdiction, Equitable apportionment, *New York, *Vermont, Wastes, Effluents, Water level, United States, Regulation, Standards, Dredging, Compacts, Ponds, Lakes, Tributaries, Navigation, Interstate, Governmental interrelations, Enforcement, Water quality control, Water quality standards.
Identifiers: *Nuisance(Legal aspects).

Plaintiff State of Vermont brought suit in the United States Supreme Court alleging that defendants State of New York and paper company were responsible for a sludge bed in its state waters which polluted the water, impaired navigation, and constituted a public nuisance. Issue was joined and a Special Master was appointed. The United States intervened as an interested party. The parties reached a settlement, in the form of a consent decree, which the Special Master recommended to the Court for approval. The proposed consent decree stipulated that no findings be made and that its provisions not constitute an adjudication on any issue of fact or law. It also requested the appointment of a special master who would police the execution of the proposed decree and submit to the Court for its approval his proposed resolutions of future contested issues. The Court rejected the decree and refused to appoint a Special Master. The Court concluded that such a decree would force it to act as an arbitrator of disputes and would thus extend the judicial power

of the Court beyond its constitutional limitations. (Chennault-Florida)
W75-04299

UNITED STATES V. IRA. S. BUSHEY AND SONS, INC. (DISCHARGE OF REFUSE INTO NAVIGABLE WATERS--OIL SPILLS),
1 Pollution Control Guide, Vol 3, paragraph 15077, 15541-15550, 1974.

Descriptors: *Rivers and Harbors Act, *Oil spills, *Water pollution, *Navigable waters, Oil pollution, Regulations, United States, Navigation, Environmental effects, Beaches, Lakes, Barges, Recreation, Oil, Gasoline, Wildlife, Environment, Water users, Water supply, Vermont, Federal Water Pollution Control Act, Judicial decisions, Federal government.
Identifiers: *Refuse Act of 1899, *Injunctive relief.

Plaintiff United States brought action to obtain injunctive relief against defendant corporate shipowner, whose vessels, in repeatedly discharging oil into the Vermont waters of Lake Champlain, had irreparably damaged beaches, public water supplies, waterfowl and fish, violated the provisions of the Refust Act, and created a public nuisance. The facts were uncontroverted. The Federal Water Pollution Control Act Amendments of 1972 did not preclude granting equitable relief and the Refuse Act of 1899 made such relief available. The United States District Court found that plaintiff was entitled to equitable relief, and ordered that defendant be permanently enjoined to operate and supervise all vessels and personnel employed by it in Lake Champlain to comply with the requirements specified by plaintiff, which were not in conflict with the authority of the United States Coast Guard of with provisions of the navigation rules for harbors, rivers and inland waters. (Chennault-Florida)
W75-04300

COURTS BACK STATE'S POWER TO HALT ACID MINE DRAINAGE,
For primary bibliographic entry see Field 5G.
W75-04301

SENATE SUBCOMMITTEE HEARS COMPLAINTS ON EPA WATER PROGRAMS.
For primary bibliographic entry see Field 5G.
W75-04302

NON-TRANSPORTATION OIL SPILL REGULATIONS.
For primary bibliographic entry see Field 5G.
W75-04303

PEOPLE (N.Y.) V. CUDAK (PROSECUTION FOR VIOLATING MORATORIUM ON ALTERATION OF TIDAL WETLANDS),
358 N.Y.S.2d 909 (Dist Ct Suffolk Cty 1974).

Descriptors: *New York, *Judicial decisions, *Regulation, *Tidal marshes, *Law enforcement, Environmental control, Environmental effects, Administration, Water law, State governments, State jurisdiction, Legal aspects, Marshes, Wetlands, Administrative agencies, Legislation, Coastal marshes, Management, Water quality control, Water policy, Penalties(Legal), Preservation, Conservation, Adjudication procedure, Adoption of practices.
Identifiers: Administrative regulations, Coastal zone management, State policy, Liability(Legal aspects).

The defendants, an individual and a corporation, were prosecuted by the state of New York for allegedly violating the state's moratorium on alteration of tidal wetlands by dumping fill on or adjacent to wetlands. Section 25-0202 of the Environmental Conservation Law proscribes the alteration of any tidal wetland or any area immediately adjacent to such wetland which the Commission of Environmental Conservation may reasonably deem necessary. The Commissioner had determined that such adjacent area would extend 300 feet landward but had not recorded the ruling with the Secretary of State. The District Court, Suffolk County, ruled that under New York law, the ruling was not effective as a regulation until it had been so recorded. The court also ruled that, under the statute, it had no power to determine on a factual or case-by-case basis whether a particular area was 'adjacent' to a tidal wetland. Accordingly, on finding that the state failed to prove beyond a reasonable doubt that the defendants had dumped their fill directly onto wetlands, the court found the defendants not guilty. (Proctor-Florida)
W75-04304

WATER REUSE...SAFE DRINKING ACT...HOW SOON...HOW GOOD.
For primary bibliographic entry see Field 5G.
W75-04322

CONTROL OF WATER POLLUTION: MISCELLANEOUS PROVISIONS.
For primary bibliographic entry see Field 5G.
W75-04323

POLLUTION AND PUBLIC HEALTH: TACONITE CASE POSES MAJOR TEST,
For primary bibliographic entry see Field 5G.
W75-04326

6F. Nonstructural Alternatives

CONSERVATION AND FLOODING EASEMENTS: A CASE STUDY,
Pennsylvania Univ., Philadelphia. Inst. of Environmental Studies.
For primary bibliographic entry see Field 6E.
W75-04211

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. ANNEX TO VOLUME I. MANAGEMENT AGENCY PROBLEMS IN THE DELAWARE ESTUARY,
Delaware Univ., Newark; and Academy of Natural Sciences of Philadelphia, Pa.
W. V. McGuinness, Jr.
Final Report (partial) April, 1973. 92 p, 3 fig, 2 tab, 6 append.

Descriptors: *Management, *Estuaries, *Planning, *Water management, *Waste disposal, *Delaware, *Estuarine environment, *Pollution abatement, Water control, Waste treatment, Water pollution, Water quality, Water consumption, Water law, Water policy, Water sources, Water treatment, Water utilization, Water conservation, Research priorities, Leadership, Decision making, Administration.
Identifiers: *Delaware Estuary System(Delaware), RANN, Problem matrix, Societal priorities.

Major estuarine-related management areas and related problems in the Delaware Estuary are identified and ranked according to societal priorities. Key managers were interviewed, and priorities were determined from their collective views. Management areas ranked as follows: highest-waste disposal; high-comprehensive planning and management, recreation, institutional and legal, and shipping; medium-commercial fishing, wetlands management, commercial land use, and residential land use; low-water supply, shore erosion, preservation and aesthetics; and lowest-sand and gravel extraction. Included is a problems matrix of four priorities, with fourteen problem areas listed for each. Under Priority A, for example, is included abating unrecorded pollution, regionalization, unrecorded pollution loads, urban waterfront renewal, wetland values, biological implications, deep water ports, capability to support basic uses, land use management techniques, dredge spoil disposal, cost effectiveness in pollution control, attitudes and education, and translating research into action. Criteria for selecting the 56 problems included the number of interviewees who cited it, the emphasis placed on it, the stature of the interviewee, and the judged significance of not solving the problem. (Grden-North Carolina)
W75-04328

6G. Ecologic Impact Of Water Development

EVALUATION OF INTERREGIONAL INPUT-OUTPUT MODELS FOR POTENTIAL USE IN THE MCCLELLAN-KERR ARKANSAS RIVER MULTIPLE PURPOSE PROJECT IMPACT STUDY,
Catholic Univ. of America, Washington, D.C. Inst. of Social and Behavioral Research.
For primary bibliographic entry see Field 4A.
W75-03923

GUIDELINES FOR PREPARATION OF ENVIRONMENTAL STATEMENTS FOR REVIEWING AND COMMENTING ON ENVIRONMENTAL STATEMENTS BY OTHER FEDERAL AGENCIES.
Environmental Protection Agency, Seattle, Wash. Region X.
Available from National Technical Information Service, Springfield, Va. 22161, as PB-226 998, $4.25 in paper copy, $2.25 in microfiche. April 1973. 249 p.

Descriptors: *Comprehensive planning, *Environmental control, Environment, Water resources development, Water pollution, Air pollution, Water pollution control, Management, Legislation, Agencies, Coordination, Water law, Pollution abatement, Water management(Applied), Interagency cooperation.
Identifiers: *Environmental Impact Statements, *Environmental policy, *National Environmental Policy Act.

An objective of the United States Environmental Protection Agency (EPA) is to assist other government agencies in developing an environmental ethic for their planning and action programs. This function assures that environmental values receive equal consideration with economics and need in the federal decision making process. Environmental Impact Statements (EIS) are the vehicles to accomplish environmental evaluations. Carefully planned and prepared EIS must be the unvarying rule if the environment is to be protected. Guidelines to be followed in preparing the EIS are presented. Included are sections on the National Environmental Policy Act, content of EIS, general guidelines, guidelines for specific projects such as dredging and spoil disposal and water resource development, and regional review procedures. Also included are pertinent federal statutes, executive orders, and memos from the Council on Environmental Quality and the Office of Management and Budget. (Proctor-Florida)
W75-04010

SYMPOSIUM ON POPULATION EXPOSURES,
Health Physics Society, East Weymouth, Mass.
For primary bibliographic entry see Field 5C.
W75-04152

CONSIDERATION OF BACKGROUND IN DEVELOPMENT OF ENVIRONMENTAL STANDARDS,
Georgia Inst. of Tech., Atlants. Office of Interdisciplinary Programs.
For primary bibliographic entry see Field 5G.
W75-04155

WATER RESOURCES APPRAISAL FOR HYDROELECTRIC LICENSING, THE CLARION RIVER BASIN, PENNSYLVANIA.
Federal Power Commission, Washington, D.C. Bureau of Power.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 232 186, $4.25 paper copy, $2.25 microfiche. Appraisal Report, 1974. 61 p, 24 fig, 14 tab.

Descriptors: *Water resources development, *Hydroelectric project licensing, *Powerplants, Flood control, Hydroelectric power, Water quality control, Water supply, Dams, Recreation, Fish, Wildlife, Watersheds(Basins), Evaluation, Reclamation, *Pennsylvania.
Identifiers: *St. Petersburg reservoir(Penn), Clarion River Basin(Penn).

Information was provided to use in considering hydroelectric licensing, relicensing, or recommendation for Federal takeover of the Clarion River basin. A comprehensive plan for flood control, hydroelectric power generation, water quality control, water supply, recreation, fish and wildlife enhancement, and land reclamation was found to be economically feasible by the Corps of Engineers in its 1969 study of the Appalachian Region. Construction of the St. Petersburg reservoir would inundate the existing Piney hydroelectric project and preclude the development of the possible dam sites at Foxburg and at Mill Creek, and Cooksburg. The potential projects, Mill Creek, Cooksburg, and Foxburg, are alternative developments to the St. Petersburg project. The alternatives are less favorable than St. Petersburg and were not expected to be seriously considered. (Dawes-ISWS)
W75-04274

BIDERMAN V. MORTON (SEEKING INJUNCTION TO RESTRAIN CONSTRUCTION ON FIRE ISLAND PENDING ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 6E.
W75-04291

MINNESOTA PUBLIC INTEREST RESEARCH GROUP V. BUTZ (ACTION FOR INJUNCTIONS AGAINST LOGGING IN BOUNDARY WATERS CANOE AREA).
For primary bibliographic entry see Field 6E.
W75-04293

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. ANNEX TO VOLUME I. MANAGEMENT AGENCY PROBLEMS IN THE DELAWARE ESTUARY,
Delaware Univ., Newark; and Academy of Natural Sciences of Philadelphia, Pa.
For primary bibliographic entry see Field 6F.
W75-04328

7. RESOURCES DATA

7A. Network Design

THE PROCESSING AND STORAGE OF WATER-QUALITY DATA IN THE NATIONAL WATER DATA STORAGE AND RETRIEVAL SYSTEM,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W75-03970

THE ULTRASONIC METHOD OF RIVER GAUGING,
Department of the Environment, Reading (England). Water Data Unit.
For primary bibliographic entry see Field 4A.
W75-04026

CLASSIC CANAL THEORY WITH GRAPHS AND TABLES. VOLUME I,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 8B.
W75-04269

7B. Data Acquition

AN ENERGY PARTITION EVAPORATION RECORDER,
Commonwealth Scientific and Industrial Research Organization, Mordiallc (Australia). Div. of Atmospheric Physics
For primary bibliographic entry see Field 2D.
W75-03937

MONITOR FOR THE QUALITY OF AUSTRALIA'S WATER RESOURCES,
Commonwealth Scientific and Industrial Research Organization, Clayton (Australia). Div. of Chemical Physics
For primary bibliographic entry see Field 5A.
W75-03939

APPLICATION OF SURFACE MODERATORS TO MEASUREMENT OF WATER CONTENT IN FIELD TOPSOILS WITH A NEUTRON MOISTURE DEPTH GAUGE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry
For primary bibliographic entry see Field 2G.
W75-03940

SPECIAL TECHNIQUES FOR DETERMINING CHEMICAL PROPERTIES OF GEOTHERMAL WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W75-03980

USEFULNESS OF ERTS-1 AND SUPPORTING AIRCRAFT DATA FOR MONITORING PLANT DEVELOPMENT AND RANGE CONDITIONS IN CALIFORNIA'S ANNUAL GRASSLAND,
California Univ., Berkeley. School of Forestry and Conservation.
For primary bibliographic entry see Field 4A.
W75-03990

DETERMINING LAND USE CHANGES IN WATERSHEDS BY AERIAL PHOTOGRAPHIC MEASUREMENTS,
Clemson Univ., S. C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W75-04051

SOME CHARACTERISTICS OF UPPER CLOUDS AND SUGGESTIONS REGARDING THE UTILIZATION OF RADIOACTIVE TRACERS IN MERIDIONAL FLOWS,
For primary bibliographic entry see Field 2B.
W75-04059

ACCOUNTING FOR SOME NONSTEADY PROCESSES IN RECORDING NATURAL AIR RADIOACTIVITY,
For primary bibliographic entry see Field 5A.
W75-04080

STUDY OF THE RESISTANCE OF FIBROUS FILTERING MATERIALS IN RAREFIED AIR,
For primary bibliographic entry see Field 5A.
W75-04105

A FLOTATION METHOD FOR THE RAPID MEASUREMENT OF THE WET BULK DENSITY OF SOIL CLODS,
National Inst. of Agricultural Engineering, Penicuik (Scotland).
For primary bibliographic entry see Field 2G.
W75-04135

USE OF A MICROWAVE REMOTE SENSOR FOR DETERMINATION OF WATER IN SUBSOILS,
Missouri Univ., Rolla. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 2G.
W75-04149

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME I - SYSTEM DEFINITIONS STUDIES.
Aerojet Electrosystems Co., Azusa, Calif.
For primary bibliographic entry see Field 5A.
W75-04259

PROJECT SKYWATER.
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 3B.
W75-04265

OPEN CHANNEL FLOW EVAPORATION STUDY,
Bonneville Power Administration, Portland, Oreg.
For primary bibliographic entry see Field 2D.
W75-04273

THE USE OF STEREO, HORIZONTAL, AND GROUND LEVEL ORIFICE GAGES TO DETERMINE A RAINFALL-ELEVATION RELATIONSHIP,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 2B.
W75-04330

DEEP SNOW MEASUREMENTS SUGGESTED USING COSMIC RADIATION,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2C.
W75-04331

LYSIMETER INSTALLATIONS IN SANDSTONE AT STYRRUP, NOTTINGHAMSHIRE,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 2G.
W75-04332

A GAMMA TRANSMISSION METHOD FOR THE DETERMINATION OF MOISTURE CONTENT IN SOILS,
Uttar Pradesh Irrigation Dept., Locknow (India).
For primary bibliographic entry see Field 2G.
W75-04343

7C. Evaluation, Processing and Publication

DATA REDUCTION METHODS FOR HYDROLOGIC ANALYSES,
Los Angeles County Sanitation Districts, Whittier, Calif.
K. L. Lewinger, D. P. Loucks, and E. A. McBean.

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No. HY1, Proceedings paper No. 11053, p 17-27, January 1975. 6 fig, 4 equ, 6 ref.

Descriptors: Hydraulics, Hydrology, *Information retrieval, *Data processing, *Computer programs, *Hydrologic data, Optimization, Least squares method, Water resources, Costs.
Identifiers: Data reduction, Data systems.

The determination of what portion of data is or is not needed to describe a phenomenon is partly a problem of economics. One can examine the tradeoff between the loss in relative accuracy of the reduced data and the savings in computer and storage costs. Three numerical methods are presented for reducing the quantity of data required to define the time series of relatively stable hydrologic parameters. The feasibility of each method is examined, showing the associated savings in computation time and data storage (and therefore in cost). The percentage reduction obtained depends on the allowable measurement and approximation error and the percentage of time this total error may be exceeded. The hydrologic data used in this study suggest that reductions of 25% or more may be possible without a significant loss of accuracy if the measured data are within 5% - 10% of the true value 95% of the time. (Bell-Cornell)
W75-03929

CHANCE-CONSTRAINED DYNAMIC PROGRAMING AND THE OPTIMIZATION OF WATER RESOURCE SYSTEMS,
New South Wales Univ., Kensington (Australia).
For primary bibliographic entry see Field 4A.
W75-03934

STOCHASTIC MODELS FOR THE INTERACTION OF RAINFALL AND GROUNDWATER LEVELS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 2A.
W75-03949

LAKES OF OREGON: VOLUME 2. BENTON, LINCOLN, AND POLK COUNTIES,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 2H.
W75-03968

CREST-STAGE GAGING STATIONS IN OREGON--A COMPILATION OF PEAK DATA COLLECTED FROM OCTOBER 1952 TO SEPTEMBER 1974,
Geological Survey, Portland, Oreg.
J. Friday.
Open-file report, October 1974. 160 p, 7 fig, 1 tab.

Descriptors: *Crest-stage gages, *Basic data collections, *Peak discharge, *Small watersheds, *Oregon, Streamflow, Hydrologic data, Gages, Gaging stations, Stage-discharge relations.
Identifiers: Crest-stage stations.

Stage and discharge data associated with recorded annual peak flows are tabulated for 232 crest-stage stations in Oregon. The stations (active and discontinued) are located in all parts of the State and are operated to provide flood information at drainage basins having generally less than 10 sq mi. (Knapp-USGS)
W75-03969

THE PROCESSING AND STORAGE OF WATER-QUALITY DATA IN THE NATIONAL WATER DATA STORAGE AND RETRIEVAL SYSTEM,
Geological Survey, Reston, Va.
M. D. Edwards.
Availabile from National Technical Information Service, Springfield, Va. 22161, as PB-236 246, $4.25 paper copy, $2.25 microfiche. Computer Contribution, September 1974. 85 p, 3 fig, 1 tab.

Descriptors: *Computer programs, *Data storage and retrieval, *Data processing, *Hydrologic data, Data collections, Basic data collections, *Water quality.

The computer program used by the United States Geological Survey to store water-quality and other data in the Water-Quality File of the National Water Data Storage and Retrieval System is described. Chemical, physical, biological, and radiochemical parameters for both surface and groundwaters may be processed and stored. Data for other parameters may also be processed and stored if desired. Complete descriptions of the computer program, the operation, and the functional capabilities of the system are presented. (Knapp-USGS)
W75-03970

THE OBSERVATION-WELL NETWORK OF THE U.S. GEOLOGICAL SURVEY IN FLORIDA,
Geological Survey, Tallahassee, Fla.
H. G. Healy.
Florida Bureau of Geology Map Series No. 65, 1974. 1 sheet, 1 fig, 2 tab, 3 ref.

Descriptors: *Observation wells, *Florida, *Basic data collections, *Hydrologic data, Water levels, Water quality, Sampling, *Maps.

An observation-well network has been established throughout Florida to evaluate the status of groundwater resources in each aquifer. The network provides basic documentation of the effects of natural variations and the effect of man on the groundwater resource. The network also provides the data by which the potential of the groundwater resources can be determined. The observation-well network is part of the statewide hydrologic monitoring network used to evaluate the total water resources of the State. The network is constantly being revised in response to the varying needs brought about by water-resource problems and application of new hydrologic techniques. Water-level measurements are made on a continuous or periodic basis. The frequency of measurement is determined primarily by the use of the record. In addition to the water-level monitoring netowrk, an extensive quality-of-groundwater network is maintained by the U.S. Geological Survey in Florida. Water samples were being collected for chemical analyses from 509 wells in 34 counties as of January 1974. (Knapp-USGS)
W75-03971

GEOHYDROLOGIC MAP OF SOUTHERN CALIFORNIA,
Geological Survey, Menlo Park, Calif.
W. R. Moyle, Jr.
Water-Resources Investigations 48-73 (open-file report), 1974. 1 map, 19 ref.

Descriptors: *Hydrogeology, *California, *Maps, Water levels, Aquifer characteristics, *Groundwater movement, Geologic mapping, Groundwater basins.

This geohydrologic map of southern California illustrates the general pattern of groundwater flow in the unconsolidated deposits of the area. Generalized geology and water-level contours are shown in the various basins in an area bounded by the California-Arizona-Nevada State line, the Mexicon border, the California coast line, the surface-water drainage at the crest of the Sierra Nevada, and the drainage divide between the coast and the San Joaquin Valley. (Knapp-USGS)
W75-03973

LIMNOLOGICAL DATA FROM SELECTED LAKES IN THE SAN FRANCISCO BAY REGION, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2H.
W75-03975

HYDROLOGIC DATA FOR 1973, BROWARD COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 3B.
W75-03976

WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN THE NORTHERN GREAT PLAINS COAL REGION OF EASTERN MONTANA, 1974-75.
Geological Survey, Helena, Mont.
Open-file report, January 1975. 22 p, 8 fig.

Descriptors: *Basic data collections, *Groundwater, *Surface waters, *Montana, *Coal mines, Water supply, Streamflow, Water yield, Hydrologic data.

A water data-collection program and interpretive hydrologic investigations are being conducted by the U.S. Geological Survey in the Northern Great Plains coal region of eastern Montana, an area of intense interest for coal companies, utilities, State and Federal agencies, universities, landowners, and environmental groups. In October 1974 there were 39 surface-water and 47 water-quality stations in the region for collection of streamflow, chemical-quality, sediment, and temperature data. These stations are located on all types of streams from the main-stem Yellowstone and Missouri Rivers to small ephemeral and intermittent streams that drain proposed mine areas. Groundwater investigations are being conducted to determine the areal hydrology of the Madison Group and associated Paleozoic rocks and the areal and site hydrology of shallow aquifers in the Fort Union Formation, including the coal beds. Available data, mostly from oil tests, indicate that the Madison may yield water suitable for use in energy development in the Northern Great Plains coal region. Most of the field work in the shallow groundwater study is a partial data inventory of wells and springs and construction of a few wells for water sampling, aquifer testing, and water-level measurements. A computer model is being constructed to determine the effect on stream temperature of selected increases in withdrawal rates, and thus reduced flow, of the Yellowstone River from Billings to Sidney, Montana. (Knapp-USGS)
W75-03977

WATER-RESOURCES DATA COLLECTED IN THE DEVILS HOLE AREA, NEVADA, 1973-74,
Geological Survey, Las Vegas, Nev.
J. D. Larson.
Open-file report, 1974. 12 p, 7 fig, 1 tab, 1 ref.

Descriptors: *Water levels, *Withdrawal, *Springs, *Nevada, Killifishes, Irrigation water, Hydrogeology, Basic data collections, Hydrologic data, Regimen.
Identifiers: *Devils Hole pupfish.

Water-level, spring-flow, and power-consumption data were collected in the Devils Hole area of Nevada from July 1973 through June 1974. Continuous recorders were used to monitor water levels in Devils Hole, two observation wells, and the flow from four springs. Also, monthly readings were made on two wells to help define a general trend of groundwater levels. Monthly meter readings of six electrically powered irrigation wells provided a record of power consumption, which in turn is a measure of the amount of water pumped. The purpose of the work is to observe the effects of groundwater withdrawals for irrigation on the level in Devils Hole and the flow from the major springs in the area. The pool in Devils Hole,

which is a collapsed fault structure, is the only native habitat of desert pupfish, Cyprinodon diabolis. (Knapp-USGS)
W75-03978

GEOLOGY AND GROUND-WATER RESOURCES OF GORDON, WHITFIELD, AND MURRAY COUNTIES, GEORGIA,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 2F.
W75-03984

GEOHYDROLOGY OF NEMAHA COUNTY, NORTHEASTERN KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 2F.
W75-03986

GEOLOGY AND GROUND-WATER RESOURCES OF MONTGOMERY COUNTY, SOUTHEASTERN KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 2F.
W75-03987

PRECONSTRUCTION ASSESSMENT OF BIOLOGICAL QUALITY OF THE CHENA AND LITTLE CHENA RIVERS IN THE VICINITY OF CHENA LAKES FLOOD CONTROL PROJECT NEAR FAIRBANKS, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 5B.
W75-03988

THE DILUTION CAPACITY OF SMALL STREAMS IN SOUTH CAROLINA,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-04050

RAPID SYSTEM OF AUTOMATIC PUNCH-TAPE OUTPUT OF INFORMATION FROM THE AI-100-1 ANALYZER,
For primary bibliographic entry see Field 5A.
W75-04100

THE USE OF AN AUTOMATED POPULATION DATA BASE IN POPULATION EXPOSURE CALCULATIONS,
Office of Radiation Programs, Silver Spring, Md. Electromaganetic Radiation Analysis Branch.
For primary bibliographic entry see Field 5A.
W75-04157

CONDOS-A MODEL AND COMPUTER CODE TO ESTIMATE POPULATION AND INDIVIDUAL RADIATION DOSES TO MAN FROM THE DISTRIBUTION, USE AND DISPOSAL OF CONSUMER PRODUCTS THAT CONTAIN RADIOACTIVE MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-04182

COOLING POND TEMPERATURE PREDICTION,
Towson State Coll., Baltimore, Md. Dept. of Computer Science.
For primary bibliographic entry see Field 5B.
W75-04222

DATA COLLECTION AND ANALYSIS TECHNIQUES FOR GLOBAL MARINE POLLUTION STUDIES,
Department of the Environment, Ottawa, (Ontario). Marine Sciences Directorate.
For primary bibliographic entry see Field 5A.
W75-04236

RELATIONSHIP BETWEEN LIMNOLOGICAL CONDITIONS OF RESERVOIRS AND WATERSHED FEATURES - A SURVEY,
Ministry of Public Works, Madrid (Spain). Section of Sedimentation and Natural Pollution.
For primary bibliographic entry see Field 2H.
W75-04244

CLASSICAL CANAL THEORY WITH GRAPHS AND TABLES. VOLUME II,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 8B.
W75-04270

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA, PART V; DATA REPORT, TEMPERATURE, SALINITY, OXYGEN AND HYDROGEN ION CONCENTRATION IN OUTER LOS ANGELES HARBOR, JUNE 1971 TO NOVEMBER 1973.
Southern California, University of Los Angeles. Sea Grant Program.
For primary bibliographic entry see Field 5B.
W75-04272

SURFACE WATER DATA OF THE UPPER MICHIGAN REGION PROJECT SANGUINE, SITE STUDY.
EDAW, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 2E.
W75-04277

IDENTIFICATION OF A DISTRIBUTED PARAMETER SYSTEM IN HYDROLOGY,
California Univ., Berkeley. Operations Research Center.
For primary bibliographic entry see Field 2F.
W75-04280

A METHOD FOR MAINTAINING CROSS AND SERIAL CORRELATIONS AND THE COEFFICIENT OF SKEWNESS UNDER GENERATION IN A LINEAR BIVARIATE REGRESSION MODEL,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Dept. of Research, Development and Planning.
For primary bibliographic entry see Field 2E.
W75-04309

CRE: A METHOD FOR SOLVING PROBABILITY PROBLEMS RELATED TO HYDROLOGIC TIME SERIES,
Idrotecneco, San Lorenzo in Campo, (Italy).
For primary bibliographic entry see Field 2E.
W75-04310

8. ENGINEERING WORKS

8A. Structures

SELF-CLEANING FILTER FOR HYDROLOGICAL REGENERATION,
For primary bibliographic entry see Field 5D.
W75-03864

DAM BUILDING SYSTEM,
G. L. Malan.
U.S. Patent No 3,845,631, 6 p, 5 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 55, November 5, 1974.

Descriptors: *Patents, *Dams, *Concrete dams, *Dam construction, Equipment, Water control, Construction, Engineering structures, Concrete structures.

A pool is formed upstream of the dam site; a floating platform bearing a concrete mixing plant is placed in the pool; and concrete is discharged from the mixing plant at a placement site on the damsite so as to build the dam and to increase its height. The pool is permitted to deepen as the dam rises so that the mixing plant approximately rises with the dam, whereby the concrete is mixed at a location relatively close to a placement site. The floating platform may be supported on pontoons which may be connected to pumps which can variably flood or evacuate them so as to change elevation of the platform relative to the surface of the pool. A means is provided for the safe and closely coupled mixing and placement of concrete on a dam. The requirement for conventional cableways with all of their inconveniences and risks is eliminated, and a mixing plant can be placed only a few feet away from the actual placement site. The mixing plant can conveniently be moved back and forth laterally along the upstream face of the dam. The materials of construction can handily be supplied to the mixing plant and can be kept cool, both in storage and on their way to the mixing plant. (Sinha-OEIS)
W75-03873

PNEUMATIC BARRIERS TO REDUCE SALT INTRUSION THROUGH LOCKS,
Waterloopkundig Laboratorium, Delft (Netherlands). Density Currents Branch.
G. Abraham, P. van der Burgh, and P. de Vos.
Rijkswaterstaat Communications, No. 17, Government Publishing Office, The Hague, The Netherlands, 1973. 68 p, 21 fig, 3 tab, 15 photo, 79 equ, 18 ref.

Descriptors: *Saline water intrusion, *Locks, *Canals, Hydrodynamics, Hydraulics, Sea water, Fresh water, Evaluation, Design criteria, Ships, Water quality control, *Saline water barriers, *Barriers.
Identifiers: *Pneumatic barriers, North Sea(The Netherlands).

In the Netherlands, salt intrusion through locks on the coast is a serious threat to the water quality in the 'collector' canals linked with the locks. The various means of controlling sea water intrusion through locks are evaluated. The mechanism of salt intrusion through the lock is examined; considered are intrusion due to equalization of levels, the pattern produced when lock gates separating saline and fresh water are opened, and the effect of displacement of ships. After briefly considering current practices in the Netherlands, the hydrodynamics of pneumatic barriers are discussed. Described are a continuity equation, a momentum equation, and a mathematical solution. Design criteria for pneumatic barriers in locks are examined and their upkeep is explained. Among the measures of reducing salt intrusion, the exchange of salt water for fresh water while the lock gates are closed is the most effective (and most expensive) method. Pneumatic barriers constitute a simple, convenient and cheap method which will not keep out all the salt but will reduce intrusion considerably. The pneumatic barrier method of preventing salt intrusion is suitable for practically all the locks adjoining the sea in the Netherlands. Measures for new locks should be considered for each case individually. Pneumatic barriers can be combined with alternative means. (Bell-Cornell)
W75-03920

SOME HYDRODYNAMICAL ASPECTS OF GRAVITY-TYPE PLATFORM DESIGN,
Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 8B.
W75-03924

DESIGN OF A CONDUIT SYSTEM WITH DIVERGING BRANCHES,
North Carolina State Univ., Raleigh. Dept. of Agricultural Engineering.
K-P. Yang, T. Liang, and I-P. Wu.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No. HY1, Proceedings paper No. 11080, p 167-188, January 1975. 12 fig, 3 tab, 31 equ, 16 ref.

Descriptors: Hydraulics, *Pipelines, *Pumping, *Water distribution(Applied), *Dynamic programming, *Conduits, Design, Computer programs, Irrigation, Transmission lines, Optimization, Costs, Methodology, Networks, Systems analysis, Equations, Computer models, Flow.
Identifiers: Systems engineering.

The capability of a dynamic programming conduit design technique has been expanded to cover systems with diverging branch pipelines. An interactive computer programming approach is used in the optimization design. Design applies to complete turbulent, transient, as well as laminar, flow conditions. The decision variable, pipe size, assumes only pipe sizes that are available on the market. The sum of all cost phases, which includes pipe material cost, power cost, and wasted water cost, is used as a criterion for measuring the overall system effectiveness. The interactive approach, as opposed to the previously-used batch process, proves to be superior in the flexibility of allowing human decision and in the reduction of computation time. This expansion of the prior calculation method has been used successfully many times in solving different problems. It can handle various diverging branch type fluid networks; moreover, the dynamic programming technique is applicable to analysis and design of a more complex water system. (Bell-Cornell)
W75-03930

SOME CHARACTERISTICS OF COUNTERJET FLOW,
Sir George Williams Univ., Montreal (Quebec).
For primary bibliographic entry see Field 5B.
W75-04217

DRY-TYPE COOLING SYSTEMS IN ELECTRIC POWER PRODUCTION,
North Dakota State Univ., Fargo. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 5D.
W75-04221

WATER RESOURCES APPRAISAL FOR HYDROELECTRIC LICENSING, THE CLARION RIVER BASIN, PENNSYLVANIA.
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 6G.
W75-04274

8B. Hydraulics

METHOD AND APPARATUS FOR BREAKING WAVES,
M. L. Edwards.
US Patent No 2,851,476, 5 p, 6 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 929, No 1, p 58, December 3, 1974.

Descriptors: *Patents, *Shore protection, *Beach erosion, *Breakwaters, Waves(Water), Beaches, Coastal structures.
Identifiers: *Wave action.

The base of an artificial shore machine is anchored to the bed or floor near the shore of the body of water to be controlled. The anchor is any conventional anchorage means, such as legs or posts which penetrate into the sea floor to maintain the base in position. The shore machine may be supported at the desired depth by attachment to a ship, a barge, or other convenient float, and may thus also be used quite far from shore. A relatively flat platform is attached to the base by means of a hinge along the side of the base closest to the incoming waves, and generally most distant from the shore. The end of the platform away from the approaching waves is then free to move on the hinge upward and downward to vary the slope of the platform and the height of the edge of the platform away from the waves (nearest the shore). A double acting hydraulic cylinder is connected between the base and the platform to move the platform up and down relative to the base, in controlled fashion. The hydraulic cylinder is remotely controlled by means of hydraulic oil lines connected to a conveniently located remote control station on the shore or on board a ship (or barge) near the machine. The machine thus artificially induces waves to break in a controllable fashion, at an earlier time, and at a generally fixed location farther from shore, than would otherwise occur. (Sinha-OEIS)
W75-03868

DEVICE FOR PRODUCING AND PROTECTING DEPOSITS OF SEDIMENTARY MATERIAL ON THE FLOOR OF BODIES OF WATER,
O. J. F. Larsen.
U.S. Patent No 3,844,123, 5 p, 22 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1838, October 29, 1974.

Descriptors: *Patents, *Shore protection, *Beach erosion, Equipment, Erosion, Deposition, Sands, Littoral drift, Sand bars, Sediment control.
Identifiers: *Wave action, Offshore bars.

A device is described for deposition and protecting sand and other littoral drift material on the floors of seas, lakes, rivers and other bodies of water where the bed and sides consist of erosionable material. The device is placed at a certain level above the floor, thereby allowing for a height of the deposition underneath the device greater than corresponding to the height of the device itself. Plane or curved, flexible or stiff-plate-like members are disposed to form a surface in upwardly spaced relation to and generally parallel to the floor. The waves and currents thereby loose a part of the material drifting underneath this surface. The consequent deposition of material is protected by the depositing device against scouring. The plate-like members may form a continuous, flexible carpet or stiff plate, or individual, interspaced elements. Where the purpose is creation of offshore bars for coastal protection and reforming, the device is raised according as deposition of the drift material takes place, so that one layer of material is precipitated on top of the other until the required height is reached. (Sinha-OEIS)
W75-03871

TRANSVERSE MIXING IN RIVERS; A NUMERICAL APPROACH,
Waterloopkundig Laboratorium, Delft (Netherlands). Mathematics Branch.
G. K. Verboom.
Reprint paper from: The XVth IAHR Congress, Istanbul, September 2-7, 1973. Publication No. 117, Delft Hydraulics Laboratory, the Netherlands, March 1974. 14 p, 5 fig, 1 tab, 10 equ, 4 ref, 1 append.

Descriptors: *Rivers, *Mixing, Hydraulics, *Numerical analysis, Concentration, Measurement, Downstream, Upstream, Model studies, Simulation analysis, Advection, Diffusion, Dispersion, Flow, Velocity, Channels, Equations, Systems analysis.
Identifiers: *Transverse mixing, *Conservation equation, *Finite-difference method, Transverse dispersion coefficient, IJssel River(Netherlands), Non-buoyant material, Discharged material.

To study the transverse mixing in rivers numerically, the conservation equation of the released material is solved, using a fourth order accurate finite-difference method that has small numerical diffusion and dispersion. After preliminary computations to study the accuracy of the results, the concentration is calculated of a conservative, non-buoyant material released into a model of a river. From concentration measurements in this model and other characteristic features of the stream, Holley calculated the transverse dispersion coefficient with the general change of momentum method. Herein, this coefficient is used to find the concentration distribution. The agreement is quite satisfactory, giving support to the numerical method as well as to the analytical method by which the dispersion coefficient was found. (Bell-Cornell)
W75-03917

MODEL-PROTOTYPE COMPARISONS FOR TRANSVERSE MIXING IN RIVERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
E. R. Holley, and M. Karelse.
Reprint paper from: XVth IAHR Congress, Istanbul, September 2-7, 1974. Delft Hydraulics Laboratory, Publication No. 116, The Netherlands, March 1974. 12 p, 2 fig, 1 tab, 6 equ, 13 ref.

Descriptors: *Rivers, Hydraulics, *Model studies, *Streamflow, *Mixing, Downstream, Discharge(Water), Measurement, Depth, Velocity, Turbulence, Diffusion, Effluents, Water quality, Equations, Systems analysis.
Identifiers: *Transverse mixing, Longitudinal mixing, Concentration distribution.

The problem under consideration is transverse mixing downstream from an outfall discharging at a steady rate into a river. It is assumed that: (1) the material being injected is conservative; (2) depth-averaged values can be used so that only the transverse and longitudinal variations of the quantities of interest need to be considered; and (3) longitudinal mixing can be neglected for the steady state concentration distribution. Analytical considerations are reviewed relative to the model reproduction of the mixing process. An undistorted model can correctly reproduce the transverse diffusion in the prototype, but the diffusion in a distorted model will be too great relative to the prototype. Comparisons of model and prototype concentration measurements are presented for an undistorted model of one river and for a distorted model of another river. These data comparisons substantiate the previous statements about the reproduction of diffusion. If diffusion is a significant mechanism in the process to be studied, a distorted hydraulic model should not be used. (Bell-Cornell)
W75-03918

DIGGING IN OF ANCHORS INTO THE BOTTOM OF THE NORTH SEA,
Waterloopkundig Laboratorium, Delft (Netherlands).
J. Koster.
Publication No. 129, The Delft Hydraulics Laboratory, The Netherlands, June 1974. 17 p, 2 fig, 7 photos, 1 tab, 62 ref.

Descriptors: *Anchors, *Hydraulics, *Pipelines, *Bibliographies, Depth, Damages, Data collections, Ships.
Identifiers: *North Sea(Netherlands), *Ocean floor, Depth of penetration.

Oil or gas pipelines are expected to be laid on the Dutch section of the bottom of the North Sea. Utmost care will have to be taken to keep these pipelines from leaking. Damages to dug in pipelines, apart from those caused by bottom fluctuations, may be caused also by anchors caught behind the pipeline. This can be prevented by applying on the pipeline a top layer of ground which is thicker than the depth to which the anchor digs

into the bottom (penetration depth). To study the possible digging in of anchors, a literature review was made. This report includes a list of all known literature relating to ships' anchors and a discussion of data taken from the literature. The summary of information is restricted to types of anchors that dig in without outside help or the use of explosives. Considered are: (1) ships' anchors, including stock, stockless, and non-stockless patent anchors; and (2) work anchors, including various patent anchors. The behavior of the various types of anchor in sandy, clay, and muddy bottoms is examined. (Bell-Cornell)
W75-03919

PNEUMATIC BARRIERS TO REDUCE SALT INTRUSION THROUGH LOCKS,
Waterloopkundig Laboratorium, Delft (Netherlands). Density Currents Branch.
For primary bibliographic entry see Field 8A.
W75-03920

SOME HYDRODYNAMICAL ASPECTS OF GRAVITY-TYPE PLATFORM DESIGN,
Waterloopkundig Laboratorium, Delft (Netherlands).
J. van der Weide.
Reprint from: Paper presented at Inter Ocean '73, Dusseldorf, November 13-18, 1973. Delft Hydraulics Laboratory, Publication No. 120, March 1974. 15 p, 12 fig, 26 equ, 8 ref.

Descriptors: Hydraulics, *Hydrodynamics, *Waves, *Design data, Caissons, Stability, Depth, Height, Deep water, Shallow water, Piles(Foundations), Gravity, Equations, Methodology.
Identifiers: *Platform design, *Wave forces, *Design graphs, Production platforms, Spectral analysis.

In recent years, the concept of gravity-type production platforms has been introduced as an alternative to the traditional pile-supported platforms. For the design of these structures, wave forces under design conditions are of primary importance. Available techniques to obtain these forces are reviewed. Design graphs are given to facilitate the determination of wave forces on large objects, such as caissons for gravity-type structures. From the graphs, the wave loads in both regular and irregular waves can be computed. Horizontal forces for piles with both square and circular cross-sections, as obtained from the graphs, are in good agreement with values measured in model experiments. Results are valid for conditions where the wave profile can be approximated by the first order wave theory, which implies waves of moderate steepness in relatively deep water. When computing forces due to shallow water waves, the results obtained from the graphs may be used as a first approximation. Model tests with the final design are recommended to check the preliminary design data obtained from the graphs. (Bell-Cornell)
W75-03924

STOPPING DISTANCES OF V.L.C.C. IN IJMUIDEN,
Waterloopkundig Laboratorium, Delft (Netherlands).
J. Koster.
Reprint from: De Nederlandse Loods, 16e jaargang, No. 3, June 1974. Publication No. 123, Delft Hydraulics Laboratory, The Netherlands, March 1974. 10 p, 7 fig, 3 ref.

Descriptors: *Ships, *Harbors, *Measurement, Velocity, Distance, Simulation analysis, Equations, Experiments, Data collections, *Hydraulics, Resistance.
Identifiers: *Stopping maneuver, Stopping length, Tugboats, Speed, Amsterdam(The Netherlands), IJmuiden(The Netherlands).

As long as the dimensions of ships have been growing, the discussion about stopping distances of giant vessels has taken place. Especially in harbors, the stopping maneuver is worth a separate study, since the available stopping length is limited and a minimum velocity is required in order to enter the harbor safely. Much data are available about the stopping maneuver under the conditions of crash-stop trials at high sea. However, conditions in harbors are different; they are characterized by confined water (in depth and width), low speeds, tug assistance and maneuvers with rudder and propeller to keep course. For this reason, the existing computational methods to determine the stopping length at high sea have been adapted for application in harbors. The computation can determine the required stopping length under severe conditions, when tests are unwarranted. Some prototype measurements have been carried out to calibrate this new computational method. Measurements were made in the harbor of IJmuiden, where several extensions to sluices and breakwaters are making the entrance route rather complicated. (Janet Bell-Cornell)
W75-03925

LINEAR WAVE PROPAGATION PROBLEMS AND THE FINITE ELEMENT METHOD,
Waterloopkundig Laboratorium, Delft (Netherlands). Mathematics Branch.
J. C. W. Berkhoff.
Reprint paper from: The International Symposium on Finite Element Methods in Flow Problems, Swansea, January 7-11, 1974. Publication No. 124, Delft Hydraulics Laboratory, March 1974. 29 p, 19 fig, 81 equ, 13 ref.

Descriptors: Hydraulics, *Waves(Water), *Model studies, *Finite element analysis, Equations, Structures, Harbors, Refraction(Water waves), Computers, Systems analysis.
Identifiers: *Linear wave propagation, *Harmonic linear waves, *Wave forces.

Mathematical models for the computation of water wave propagation problems restricted to simple harmonic linear, irrotational waves have been developed during the past ten years in the field of wave forces on structures, harbor oscillations, diffraction, refraction and the combined phenomenon of refraction and diffraction. A survey is presented of these modeling techniques for which the numerical treatment can be classified as finite element analysis. Described are the mathematical formulation, the methods of solution, and the relation between the different models. The models yield quantitative or qualitative information concerning the effect of waves on structures or harbors. The main restriction of these models is the numerical requirement of about five computing points over one wave length to compute the potential function with an accuracy of roughly five percent. For the combined refraction-diffraction model, this requirement is a rigid one with respect to computing time and computer memory in the case of a large area compared with the mean wave length. However, it is possible to divide the whole area of interest into subareas for which different models can be applied and to join the different solutions in an appropriate way. (Bell-Cornell)
W75-03926

EXPERIENCES WITH TIDAL SALINITY MODEL EUROPOORT,
Delta Works, The Hague (Netherlands). Hydraulics Div.; and Waterloopkundig Laboratorium, Delft (Netherlands).
A. J. van Rees, P. van der Kuur, and H. J. Stroband.
Reprint paper from: The 13th International Conference on Coastal Engineering, Vancouver, Canada, July 10-14, 1972. Publication No. 125, Delft Hydraulics Laboratory, June 1974. 21 p, 8 fig, 4 ref.

Descriptors: *Coastal engineering, *Hydraulic models, *Tides, *harbors, Simulation analysis, Water level, Salinity, Dispersion, Silts, Rivers, Currents(Water), Data collections, Research, Density currents, Estuaries, Mathematical models, Systems analysis, Flow.
Identifiers: *Shipping, Seaports, North Sea(The Netherlands), Rotterdam Waterway Estuary(The Netherlands), Water transportation, Tidal movements.

A tidal salinity model for the harbor entrance at Rotterdam-Europoort was constructed in 1965. Described in detail are the preliminary studies, the setting up of the model, the boundary conditions, and use of the model in experimental studies. The model includes a part of the North Sea and the Rotterdam Waterway Estuary. For its regular adjustment, use could be made of extensive prototype measurements, two-dimensional tidal computations and tidal computations by means of the DELTAR (analogue, one-dim.). The model has proved to be very valuable for predicting stream patterns for nautical purposes, allowing shipping to continue without danger while the works were being carried out. The model has been used also for the solution of harbor problems (design, siltation), for predicting cooling water recirculation, and for advice on salinity intrusion problems. (Bell-Cornell)
W75-03927

LABORATORY STUDIES ON TRANSVERSE MIXING IN RIVERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
E. R. Holley, and G. Abraham.
Reprint from Journal of Hydraulic Research, Vol 11, No 3, 1973. Publication No. 127, Delft Hydraulics Laboratory, The Netherlands, June 1974. 35 p, 12 fig, 2 tab, 7 equ, 8 ref.

Descriptors: *Rivers, *Streams, *Mixing, Hydraulics, *Simulation analysis, *Laboratory tests, Analytical techniques, Least squares analysis, Equations, Model studies, Flow, Tracers, Channels, Depth, Velocity, Concentration, Flumes, Width, Experiments, Data collections, Systems analysis.
Identifiers: *Transverse mixing, *Lateral dispersion, IJssel River(Netherlands), Bed-shear turbulence, Groins, Bends, Helical motion, Chezy coefficients, Displacement, Non-buoyant tracers.

Described are some laboratory studies made with non-buoyant tracers to investigate the mixing under simulated stream conditions and the possible significance of mechanisms which are in addition to bed-shear turbulence and which contribute to the transverse mixing. Experiments were conducted for (1) a straight rectangular flume with simulated groins, and (2) an undistorted, fixed bed river model with groins. The flows considered are characterized by (1) variations in depth and width (2) extra side roughness, as protective works (groins) are present, and (3) bends. As a result of these characteristics, the transverse spreading of a non-buoyant tracer is influenced by: (1) turbulence, which may be non-uniformly distributed as a result of side roughness; (2) helical motion associated with channel bends; and (3) net transverse velocities. Transverse velocities from changes in channel geometry cause transverse displacements of the tracer plume. The displacement must be considered when using measured distributions of tracer concentrations to study transverse mixing; the applicability of a method of doing so is demonstrated. The transverse mixing problem can be treated using a transverse dispersion coefficient. The generalized change of moments method of analysis using data obtained for a simulated river is useful in showing some consistency in data which appeared to be inconsistent based on the traditional change of moments analysis. (Bell-Cornell)
W75-03928

WATER FOR THE HUMAN ENVIRONMENT, VOLUME IV, SPECIAL SESSIONS.
For primary bibliographic entry see Field 5B.
W75-04213

DESIGN AND MODEL TESTS OF THERMAL DISCHARGE DIFFUSERS,
Sudesco Systems, Inc., Buffalo, N.Y.
J. A. Tallis.
In: Water For The Human Environment, Volume IV, Special Sessions; Proceedings of the First World Congress on Water Resources (4 Vol.), Chicago, Illinois, September 24-28, 1973. International Water Resources Association, Business Office, 425 Illinois Building, Champaign, Illinois, p 48-61. 3 fig, 6 ref.

Descriptors: *Model studies, *Thermal water, *Froude number, *Hydraulic models, *Hydraulic structures, *Lake Ontario, Mixing, Jets, Dispersion, Turbulence, Momentum transfer, Entrainment, Harbors, Waste dilution, Discharge(Water).
Identifiers: *Diffusers, Densimetric Froude number, Thermal discharge.

Two specific aspects of thermal hydraulic model simulation were described. The results obtained from the study of a particular thermal discharge are applicable to other design situations. The use of an undistorted, two-dimensional model for investigating in detail the flow and mixing characteristics of a thermal discharge diffuser was discussed. Methods for calibrating distorted scale models to provide satisfactory prototype simulation were detailed. Guidelines for the initial design of a diffuser structure were presented. (See also W75-04213) (Bhowmik-ISWS)
W75-04216

SOME RESULTS FROM EXPERIMENTAL DATA ON SURFACE JET DISCHARGE OF HEATED WATER,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W75-04220

DESIGN OF THERMAL COOLING SYSTEMS USING THE CASCADE OF ENERGY CONCEPT,
Oklahoma Univ., Norman. Dept. of Aerospace, Mechanical and Nuclear Engineering.
For primary bibliographic entry see Field 5D.
W75-04228

REVIEW OF HEATED SURFACE DISCHARGE MODELS APPLICABLE TO RIVERS,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5B.
W75-04229

THE TRIANGLE AS A TENTATIVE UNIT HYDROGRAPH,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-04239

A DOUBLE-TRIANGLE MODEL FOR GENERATING STORM HYDROGRAPHS,
Tennessee Valley Authority, Knoxville, Tenn. Hydrologic Research and Analysis Office.
For primary bibliographic entry see Field 4A.
W75-04241

CLASSIC CANAL THEORY WITH GRAPHS AND TABLES. VOLUME I,
Hawaii Inst. of Geophysics, Honolulu.
R. W. Preisendorfer, and F. I. Gonzalez, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10875, $8.75 in paper copy, $2.25 in microfiche. Report No. NOAA-74040402, August 1973. 284 p, 3 tab, 107 ref. NSF-AG-253.

Descriptors: *Hydrodynamics, *Seiches, *Canals, *Theoretical analysis, *Mathematical studies, Resonance, Networks, Waves(Water), Surface waters, Mathematics.
Identifiers: *Canal theory, *Linear transport theory, *Radiative transfer theory, *Boundary value problems, Wave propagation.

The practical problems of linear surface-wave transport in nonuniform canals reduce principally to four main types: general responses to external and internal sources, seiches, resonances, and network problems. In each type of problem the geometry and physical parameters of the canals were given, and it was required to predict the time dependent or steady state (time-harmonic) wave amplitudes within the canals. These problems were reformulated for the time-harmonic case by using the concepts and methods of linear transport theory as they have been developed principally in the neighboring fields of geophysical radiative transfer theory and electric network theory. By applying the transport ideas of these two fields to classic canal theory, new mathematical and numerical procedures were developed in each of the four main problem domains. The mathematical procedures themselves fall into four classes: analytic, algebraic, product and quotient functionals, and inter-relations among these classes. The applications were summarized and illustrated by means of a selected set of graphs. Detailed comparisons between the present approach and the classic approach were made. (See also W75-04270) (Humphreys-ISWS)
W75-04269

CLASSICAL CANAL THEORY WITH GRAPHS AND TABLES. VOLUME II,
Hawaii Inst. of Geophysics, Honolulu.
R. W. Preisendorfer, and F. I. Gonzalez, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10876, $9.50 in paper copy, $2.25 in microfiche. Report No. NOAA-74040403, August 1973. 341 p, 243 fig. NSF-AG-253.

Descriptors: *Data collections, *Curves, Hydrodynamics, Seiches, Canals, Waves(Water), Surface waters, Resonance.
Identifiers: *Canal theory, Wave propagation, International Decade of Ocean Exploration.

This volume contains the graphs and data tabulations prepared in connection with Volume I. (See W75-04269) (Humphreys-ISWS)
W75-04270

OPEN CHANNEL FLOW EVAPORATION STUDY,
Bonneville Power Administration, Portland, Oreg.
For primary bibliographic entry see Field 2D.
W75-04273

HYDRODYNAMIC EFFECTS OF OIL SLICK MECHANICAL CONTROL DEVICES,
Texas A and M Research Foundation, College Station.
For primary bibliographic entry see Field 5G.
W75-04327

HEAT DISSIPATION FROM TURBULENT OPEN CHANNEL FLOW,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-04350

8C. Hydraulic Machinery

MEANS FOR ROTATABLY SUPPORTING AN OVERHEAD IRRIGATION PIPE,
Lindsay Mfg. Co., Nebr. (assignee)
For primary bibliographic entry see Field 3F.
W75-03867

WATER RESOURCES APPRAISAL FOR HYDROELECTRIC LICENSING, THE CLARION RIVER BASIN, PENNSYLVANIA.
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 6G.
W75-04274

8D. Soil Mechanics

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY; VOLUME I: MAIN TEXT,
Green Associates, Inc., Towson, Md.
For primary bibliographic entry see Field 5G.
W75-04266

8F. Concrete

DAM BUILDING SYSTEM,
For primary bibliographic entry see Field 8A.
W75-03873

DETERIORATION OF CONCRETE DITCH LINERS IN SALINE-ALKALI SOIL,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
L. B. Grass, and P. Koluvek.
Journal of the Irrigaion and Drainage Division, Proceedings of the American Society of Civil Engineers. Vol. 100, No. IR4, December, 1974. p 477-484, 3 fig, 2 tab, 10 ref.

Descriptors: *Irrigation ditches *Salinity, *Concrete-lined canals, *Deterioration, *Chemical degradation, berms, Saline Soils, Soil moisture, Calcium, Sodium, Heating, Cracks, Stress, Arid Lands, Solar radiation, *California.

Deterioration of portland cement concrete ditch liners has been noted in Imperial Valley, California. Deterioration has taken place in less than 10 years in some cases and is most severe on the north slope of east-west ditches and the east slope of north-south oriented ditches. Both chemical and physical reactions are responsible for the gradual softening of the concrete ditch liners. Cracking is due to the differences in temperature above and below the water level which accelerates chemical corrosion by continually exposing new surfaces. The most rapid and severe deterioration occurs at the top of the liner and decreases toward the bottom of the ditch, as saline solutions (particularly sodium and calcium) migrate from the soil by capillarity into the concrete mass. As water enters a heated ditch stresses are created by differential temperatures above and below the water lines, and the liner, already weakened by chemical stresses, will crack. This accounts for greater damages to the slopes exposed to maximum sunlight and heat. The problem can be avoided by interrupting the flow of moisture into the concrete. This can be done by using a more dense concrete mass having a lower porosity, by scheduling water application during the cooler part of the day to avoid undue stress, and using a soil low in salt content when building the berm. (Mastic-Arizona)
W75-03966

8G. Materials

IRRIGATION DITCH LINER AND METHOD FOR MAKING SAME,
For primary bibliographic entry see Field 4A.
W75-03863

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY; VOLUME I: MAIN TEXT,
Green Associates, Inc., Towson, Md.
For primary bibliographic entry see Field 05G.
W75-04266

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

SETTING UP A SPECIAL COLLECTION ON WATER POLLUTION IN A UNIVERSITY LIBRARY,
Case Western Reserve Univ., Cleveland, Ohio. Sears Library.
For primary bibliographic entry see Field 05G.
W75-04118

10D. Specialized Information Center Services

SETTING UP A SPECIAL COLLECTION ON WATER POLLUTION IN A UNIVERSITY LIBRARY,
Case Western Reserve Univ., Cleveland, Ohio. Sears Library.
For primary bibliographic entry see Field 05G.
W75-04118

10F. Preparation Of Reviews

EFFECTS OF TEMPERATURE ON THE TOXICITY TO THE AQUATIC BIOTA OF WASTE DISCHARGES-A COMPILATION OF THE LITERATURE,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 05C.
W75-03854

STANDARDS, ADMINISTRATION, AND SURVEYS, (LITERATURE REVIEW),
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 05G.
W75-04014

SOLID WASTE AND WATER QUALITY, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 05B.
W75-04016

MICROBIOLOGY OF WASTE TREATMENT, (LITERATURE REVIEW),
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 05D.
W75-04117

WASTEWATER TREATMENT, PHYSICAL AND CHEMICAL METHODS, (LITERATURE REVIEW),
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W75-04121

SUBJECT INDEX

ABSORPTION
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

ACCELERATORS
Population Exposure from High-Energy Accelerators,
W75-04183 5C

ACCIDENTS
An Analysis of Oil Outflows Due to Tanker Accidents, 1971-1972.
W75-04260 5B

ACCRETION (LEGAL ASPECTS)
Wineman v. Shannon Brothers Lumber Co., Inc. (Action Between Coterminous Riparian Landowners to Determine Accretion Apportionment).
W75-03994 6E

ACID MINE WATER
Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

Courts Back State's Power to Halt Acid Mine Drainage,
W75-04301 5G

ACIDIC SOILS
Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

ACIDIFICATION
Apparatus for Determining Organic Carbon Content of Polluted Liquids,
W75-03861 5A

ACTIVATED CARBON,
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

ACTIVATED SLUDGE
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

ADJUDICATION PROCEDURE
Minnesota Public Interest Research Group V. Butz (Action for Injunctions Against Logging in Boundary Waters Canoe Area).
W75-04293 6E

Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved).
W75-04299 6E

ADMINISTRATION
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

WPCF Adopts Resolutions Aimed at Easing Problems of Water Law.
W75-04009 5G

Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5G

ADMINISTRATIVE AGENCIES
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

Scattering Fork Drainage District, County of Douglas v. Ogilvie (Suit Challenging Legality of Proposed Consruction of Water Reservoir Project).
W75-04008 6E

ADMINISTRATIVE DECISIONS
Minnesota Public Interest Research Group V. Butz (Action for Injunctions Against Logging in Boundary Waters Canoe Area).
W75-04293 6E

ADMINISTRATIVE REGULATIONS
Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5G

Non-Transportation Oil Spill Regulations.
W75-04303 5G

ADOPTION OF PRACTICES
Biderman V. Morton (Seeking Injunction to Restrain Construction on Fire Island Pending Environmental Impact Statement).
W75-04291 6E

ADSORPTION
Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

Soil Adsorption of Humic Color,
W75-04043 5D

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

Models of Dispersion in a Granular Medium,
W75-04340 2F

AEDES SOLLICITANS
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

AERATED LAGOONS
Static Mixing Concept for Aerators Wins Acceptance,
W75-03914 5D

Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

AERATION
Effectiveness of the Pre-Aerator (Effektivnost' raboty pre-aeratora),
W75-03905 5D

Static Mixing Concept for Aerators Wins Acceptance,
W75-03914 5D

Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

AERATORS
Liquid Aerating Apparatus,
W75-03875 5D

AERIAL PHOTOGRAPHY
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

AEROSOLS
Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

AEROSOLS

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

AERSOLS
Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

AFRICA
A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

AGE EFFECT
Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

AGRICULTURE
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

Some Considerations on Plant Types for Dryland Agriculture,
W75-04126 2I

AGRO-INFORMATION
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

AIR DRYING
Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

AIR ENTRAINMENT
Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

AIR POLLUTION
Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

Accumulation of Strontium-90 in Soils,
W75-04062 5B

Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

ALABAMA
Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

ALASKA
Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

Temperature Regimes and Classification of Some Well-Drained Alpine Soils in Alaska,
W75-04314 2G

ALBEDO
The Three Stages of Drying A Field Soil,
W75-03965 2D

ALGAE
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

Effect of Turbidity on Algal Growth,
W75-04306 5C

ALGAL CONTROL
Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

ALGAL SPECIES SUCCESSION
Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

ALGORITHMS
CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

ALLUVIAL CHANNELS
A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

ALPINE SOILS
Temperature Regimes and Classification of Some Well-Drained Alpine Soils in Alaska,
W75-04314 2G

ALTAHAMA GEORGIA SOUTHERN AREA
Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

ALTERNATIVE WATER USE
The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

AMBIENT CURRENT EFFECTS
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

AMMONIUM CHLORIDE
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L,
W75-04011 3F

AMMONIUM SALTS
Process and Device for Purification of Effluents Containing Phenols and Ammonium Salts,
W75-03859 5D

ANAEROBIC CONDITIONS
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5E

Conversion of DDT to DDD in Flooded Soil,
W75-04348 5E

ANAEROBIC DIGESTION
Mixing in Anaerobic Digestion,
W75-04120 5D

ANALOG MODELS
Application of Analog Techniques to Water Management,
W75-04202 6A

ANALYTICAL TECHNIQUES
Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

ANCHORS
Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

ANIMAL GROUPINGS
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

ANOPHELES MOSQUITOES
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

APPROXIMATE PROBABILITY DENSITY FUNCTION
The Approximate Probability Density Function of Range and Adjusted Range,
W75-04246 6A

AQUACULTURE
Biological Processes Involved in Pollution of Coastal Aquaculture Waters,
W75-04281 5C

AQUATIC ENVIRONMENT
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

AQUATIC HABITATS
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

AQUATIC MICROBIOLOGY
Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

AQUIFER MANAGEMENT
Application of Analog Techniques to Water Management,
W75-04202 6A

AQUIFER SYSTEMS
Identification of a Distributed Parameter System in Hydrology,
W75-04280 2F

AQUIFERS
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

Hydrogeology of the Carefree Ranch Area, Maricopa County, Arizona,
W75-04145 2F

Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

ARCHAEOLOGY
Irrigation's Impact on Society.
W75-04138 3F

ARGON
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

ARID CLIMATES
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

ARID LANDS
Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

Some Considerations on Plant Types for Dryland Agriculture,
W75-04126 2I

Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

ARIZONA
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

The Three Stages of Drying A Field Soil,
W75-03965 2D

Report on: Arizona Indian Water Rights Conference,
W75-04143 6E

ARIZONA INDIANS
Report on: Arizona Indian Water Rights Conference,
W75-04143 6E

ARKANSAS RIVER PROJECT
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

ARTESIAN AQUIFERS
Application of Analog Techniques to Water Management,
W75-04202 6A

ASBESTOS
Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

ASCOMYCETE
The Effect of Salinity on a Marine and a Freshwater Ascomycete,
W75-04267 5C

ASSAY
Horizontal Water Migration of Strontium-90,
W75-04066 5B

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

Radiochemical Method of Determining Low Strontium-90 Concentration Levels in Environmental Samples,
W75-04102 5A

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

ASSESSMENT
The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Doses from Operating Facilities,
W75-04166 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

ASSESSMENTS
Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

ATLANTIC OCEAN
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

ATLANTIC SALMON
Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

ATMOSPHERE
Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

ATMOSPHERIC FALLOUT
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

ATOMIC ABSORPTION
Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

AUSTRALIA
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

AUTOMATION
An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

BACKGROUND RADIATION
Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

BACTERIAL CELLS
Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

BACTERICIDES
Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

BALDWIN LAKE (CALIF)
Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

BARLEY
Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

BARRIERS
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

BARSTOW (CALIF)
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

BASE FLOW
Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

BASELINE STUDIES
Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

BASIC DATA COLLECTION
Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

BASIC DATA COLLECTIONS
Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

Water-Resources Investigations of the U.S. Geological Survey in the Northern Great Plains Coal Region of Eastern Montana, 1974-75.
W75-03977 7C

Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

BEACH EROSION
Method and Apparatus for Breaking Waves,
W75-03868 8B

Device for Producing and Protecting Deposits of Sedimentary Material on the Floor of Bodies of Water,
W75-03871 8B

BEETLE-INFESTED WATERSHEDS
More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

BEHAVIOR
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

BEIDELLITE
Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

BELGIUM
Biological Purification of Effluents from Bleached Kraft Pulp: The Case of La Cellulose Des Ardennes (Epuration biologique d'effluents de pate Kraft blanchie: Le cas de la Cellulose des Ardennes),
W75-03895 5D

BENEFITS
The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

BENTHIC MACROINVERTEBRATES
Rejuvenation of the Buffalo River,
W75-04248 5C

BENTHOS
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

BENZENE COMPOUNDS
Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

BERYLLIUM
Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

BIBLIOGRAPHIES
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

Standards, Administration, and Surveys (Literature Review),
W75-04014 5C

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

Law, (Literature Review),
W75-04020 5C

Microbiology of Waste Treatment, (Literature Review),
W75-04117 5B

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

BIOACCUMULATION
Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

BIOASSAY
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

BIOCHEMICAL OXYGEN DEMAND
Oxygenation of Waste Water,
W75-03858 5D

How to Reduce BOD Levels From Size-Press Starches,
W75-03906 5G

The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water,
W75-03913 5C

Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

BIODEGRADATION
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

BIODEGRATION
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

BIOLOGICAL COMMUNITIES
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

BISMUTH
Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

BIVARIATE REGRESSION MODEL
A Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regression Model,
W75-04309 2E

BLACK FOREST
Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

BLEACHING WASTES
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

BORDER IRRIGATION
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

BORON
Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

BOUNDARY DISPUTES
Wineman v. Shannon Brothers Lumber Co., Inc. (Action Between Coterminous Riparian Landowners to Determine Accretion Apportionment).
W75-03994 6E

BOUNDARY LAYERS
Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

BOUNDARY VALUE PROBLEMS
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

BRACKISH WATER
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

BRAZIL
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

BREAKWATERS
Method and Apparatus for Breaking Waves,
W75-03868 8B

BRIDGE CONSTRUCTION
Kelso v. C.B.K. Agronomics, Inc. (Action by Upstream Landowners for Damages Due to Construction of Concrete Structure Across River by Downstream Owners).
W75-03997 6E

BRISTOL AVON RIVER AUTHORITY (UK)
Quality Control in River Management of the Bristol Avon,
W75-04324 5G

BROWARD COUNTY (FLA)
Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

BROWN TROUT
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

BUBBLES
Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

BUCKS COUNTY (PENN)
Conservation and Flooding Easements: A Case Study,
W75-04211 6E

BUFFALO RIVER (NY)
Rejuvenation of the Buffalo River,
W75-04248 5C

BUNTER SANDSTONE (UK)
Lysimeter Installations in Sandstone at Styrrup, Nottinghamshire,
W75-04332 2G

BUREAU OF RECLAMATION
The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

BUREAU OF WATER
How Chicago Manages its Distribution System,
W75-04197 6C

CADMIUM
The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

CALCAREOUS SOILS
Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

CALCIUM
Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

CALIBRATIONS
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

CALIFORNIA
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

Agronomic Survey of Jojoba in California,
W75-03960 3F

Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

Geohydrologic Map of Southern California,
W75-03973 7C

Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and

CALIFORNIA

Range Conditions in California's Annual Grassland,
W75-03990 4A

Project Skywater.
W75-04265 3B

Marine Studies of San Pedro Bay, California, Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973.
W75-04272 5B

A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

CANADA

Control of Water Pollution: Miscellaneous Provisions.
W75-04323 5G

CANADA (QUEBEC)

Preliminary Study of Phytoplankton of Lake St. Louis, A Broadening of the St. Lawrence River near Montreal, Quebec, (In French),
W75-04335 5C

CANAL THEORY

Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

Classical Canal Theory with Graphs and Tables. Volume II,
W75-04270 8B

CANALS

Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

CARBOFURAN

Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

CARBON

A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

CARBON-14

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

CARBON-14 GASES

C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

CARBON DIOXIDE

Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

CARBONATES

Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

CAUSTIC ALKALI

Process and Device for Purification of Effluents Containing Phenols and Ammonium Salts,
W75-03859 5D

CENTRIFUGATION

Solving Effluent Problems by the Use of Centrifuges,
W75-03942 5D

CENTRIFUGES

Solving Effluent Problems by the Use of Centrifuges,
W75-03942 5D

CERIUM

State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

CESIUM

Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

CHANNEL IMPROVEMENT

Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

CHANNEL LINERS

Irrigation Ditch Liner and Method for Making Same,
W75-03863 4A

CHANNEL MORPHOLOGY

The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

CHANNELS

A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

CHEMICAL ANALYSIS

Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

CHEMICAL DEGRADATION

Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

CHEMICAL OXIDANTS

Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

CHEMICAL OXYGEN DEMAND

Soil Adsorption of Humic Color,
W75-04043 5D

Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

CHEMICAL PRECIPITATION

Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

Corrugated Ink and Starch Wastes Meet EPA Standards at St. Regis.
W75-03907 5D

CHEMICAL REACTIONS

Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

CHEMICAL SLUDGE

Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

CHEMICAL TREATMENT

An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

CHEMICAL WASTES

Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

Spill Prevention and Control Aspects of Paper Industry Waste Water Management Programs,
W75-03912 5G

CHENA RIVER (ALASKA)
Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

CHESAPEAKE BAY
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

CHICAGO (ILLINOIS)
How Chicago Manages its Distribution System,
W75-04197 6C

CHLORIDE COMPOUNDS
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L,
W75-04011 3F

CHLORIDES
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

CHLORINATED PARAFFINS
Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

CHOCTAWHATCHEE RIVER
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

CHROMATOGRAPHY
A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

CHROMIUM
New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

CHRYSAORA
Enhancement of Recreational Uses of Estuarine Waters Through Study of Potential Control Methods for Stinging Sea Nettles,
W75-04037 5C

CITIZEN PARTICIPATION
Protecting Creeksheds, Analysis and Action,
W75-03948 4D

CITY PLANNING
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

CLARIFICATION
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

CLARIFIERS
Improved Clarification of Book Mill Effluent,
W75-03902 5D

CLASSIFICATION
The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

CLAY LOAM
Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

CLAY MINERALS
Mechanistic Response of Expansive Clays,
W75-03955 2G

Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

CLAY-WATER SYSTEM
Mechanistic Response of Expansive Clays,
W75-03955 2G

CLAYS
Mechanistic Response of Expansive Clays,
W75-03955 2G

The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

CLIMATIC DATA
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

CLIMATOLOGY
Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

CLODS (SOIL)
A Flotation Method for the Rapid Measurement of the Wet Bulk Density of Soil Clods,
W75-04135 2G

CLOUDS
Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

COAGULATION
Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

Improved Clarification of Book Mill Effluent,
W75-03902 5D

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

COAL MINES
Water-Resources Investigations of the U.S. Geological Survey in the Northern Great Plains Coal Region of Eastern Montana, 1974-75.
W75-03977 7C

COALS
Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

COASTAL AQUIFERS
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

COASTAL ENGINEERING
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

COLIFORMS
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

COLOR
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Soil Adsorption of Humic Color,
W75-04043 5D

COLORADO
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

COMMUNITY DEVELOPMENT
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

COMPACTION
Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

COMPETING USES
Boats and Riparian Rights,
W75-04006 6E

COMPREHENSIVE PLANNING
Guidelines for Preparation of Environmental Statements for Reviewing and Commenting on Environmental Statements by Other Federal Agencies.
W75-04010 6G

Whither Water.,
W75-04025 6B

Conservation and Flooding Easements: A Case Study,
W75-04211 6E

Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

COMPRESSIBILITY
Mechanistic Response of Expansive Clays,
W75-03955 2G

COMPUTER MODELS
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

COMPUTER PROGRAMS
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

COMPUTERS
Toward a Science Policy for Computers in Water Resources: Trends and Issues,
W75-04257 6A

CONCRETE DAMS
Dam Building System,
W75-03873 8A

CONCRETE-LINED CANALS
Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

CONDEMNATION
United States v. 21.54 Acres of Land, Marshall County, West Virginia (Condemnation Case for Flowage Easements Near Dam Site).
W75-03993 6E

CONDENSATION
Milti-Stage Flash Evaporator,
W75-03860 3A

Hot Ball Desalination Process,
W75-03878 3A

CONDENSERS
Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

CONDUITS
Self-Cleaning Filter for Hydrological Regeneration,
W75-03864 5D

Design of a Conduit System with Diverging Branches,
W75-03930 8A

CONFERENCES
Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

CONJUNCTIVE USE
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

CONNECTICUT RIVER
Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

CONSERVATION EQUATION
Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

CONSTRAINTS
Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

CONSTRUCTION MATERIALS
Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

CONTROL
United States V. Boyd (Discharge of Oil into Navigable Waters).
W75-04298 6E

CONTROL SYSTEMS
Application of Micro-Controllers Melmic 100 to Water Treatment Facilities, (In Japanese),
W75-04338 5D

CONVECTION-DIFFUSION EQUATION
Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

COOLING
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

COOLING TOWERS
Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

COOLING WATER
Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

Cooling Pond Temperature Prediction,
W75-04222 5B

Thermal Pollution Aspects in Europe,
W75-04226 5B

A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

CORN (FIELD)
Effect of Soil Temperature on Direction of Corn Root Growth,
W75-03954 3F

Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L.,
W75-04011 3F

Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

Corn Root-Configuration Response to Soil Temperature and Matric Suction,
W75-04288 3F

Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

CORRELATION ANALYSIS
Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

COSMIC RAYS
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

COSMOGONIC RADIOISOTOPES
Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

COST ANALYSIS
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

COST-BENEFIT ANALYSIS
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

Thermal Pollution of the Great Lakes -- A Non-Problem,
W75-04231 5B

Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

COST COMPARISONS
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

COSTS
Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5G

Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

COTTON
The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

REEKSHEDS
Protecting Creeksheds, Analysis and Action,
W75-03948 4D

REST-STAGE GAGES
Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

ROP MANAGEMENT
Cropping Patterns Involving Rice and Their Management,
W75-04127 3F

ROP PRODUCTION
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

Agronomic Survey of Jojoba in California,
W75-03960 3F

Some Considerations on Plant Types for Dry-and Agriculture,
W75-04126 2I

Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

LTIVATION
Studies of Tillage-Fertility on Pearl Millet in andy Arid Plains of Rajasthan,
W75-04129 3F

RRENTS (WATER)
Computation of Tides, Currents, and Dispersal f Pollutants in the New York Bight from lock Island to Atlantic City with Large Grid ize, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

RVES
lassical Canal Theory with Graphs and Tables. Volume II,
W75-04270 8B

ANEA
nhancement of Recreational Uses of stuarine Waters Through Study of Potential ontrol Methods for Stinging Sea Nettles,
W75-04037 5C

ANOPHYTA
itrogen Fixation By Blue-Green Algae-Lichen rusts in the Great Basin Desert,
W75-03963 5B

GON
oxicity of Zinc and Cygon, Applied Singly d Jointly, to Zebrafish Embryos,
W75-04282 5C

CZECHOSLOVAKIA
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

DAM CONSTRUCTION
Dam Building System,
W75-03873 8A

DAMS
Dam Building System,
W75-03873 8A

Ford Motor Co. V. Dallas Power and Light Co. (Action for Property Damage Resulting from Release of Waters from Dam During Time of Flooding).
W75-04297 6E

DATA ANALYSIS
Objective Double-Mass Analysis,
W75-04307 2B

DATA COLLECTIONS
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

Lakes of Oregon: Volume 2. Benton, Lincoln, and Polk Counties,
W75-03968 2H

Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

Classical Canal Theory with Graphs and Tables. Volume II,
W75-04270 8B

DATA PROCESSING
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

DATA STORAGE AND RETRIEVAL
The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

DDD
Conversion of DDT to DDD in Flooded Soil,
W75-04348 5B

DDT
Conversion of DDT to DDD in Flooded Soil,
W75-04348 5B

DDT ANALOGUES
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

DECENTRALIZATION
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

DECISION MAKING
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

Biderman V. Morton (Seeking Injunction to Restrain Construction on Fire Island Pending Environmental Impact Statement).
W75-04291 6E

DECLARATORY JUDGMENTS
Opinion of the Justices to the House of Representatives (Relating to the Constitutionality of a Bill Creating a Public 'On-Foot Free Right-of-Passage' Along Shore of Coastline).
W75-04294 6E

DECOMPOSING ORGANIC MATTER
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

DEEP PERCOLATION
Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

DEGRADATION (DECOMPOSITION)
Degradation in Groundwater and Mobility of Herbicides,
W75-04045 5B

DELAWARE
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

DELAWARE ESTUARY SYSTEM (DELAWARE)
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

DELAWARE RIVER BASIN COMMISSION
The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

DEMOGRAPHIC ACTIVITIES
Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

DENDROCHRONOLOGY
Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

DENSITY
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

DEPARTMENT OF WATER AND SEWERS
How Chicago Manages its Distribution System,
W75-04197 6C

DESALINATION
Milti-Stage Flash Evaporator,
W75-03860 3A

Hot Ball Desalination Process,
W75-03878 3A

Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

DESERT PLANTS
A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

DESERTIZATION
A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

DESERTS
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

DESIGN
Operational Aspects of Urban Sewage Works,
W75-04114 5D

DESIGN CRITERIA
Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2A

DESIGN DATA
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

DESIGN GRAPHS
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

DETERGENTS
Phosphorus Detergent Ban-How Effective,
W75-04109 5D

Rejuvenation of the Buffalo River,
W75-04248 5C

DETERIORATION
Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

DEVILS HOLE PUPFISH
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

DEW
Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

DEW POINT
Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2A

DEWATERING
Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

DICHROMATE REFLUX METHOD
Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

DIFFUSERS
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

DIFFUSION
Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

DIGESTED SLUDGE
Rebirth of the Sewage Farm.
W75-04337 5D

DIGESTION
Containing the Flow of Sewage Sludge.
W75-04336 5D

DISCHARGE (WATER)
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved).
W75-04299 6E

DISCRETE DISTRIBUTION
CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

DISCRETE LINEAR MODEL
A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

DISPERSION
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

Models of Dispersion in a Granular Medium,
W75-04340 2F

DISPOSAL
Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

DISSOLVED OXYGEN
The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water,
W75-03913 5C

Long Term Trends in Water Quality, Lower Hawand New Hope Rivers - 1966-1973,
W75-04046 5B

Marine Studies of San Pedro Bay, California, Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973,
W75-04272 5B

DISSOLVED SOLIDS
Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

DISTILLATION
Milti-Stage Flash Evaporator,
W75-03860 3A

Apparatus for Solar Distillation,
W75-03876 3A

Hot Ball Desalination Process,
W75-03878 3A

Calculation of Fractionation Effects in Atmospheric Nuclear Bursts,
W75-04068 5B

DISTRIBUTION
Vertical Distribution of the Concentration of Radon Decay Products in the 0-300-m Layer,
W75-04106 5F

Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5F

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5F

DISTRIBUTION PATTERNS
Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

DITCHES
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

DIVERSION STRUCTURES
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

DOMESTIC USE
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

DOMESTIC WASTES
Rejuvenation of the Buffalo River,
W75-04248 5C

DOMESTIC WATER
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

DOSE
The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

DOSE CALCULATIONS
Decay Scheme Data for Radiation Dose Calculations,
W75-04174 5A

DOSE COMMITMENT
The Historical Development of Concepts of Radiation Dose Commitment,
W75-04153 5C

DOSE RATE
Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

DOSE RATES
Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

DOSES
The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

DOSIMETERS
Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

DOSIMETRY
Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

DOUBLE BRIDGES CREEK
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

DOUBLE TRIANGLE HYDROGRAPH
A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

DRAINAGE WATER
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

DRAINS
Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

DREDGING
Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

DRIFTING (AQUATIC)
A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

DRIP IRRIGATION
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

DROUGHT RESISTANCE
Agronomic Survey of Jojoba in California,
W75-03960 3F

Some Considerations on Plant Types for Dryland Agriculture,
W75-04126 2I

DROUGHT RESISTANCE (PLANTS)
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L,
W75-04011 3F

DROUGHT TOLERANCE
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

A Field Study of the Heat and Drought Tolerance of Grain Sorghum (Sorghum Bicolor (L.) Moench) as an Approach to Genetic Improvement,
W75-04044 2I

DRY LAND FARMING
Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

DRY-TYPE COOLING TOWER
Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

DRYING
The Three Stages of Drying A Field Soil,
W75-03965 2D

DRYLAND FARMING
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

DUAL SUPPLY SYSTEM
Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

DUNE SANDS
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

DYE DITCH (MISS)
Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

DYNAMIC PROGRAMMING
Design of a Conduit System with Diverging Branches,
W75-03930 8A

Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

EARTH RESOURCES TECHNOLOGY SATELLITE (ERTS-1) WILDFIRE
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

EASEMENTS
United States v. 21.54 Acres of Land, Marshall County, West Virginia (Condemnation Case for Flowage Easements Near Dam Site).
W75-03993 6E

Conservation and Flooding Easements: A Case Study,
W75-04211 6E

ECONOMIC IMPACT
The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

ECONOMIC JUSTIFICATION
The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

ECONOMIC PREDICTION
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

ECONOMICS
Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

ECOSYSTEMS
Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

EFFICIENCIES
Effectiveness of the Pre-Aerator (Effektivnost' raboty pre-aeratora),
W75-03905 5D

EFFLUENT CONTROL
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

EFFLUENT LIMITATIONS
Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

EFFLUENTS
As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

Investigation for the Marine Disposal of Effluents,
W75-04289 5B

Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

EL PASO (TEX)
Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

ELECTRIC ANALOG MODELS
Application of Analog Techniques to Water Management,
W75-04202 6A

ELECTRIC POWER
Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

ELECTRIC POWER PRODUCTION
Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

ELECTRIC POWERPLANTS
Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

ELECTRICAL CONDUCTANCE
Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

ELECTRO-KINETICS
Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

ELECTRODES
Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5A

ELKHORN RIVER SUBBASIN (NEB)
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

EMANATION
Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

EMBRYONIC GROWTH STAGE
Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

EMINENT DOMAIN
United States v. 21.54 Acres of Land, Marshall County, West Virginia (Condemnation Case for Flowage Easements Near Dam Site).
W75-03993 6E

ENERGY
Symposium on Population Exposures,
W75-04152 5C

ENERGY BUDGET
An Energy Partition Evaporation Recorder,
W75-03937 2D

Design of Thermal Cooling Systems Using the Cascade of Energy Concept,
W75-04228 5D

ENERGY CASCADE SYSTEMS
Design of Thermal Cooling Systems Using the Cascade of Energy Concept,
W75-04228 5D

ENERGY TRANSFER
Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

Design of Thermal Cooling Systems Using the Cascade of Energy Concept,
W75-04228 5D

ENVIRONMENT
A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Doses from Operating Facilities,
W75-04166 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

ENVIRONMENTAL CONTROL
Guidelines for Preparation of Environmental Statements for Reviewing and Commenting on Environmental Statements by Other Federal Agencies.
W75-04010 6G

Progress in Satisfying Environmental Requirements,
W75-04018 5G

Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5G

ENVIRONMENTAL EFFECTS
Pollution Potential of Aquatic Sediments,
W75-04150 5B

Thermal Pollution Problems in Poland,
W75-04218 5C

Run-Off Regulation of the St. Lawrence and Its Liability,
W75-04243 4A

Biological Processes Involved in Pollution of Coastal Aquaculture Waters,
W75-04281 5C

Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5G

ENVIRONMENTAL IMPACT STATEMENTS
Guidelines for Preparation of Environmental Statements for Reviewing and Commenting on Environmental Statements by Other Federal Agencies.
W75-04010 6G

ENVIRONMENTAL POLICY
Guidelines for Preparation of Environmental Statements for Reviewing and Commenting on Environmental Statements by Other Federal Agencies.
W75-04010 6G

Non-Transportation Oil Spill Regulations.
W75-04303 5G

ENVIRONMENTAL SANITATION
Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5G

ENVIRONMENTAL STANDARDS
Consideration of Background in Development of Environmental Standards,
W75-04155 5G

ENZYMES
Improved Clarification of Book Mill Effluent,
W75-03902 5D

EPHEMERAL STREAMS
The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

EQUITABLE APPORTIONMENT
Wineman v. Shannon Brothers Lumber Co., Inc. (Action Between Coterminous Riparian Landowners to Determine Accretion Apportionment).
W75-03994 6E

EROSION
Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

EROSION CONTROL
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

ESTIMATING EQUATIONS
The Nonlinear Rainfall Response of Watersheds With Time Dependent Storage and Conveyance Properties,
W75-04240 2A

A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

ESTUARIES
Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

Biological Processes Involved in Pollution of Coastal Aquaculture Waters,
W75-04281 5C

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

ESTUARINE ENVIRONMENT
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

ESTUARINE FISHERIES
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

ESTUARINE ORGANISMS
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

EUROPE
Thermal Pollution Aspects in Europe,
W75-04226 5B

EUROPIUM
Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

EUTROPHICATION
Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

The Eutrophication and Pollution of Lake Paijanne, Central Finland,
W75-04264 5C

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

Effect of Turbidity on Algal Growth,
W75-04306 5C

EVALUATION
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

Evaluating Multireservoir Operating Rules,
W75-03932 4A

Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

EVAPORATION
An Energy Partition Evaporation Recorder,
W75-03937 2D

The Three Stages of Drying A Field Soil,
W75-03965 2D

Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

Open Channel Flow Evaporation Study,
W75-04273 2D

EVAPORATORS
Milti-Stage Flash Evaporator,
W75-03860 3A

EVAPORIMETERS
An Energy Partition Evaporation Recorder,
W75-03937 2D

EXPERIMENTAL FARMS
A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

FALLOUT
Nuclear Meteorology,
W75-04054 5B

Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

Accumulation of Strontium-90 in Soils,
W75-04062 5B

Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

FALLOUT

Distribution and Migration of Strontium-90 in Soils,
W75-04065 5B

State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

FARM MANAGEMENT

The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

FARM WASTES

Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

FEDERAL GOVERNMENT

WPCF Adopts Resolutions Aimed at Easing Problems of Water Law.
W75-04009 5G

Biderman V. Morton (Seeking Injunction to Restrain Construction on Fire Island Pending Environmental Impact Statement).
W75-04291 6E

Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

FEDERAL LEGISLATION

National Drinking Water Standards.
W75-03998 5G

FEDERAL WATER POLLUTION CONTROL ACT

Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

United States v. Holland (Action to Enjoin Unlawful Filling Operations).
W75-04005 6E

Standards, Administration, and Surveys, (Literature Review),
W75-04014 5G

Law, (Literature Review),
W75-04020 5G

United States V. Boyd (Discharge of Oil into Navigable Waters).
W75-04298 6E

Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5G

Non-Transportation Oil Spill Regulations.
W75-04303 5G

FEDERAL WATER POLLUTION CONTROL ACT AMMENDMENTS OF 1972

The Philosophy of S.2770,
W75-04001 5G

FEDERAL WATER QUALITY IMPROVEMENT ACT

United States V. Boyd (Discharge of Oil into Navigable Waters).
W75-04298 6E

FEED LOTS

Soil Adsorption of Humic Color,
W75-04043 5D

FERROUS IRON

Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

FERTILITY

Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

FERTILIZATION

Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

FERTILIZERS

Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

FIBERS (PLANT)

On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

FIBROUS MATERIALS

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

FILTERS

Filtration - Media Selection is the Key to Success,
W75-03943 5F

Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

FILTRATION

Self-Cleaning Filter for Hydrological Regeneration.
W75-03864 5D

Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

Filtration - Media Selection is the Key to Success,
W75-03943 5F

Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

Filtration Engineering's Symposium on Membrane Separation.
W75-04122 5D

FINITE-DIFFERENCE METHOD

Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

FINITE ELEMENT ANALYSIS

Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

FINLAND (LAKE PAIJANNE)

The Eutrophication and Pollution of Lake Paijanne, Central Finland,
W75-04264 5C

FIRN

Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

FISH POPULATIONS
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

FISHERIES
The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

FISHKILLS
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

FISSION PRODUCTS
Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

FLASH DISTILLATION
Milti-Stage Flash Evaporator,
W75-03860 3A

Hot Ball Desalination Process,
W75-03878 3A

FLASH EVAPORATION
Milti-Stage Flash Evaporator,
W75-03860 3A

FLOCCULATION
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

FLOOD CONTROL
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

FLOOD DAMAGE
Kelso v. C.B.K. Agronomics, Inc. (Action by Upstream Landowners for Damages Due to Construction of Concrete Structure Across River by Downstream Owners).
W75-03997 6E

Flood Plain Information: Jordan River Complex II, Midvale-Draper, Utah.
W75-04205 4A

Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

FLOOD FORECASTING
Flood Plain Information: Jordan River Complex II, Midvale-Draper, Utah.
W75-04205 4A

Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

FLOOD PEAK
A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

FLOOD PLAIN ZONING
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

FLOOD PLAINS
Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

Flood Plain Information: Jordan River Complex II, Midvale-Draper, Utah.
W75-04205 4A

FLOOD PROFILES
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

FLOOD PROTECTION
Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

FLOOD ROUTING
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

FLOODED SOILS
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

Conversion of DDT to DDD in Flooded Soil,
W75-04348 5B

FLOODING
Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

FLOODING REDUCTION
Use of Black Polyethylene Mulch to Reduce Flooding Effects on Tomato Yields,
W75-04030 3F

FLOODPLAIN ZONING
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

FLOODS
Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

FLORIDA
The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

United States v. Holland (Action to Enjoin Unlawful Filling Operations).
W75-04005 6E

Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

FLOTATION
On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

Microflotation, New-Old Water Purification Technique (Mikroflotation, nygammal vattenreningsteknik),
W75-03888 5D

FLOTATION METHOD
A Flotation Method for the Rapid Measurement of the Wet Bulk Density of Soil Clods,
W75-04135 2G

FLOW
The Ultrasonic Method of River Gauging,
W75-04026 4A

Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

FLOW AUGMENTATION
Evaluating Multireservoir Operating Rules,
W75-03932 4A

FLOW CHARACTERISTICS
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

FLOW RESISTANCE
Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

FLUORESCENCE
Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

FLUORIDE
Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

FLUOROSIS (SKELETAL)
Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

FOOD CHAINS
Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

FORECASTING
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

Cooling Pond Temperature Prediction,
W75-04222 5B

FOREST WATERSHEDS
More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

FORESTRY
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

FORMALDEHYDE
An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

FOSSIL FUELS
Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

FOX RIVER (ILL)
Effect of Turbidity on Algal Growth,
W75-04306 5C

FROUDE NUMBER
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

FUEL CYCLE
Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

FUELS
Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Doses from Operating Facilities,
W75-04166 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

FURROW IRRIGATION
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

FURROWS
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

FWPCA AMENDMENTS OF 1972
Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5G

GAGING STATIONS
Objective Double-Mass Analysis,
W75-04307 2B

GAMMA RADIATION
Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

GAMMA RAYS
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

GAMMA TRANSMISSION METHOD
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

GAS CHROMATOGRAPHY
Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

GASES
Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

GENEVA (ALA)
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

GEOCHEMISTRY
The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

GEOGRAPHICAL REGIONS
Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

GEORGIA
Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

Geology and Ground-Water Resources of Gordon, Whitfield, and Murray Counties, Georgia,
W75-03984 2F

GEOTHERMAL STUDIES
Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

GILLIES CREEK (VIRGINIA)
Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

GLACIERS
Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

GOVERNMENTAL INTERRELATIONS
Scattering Fork Drainage District, County of Douglas v. Ogilvie (Suit Challenging Legality of Proposed Consruction of Water Reservoir Project)
W75-04008 6E

GRAIN SORGHUM
A Field Study of the Heat and Drought Tolerance of Grain Sorghum (Sorghum Bicolor (L.) Moench) as an Approach to Genetic Improvement,
W75-04044 2I

GRASSES
The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

GRASSLANDS
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

GRAVITY SEPARATION
Apparatus and Method for Effecting Separations,
W75-03872 5G

GRAVITY WAVES
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

GREAT LAKES
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

Thermal Pollution of the Great Lakes -- A Non-Problem,
W75-04231 5B

Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

GROUND WATER
Application of Analog Techniques to Water Management,
W75-04202 6A

GROUND WATER AVAILABILITY
Application of Analog Techniques to Water Management,
W75-04202 6A

GROUNDWATER
Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

Water-Resources Investigations of the U.S. Geological Survey in the Northern Great Plains Coal Region of Eastern Montana, 1974-75.
W75-03977 7C

Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

Geology and Ground-Water Resources of Gordon, Whitfield, and Murray Counties, Georgia,
W75-03984 2F

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

Degradation in Groundwater and Mobility of Herbicides,
W75-04045 5B

Hydrogeology of the Carefree Ranch Area, Maricopa County, Arizona,
W75-04145 2F

Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

ROUNDWATER MANAGEMENT
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

ROUNDWATER MOVEMENT
Geohydrologic Map of Southern California,
W75-03973 7C

Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

Models of Dispersion in a Granular Medium,
W75-04340 2F

GROUNDWATER POTENTIAL
Hydrogeology of the Carefree Ranch Area, Maricopa County, Arizona,
W75-04145 2F

GROUNDWATER RECHARGE
Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

GROUNDWATER RESOURCES
Identification of a Distributed Parameter System in Hydrology,
W75-04280 2F

GROWTH RATE
Biological Processes Involved in Pollution of Coastal Aquaculture Waters,
W75-04281 5C

GROWTH RATES
Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

GULF OF CALIFORNIA
The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

GUPPIES
The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

HAIL
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

HARBORS
Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

HARMONIC LINEAR WAVES
Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

HAWAII
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

HAZARDOUS SUBSTANCES
Reserve Mining Co. Et. Al. V. United States (Motion for Stay of Injunction).
W75-04296 6E

HAZARDOUS SUBSTANCES (POLLUTION)
United States v. Republic Steel Corporation (Prosecution for Unlawful Discharge of Coal Tar into a River).
W75-03992 5G

HAZARDS
Exposures to Five Target Health Hazards,
W75-04190 5A

Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

HEAT BALANCE
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

HEAT EXCHANGERS
Milti-Stage Flash Evaporator,
W75-03860 3A

HEAT FLOW
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

HEAT LOSS
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

HEAT TOLERANCE (PLANTS)
A Field Study of the Heat and Drought Tolerance of Grain Sorghum (Sorghum Bicolor (L.) Moench) as an Approach to Genetic Improvement,
W75-04044 2I

HEATED SUBMERGED DISCHARGE
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

HEATED WATER
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

Some Results from Experimental Data on Surface Jet Discharge of Heated Water,
W75-04220 5B

A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

HEAVY METALS
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

HECHLER VILLAGE BRANCH (VIRGINIA)
Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

HELE-SHAW MODELS
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

HENRICO COUNTY
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

HENRICO COUNTY (VIRGINIA)
Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

HERBICIDES
The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

Degradation in Groundwater and Mobility of Herbicides,
W75-04045 5B

HEXAVALENT CHROMIUM
New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

HIGH PLAINS (N MEX)
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

HIGH WATER MARK
United States v. 21.54 Acres of Land, Marshall County, West Virginia (Condemnation Case for Flowage Easements Near Dam Site).
W75-03993 6E

HISTORIC FLOODS
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

HISTORY
The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

Irrigation's Impact on Society.
W75-04138 3F

HUMAN ENVIRONMENT
Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

HUMAN POPULATION
Symposium on Population Exposures,
W75-04152 5C

The Historical Development of Concepts of Radiation Dose Commitment,
W75-04153 5C

The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

Consideration of Background in Development of Environmental Standards,
W75-04155 5G

Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

Decay Scheme Data for Radiation Dose Calculations,
W75-04174 5A

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

HUMUS
Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

HUNGARY CREEK (VIRGINIA)
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

HYDRAULIC CONDUCTIVITY
Steady Flows of Water and Salt in Uniform Soil Profiles with Plant Roots,
W75-03956 2I

HYDRAULIC GEOMETRY
A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

HYDRAULIC MODELS
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

HYDRAULIC STRUCTURES
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

HYDRAULICS
Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

HYDRODYNAMICS
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

Classic Canal Theory with Graphs and Tables Volume I,
W75-04269 8B

HYDROELECTRIC PROJECT LICENSING
Water Resources Appraisal for Hydroelectric Licensing, The Clarion River Basin, Pennsylvania
W75-04274 6G

HYDROGEN ION CONCENTRATION
Marine Studies of San Pedro Bay, California. Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973.
W75-04272 5B

HYDROGEOLOGY
Geohydrologic Map of Southern California,
W75-03973 7C

Geology and Ground-Water Resources of Gordon, Whitfield, and Murray Counties, Georgia.
W75-03984 2F

Geohydrology of Nemaha County, Northeastern Kansas.
W75-03986 2F

Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas,
W75-03987 2F

Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report.
W75-04140 4B

Hydrogeology of the Carefree Ranch Area Maricopa County, Arizona,
W75-04145 2F

A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A.,
W75-04258 6B

HYDROGRAPH ANALYSIS
The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

HYDROGRAPHS
The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

HYDROLOGIC DATA
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

HYDROLOGIC MODELS
The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

HYDROLOGIC SYSTEMS
A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

Identification of a Distributed Parameter System in Hydrology,
W75-04280 2F

HYDROLOGY
The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

HYDROLYSIS
Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

HYGIENIC STANDARDS
Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

HYGROSCOPIC WATER
Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

ICE
Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

IDAHO
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

ILLINOIS
Scattering Fork Drainage District, County of Douglas v. Ogilvie (Suit Challenging Legality of Proposed Consruction of Water Reservoir Project).
W75-04008 6E

A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A.,
W75-04258 6B

Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

Effect of Turbidity on Algal Growth,
W75-04306 5C

ILLINOIS RIVER (ILL)
Effect of Turbidity on Algal Growth,
W75-04306 5C

IMPACT EVALUATION DESIGN
Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

IMPACT STUDIES
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

IMPAIRED WATER QUALITY
Cutback in Costruction Funding Stirs Doubt on Water Quality Goals.
W75-03999 5G

IN-SITU MEASUREMENTS
Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

INCINERATION
Containing the Flow of Sewage Sludge.
W75-04336 5D

INDIA
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

INDIA (JODHPUR.)
Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

INDIA (RAJASTHAN CANAL PROJECT.)
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

INDIANA
Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

Mixing in Anaerobic Digestion,
W75-04120 5D

INDUSTRIAL WASTES
Improved Process for Treating Water and Wastewater,
W75-03857 5D

Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

Effects of Phthalate Esters on Shrimp,
W75-04285 5C

Quality Control in River Management of the Bristol Avon,
W75-04324 5G

INDUSTRIAL WATER
Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

INDUSTRIES
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

INFILTRATION
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

Steady Flows of Water and Salt in Uniform Soil Profiles with Plant Roots,
W75-03956 2I

INFORMATION EXCHANGE
Protecting Creeksheds, Analysis and Action,
W75-03948 4D

Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

INFORMATION RETRIEVAL
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

INFRARED ANALYZERS
Apparatus for Determining Organic Carbon Content of Polluted Liquids,
W75-03861 5A

INFRARED RADIATION
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

INJUNCTIVE RELIEF
United States V. Ira. S. Bushey and Sons, Inc. (Discharge of Refuse into Navigable Waters--Oil Spills),
W75-04300 6E

INPUT-OUTPUT ANALYSIS
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

INSTRUMENTATION
Guide to Water Cleanup Materials and Methods,
W75-03880 5D

Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

INSURANCE
Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

INTERNAL WATERS (JURISDICTION)
Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

INTERNATIONAL LAW
The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

Exploitation of Deep Ocean Minerals: Regulatory Mechanisms and United States Policy,
W75-04007 6E

INTERNATIONAL WATERS
Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

INTERSTATE COMMISSIONS
The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

INTERTIDAL AREAS
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

INVERSE CONDEMNATION
United States v. 21.54 Acres of Land, Marshall County, West Virginia (Condemnation Case for Flowage Easements Near Dam Site).
W75-03993 6E

INVERSION
Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

INVESTMENT
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

ION TRANSPORT
The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

IOWA
Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

IRAN
Pricing Irrigation Water in Iran,
W75-03936 3F

IRAQ
Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report.
W75-04140 4B

IRON
Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

IRRADATION
Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

IRREVERSIBLE THERMODYNAMICS
Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

IRRIGATED AGRICULTURE
Irrigation's Impact on Society.
W75-04138 3F

IRRIGATION
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

IRRIGATION DISTRICTS
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

IRRIGATION DITCHES
Irrigation Ditch Liner and Method for Making Same,
W75-03863 4A

IRRIGATION DITCHES *SALINITY
Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

IRRIGATION EFFECTS
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L. Grown in Greenhouse,
W75-04146 2I

IRRIGATION EFFICIENCY
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

IRRIGATION PRACTICES
Trickle Irrigation System,
W75-03877 3F

IRRIGATION PROGRAMS
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

IRRIGATION (SUPPLEMENTAL)
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

IRRIGATION SYSTEMS
Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

Trickle Irrigation System,
W75-03877 3F

Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

Irrigation's Impact on Society.
W75-04138 3F

IRRIGATION WATER
Pricing Irrigation Water in Iran,
W75-03936 3F

The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

ISOTHERMS
Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2A

ISOTOPE STUDIES
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

ISOTOPIC FRACTIONATION
Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

ISRAEL (ARAVA VALLEY)
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

JAPAN
Pollution Control in Japan-A Survey.
W75-04017 5G

JETS
Some Characteristics of Counterjet Flow,
W75-04217 5B

Some Results from Experimental Data on Surface Jet Discharge of Heated Water,
W75-04220 5B

JOJOBA
Agronomic Survey of Jojoba in California,
W75-03960 3F

JORDAN RIVER (UTAH)
Flood Plain Information: Jordan River Complex II, Midvale-Draper, Utah.
W75-04205 4A

JUDICIAL DECISIONS
United States v. Republic Steel Corporation (Prosecution for Unlawful Discharge of Coal Tar into a River).
W75-03992 5G

Wineman v. Shannon Brothers Lumber Co., Inc. (Action Between Coterminous Riparian Landowners to Determine Accretion Apportionment).
W75-03994 6E

Kelso v. C.B.K. Agronomics, Inc. (Action by Upstream Landowners for Damages Due to Construction of Concrete Structure Across River by Downstream Owners).
W75-03997 6E

Lemmons v. United States (Action for Damages for Revocation of Dredge Permit).
W75-04003 6E

United States v. Holland (Action to Enjoin Unlawful Filling Operations).
W75-04005 6E

Scattering Fork Drainage District, County of Douglas v. Ogilvie (Suit Challenging Legality of Proposed Consruction of Water Reservoir Project).
W75-04008 6E

U.S. V. Rohm and Haas Co. (Continuous Discharge Pollution Action Under Refuse Act).
W75-04290 6E

Biderman V. Morton (Seeking Injunction to Restrain Construction on Fire Island Pending Environmental Impact Statement).
W75-04291 6E

U.S. V. Lebeouf Bros. Towing Co., Inc. (Government Action to Recover Penalty Imposed by Coast Guard for Gasoline Spill in Ocean).
W75-04292 6E

Minnesota Public Interest Research Group V. Butz (Action for Injunctions Against Logging in Boundary Waters Canoe Area).
W75-04293 6E

Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

Reserve Mining Co. Et. Al. V. United States (Motion for Stay of Injunction).
W75-04296 6E

Ford Motor Co. V. Dallas Power and Light Co. (Action for Property Damage Resulting from Release of Waters from Dam During Time of Flooding).
W75-04297 6E

United States V. Boyd (Discharge of Oil into Navigable Waters).
W75-04298 6E

Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved).
W75-04299 6E

Courts Back State's Power to Halt Acid Mine Drainage,
W75-04301 5G

People (N.Y.) V. Cudak (Prosecution for Violating Moratorium on Alteration of Tidal Wetlands),
W75-04304 6E

JURISDICTION
The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

Marine Conservation Commission (As Amended).
W75-04004 6E

Scattering Fork Drainage District, County of Douglas v. Ogilvie (Suit Challenging Legality of Proposed Consruction of Water Reservoir Project).
W75-04008 6E

KANSAS
Geohydrology of Nemaha County, Northeastern Kansas,
W75-03986 2F

Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas,
W75-03987 2F

KENTUCKY
Stochastic Simulation of Daily Rainfall,
W75-04036 2B

KENTUCKY RIVER (KENT)
Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

KINETICS
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Population Exposure from High-Energy Accelerators,
W75-04183 5C

KRYPTON
Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

LABORATORY TESTS
Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

Effect of Turbidity on Algal Growth,
W75-04306 5C

Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

LAKE ERIE
Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

LAKE HURON
Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

LAKE MEAD (NEV)
Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

LAKE MICHIGAN
Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

LAKE ONTARIO
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

LAKE PONTCHARTRAIN (LA)
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

LAKE SEDIMENTS
Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

LAKE SHASTINA (CALIF)
Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

LAKE ST. LOUIS (CANADA)
Preliminary Study of Phytoplankton of Lake St. Louis, A Broadening of the St. Lawrence River near Montreal, Quebec, (In French),
W75-04335 5C

LAKE SUPERIOR
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

LAKES
Lakes of Oregon: Volume 2. Benton, Lincoln, and Polk Counties,
W75-03968 2H

Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

LAND DEVELOPMENT
United States v. Holland (Action to Enjoin Unlawful Filling Operations).
W75-04005 6E

LAND SPREADING
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

LAND SUBSIDENCE
Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

LAND USE
Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

LANDFILLS
Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

LAS VEGAS VALLEY (NEVADA)
Application of Analog Techniques to Water Management,
W75-04202 6A

LASERS
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

LATERAL DISPERSION
Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

LAW ENFORCEMENT
Law, (Literature Review),
W75-04020 5G

People (N.Y.) V. Cudak (Prosecution for Violating Moratorium on Alteration of Tidal Wetlands),
W75-04304 6E

LAW OF THE SEA
The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

LAWNDALE FARMS BRANCH (VIRGINIA)
Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

LEACHATE
Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

LEACHING
Steady Flows of Water and Salt in Uniform Soil Profiles with Plant Roots,
W75-03956 2I

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

LEAD
Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

LEAD RADIOISOTOPES
The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

LEASES
Lemmons v. United States (Action for Damages for Revocation of Dredge Permit).
W75-04003 6E

LEAST SQUARES METHOD
The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

LEGAL ASPECTS
Guide to Water Cleanup Materials and Methods,
W75-03880 5D

U.S. V. Rohm and Haas Co. (Continuous Discharge Pollution Action Under Refuse Act),
W75-04290 6E

Opinion of the Justices to the House of Representatives (Relating to the Constitutionality of a Bill Creating a Public 'On-Foot Free Right-of-Passage' Along Shore of Coastline).
W75-04294 6E

Reserve Mining Co. Et. Al. V. United States (Motion for Stay of Injunction).
W75-04296 6E

Courts Back State's Power to Halt Acid Mine Drainage,
W75-04301 5G

LEGISLATION
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

Water Pollution and Control,
W75-03915

The Philosophy of S.2770,
W75-04001

Pollution Control in Japan-A Survey.
W75-04017

Progress in Satisfying Environmental Requirements,
W75-04018 5G

Biderman V. Morton (Seeking Injunction to Restrain Construction on Fire Island Pending Environmental Impact Statement).
W75-04291 6E

LETHAL LIMIT
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

Effects of Phthalate Esters on Shrimp,
W75-04285 5C

Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

LETTUCE
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

LEVEES
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

LIABILITY (LEGAL ASPECTS)
Kelso v. C.B.K. Agronomics, Inc. (Action by Upstream Landowners for Damages Due to Construction of Concrete Structure Across River by Downstream Owners).
W75-03997 6E

Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

Ford Motor Co. V. Dallas Power and Light Co. (Action for Property Damage Resulting from Release of Waters from Dam During Time of Flooding).
W75-04297 6E

LIBRARIES
Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

LIGNINS
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components or Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki),
W75-03896 5D

Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

LIMNOLOGY
Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

LINEAR PROGRAMMING
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

LINEAR TRANSPORT THEORY
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

LINEAR WAVE PROPAGATION
Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

LININGS
Irrigation Ditch Liner and Method for Making Same,
W75-03863 4A

LIQUID-GAS EXCHANGE
Waste Water Treatment System,
W75-03879 5D

LIQUID WASTES
As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

LITTLE DESCHUTES RIVER (ORE)
Open Channel Flow Evaporation Study,
W75-04273 2D

LOCAL GOVERNMENTS
Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

LOCKS
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

LOESS DISTRIBUTION
Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

LONG-TERM PLANNING
Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

LOS ANGELES HARBOR (CALIF)
Marine Studies of San Pedro Bay, California, Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973.
W75-04272 5B

LOW-FLOW AUGMENTATION
Rejuvenation of the Buffalo River,
W75-04248 5C

LUBRICANTS
Disposal/Recycle Management System Development for Air Force Waste Petroleum Oils and Lubricants.
W75-04268 5E

LULWORTHIA-MEDUSA
The Effect of Salinity on a Marine and a Freshwater Ascomycete,
W75-04267 5C

LUMBERING
The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water,
W75-03913 5C

LYSIMETERS
Flue-Cured Tobacco Yield and Oxygen Content of Soil in Lysimeters Flooded for Various Periods,
W75-04111 3F

Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

Lysimeter Installations in Sandstone at Styrrup, Nottinghamshire,
W75-04332 2G

MACROPHYTES
Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

MAGNESIUM
Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

MAINE. LUMBERING
United States v. Kennebec Log Driving Co. Et Al. (Suit by Government to Enjoin Log-Driving Activities on Upper Kennebec River).
W75-03996 6E

MANAGEMENT
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

Operational Aspects of Urban Sewage Works,
W75-04114 5D

Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

Planning for Water Quality in the Virgin River System in the State of Utah: A Program for

MANAGEMENT

Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

Disposal/Recycle Management System Development for Air Force Waste Petroleum Oils and Lubricants.
W75-04268 5E

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

MANAGEMENT OPTIONS

The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

MAPPING

Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

MAPS

The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

Geohydrologic Map of Southern California,
W75-03973 7C

The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2A

MARINE DISPOSAL SYSTEMS

Investigation for the Marine Disposal of Effluents,
W75-04289 5B

MARKOV PROCESSES

Stochastic Simulation of Daily Rainfall,
W75-04036 2B

The Approximate Probability Density Function of Range and Adjusted Range,
W75-04246 6A

MASS CURVES

Objective Double-Mass Analysis,
W75-04307 2B

MASS SPECTROMETRY

Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

MATHEMATICAL MODELS

Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

Applications of Systems Analysis to International Water Resources Projects,
W75-04232 6A

Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

Models of Dispersion in a Granular Medium,
W75-04340 2F

MATHEMATICAL STUDIES

Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

MEASUREMENT

Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Vertical Distribution of the Concentration of Radon Decay Products in the 0-300-m Layer,
W75-04106 5B

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

Exposures to Five Target Health Hazards,
W75-04190 5A

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

MEASURING INSTRUMENTS

Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

MELT WATER

Horizontal Water Migration of Strontium-90,
W75-04066 5B

MEMBRANE PROCESSES
Filtration Engineering's Symposium on Membrane Separation.
W75-04122 5D

Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

MEMBRANE SEPARATION
Filtration Engineering's Symposium on Membrane Separation.
W75-04122 5D

MERCURY
The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis,
W75-03908 5A

Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

METEOROLOGY
Nuclear Meteorology,
W75-04054 5B

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Vertical Distribution of the Concentration of Radon Decay Products in the 0-300-m Layer,
W75-04106 5B

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

Project Skywater.
W75-04265 3B

METHODOLOGY
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

METHOXYCHLOR
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

MEXICO
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

MICHIGAN
Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

MICRO-CONTROLLERS MELMIC 100
Application of Micro-Controllers Melmic 100 to Water Treatment Facilities, (In Japanese),
W75-04338 5D

MICROBIAL ACTIVITY
Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

MICROBIOLOGY
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

Microbiology of Waste Treatment, (Literature Review),
W75-04117 5D

MICROWAVE REMOTE SENSING DEVICES
Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

MIDVALE (UTAH)
Flood Plain Information: Jordan River Complex II, Midvale-Draper, Utah.
W75-04205 4A

MINE WASTES
Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

MINERAL INDUSTRY
Lemmons v. United States (Action for Damages for Revocation of Dredge Permit).
W75-04003 6E

MINERALS
Exploitation of Deep Ocean Minerals: Regulatory Mechanisms and United States Policy,
W75-04007 6E

MINING
The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

MINNESOTA
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

Reserve Mining Co. Et. Al. V. United States (Motion for Stay of Injunction).
W75-04296 6E

MISSISSIPPI
Wineman v. Shannon Brothers Lumber Co., Inc. (Action Between Coterminous Riparian Landowners to Determine Accretion Apportionment).
W75-03994 6E

Marine Conservation Commission (As Amended).
W75-04004 6E

Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

MISSISSIPPI RIVER
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

MISSOURI
Kelso v. C.B.K. Agronomics, Inc. (Action by Upstream Landowners for Damages Due to Construction of Concrete Structure Across River by Downstream Owners).
W75-03997 6E

Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

MITCHELL GRASS
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

MIXING
Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

Mixing in Anaerobic Digestion,
W75-04120 5D

Some Characteristics of Counterjet Flow,
W75-04217 5B

MODEL STUDIES
Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

Stochastic Simulation of Daily Rainfall,
W75-04036 2B

Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A.,
W75-04258 6B

Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

MODEL TOPOLOGY
Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

MODEL VERIFICATION DATA
Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

MOISTURE
Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

MOISTURE AVAILABILITY
Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

MOISTURE CONTENT
The Three Stages of Drying A Field Soil,
W75-03965 2D

A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

MOISTURE DEPLETION
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

MOISTURE STRESS
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

MOJAVE RIVER (CALIF)
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

MONITORING
An Alarming System for High-Solids White Water,
W75-03901 5C

An Energy Partition Evaporation Recorder,
W75-03937 2D

Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

IONTANA

Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

Shallow Ground Water in Selected Areas in the Fort Union Coal Region.
W75-03974 5B

Water-Resources Investigations of the U.S. Geological Survey in the Northern Great Plains Coal Region of Eastern Montana, 1974-75.
W75-03977 7C

ONTEREY BAY (CALIF) DRIFT CARDS

A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

ONTGOMERY COUNTY (KANS)

Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas,
W75-03987 2F

MORPHOEDAPHIC INDEX

The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

MOSQUITO CONTROL

Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

MOSQUITOES

Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

MOUNTAINS

The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

MULCH

Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

Use of Black Polyethylene Mulch to Reduce Flooding Effects on Tomato Yields,
W75-04030 3F

Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

MULCHES

Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

MULTI-OBJECTIVE DESIGN

Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

MULTICHANNEL ANALYZER

Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

MULTIPLE-PURPOSE PROJECTS

Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

MUNICIPAL WASTES

Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

MUNICIPAL WATER

Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

MUNSON CREEK (MISS)

Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

MYRIOPHYLLUM SPICATUM

Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

NATIONAL ENVIRONMENTAL POLICY ACT

Guidelines for Preparation of Environmental Statements for Reviewing and Commenting on Environmental Statements by Other Federal Agencies.
W75-04010 6G

Progress in Satisfying Environmental Requirements,
W75-04018 5G

Minnesota Public Interest Research Group V. Butz (Action for Injunctions Against Logging in Boundary Waters Canoe Area).
W75-04293 6E

NATURAL GAS

Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

NAVIGABLE WATERS

United States v. Kennebec Log Driving Co. Et Al. (Suit by Government to Enjoin Log-Driving Activities on Upper Kennebec River).
W75-03996 6E

Cutback in Costruction Funding Stirs Doubt on Water Quality Goals.
W75-03999 5G

Boats and Riparian Rights,
W75-04006 6E

United States V. Boyd (Discharge of Oil into Navigable Waters).
W75-04298 6E

United States V. Ira. S. Bushey and Sons, Inc. (Discharge of Refuse into Navigable Waters--Oil Spills),
W75-04300 6E

Non-Transportation Oil Spill Regulations.
W75-04303 5G

NAVIGATION OBSTRUCTIONS

United States v. Kennebec Log Driving Co. Et Al. (Suit by Government to Enjoin Log-Driving Activities on Upper Kennebec River).
W75-03996 6E

NEBRASKA

Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

NEMAHA COUNTY (KANS)

Geohydrology of Nemaha County, Northeastern Kansas,
W75-03986 2F

NEUTRALIZATION
Improved Process for Treating Water and Wastewater,
W75-03857 5D

NEUTRON ABSORPTION
Population Exposure from High-Energy Accelerators,
W75-04183 5C

NEUTRON ACTIVATION ANALYSIS
The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis,
W75-03908 5A

NEUTRON METERS
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

NEUTRON PROBES
Lysimeter Installations in Sandstone at Styrup, Nottinghamshire,
W75-04332 2G

NEVADA
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

Application of Analog Techniques to Water Management,
W75-04202 6A

Project Skywater,
W75-04265 3B

Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

NEW MEXICO
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

NEW YORK
Phosphorus Detergent Ban-How Effective,
W75-04109 5D

Rejuvenation of the Buffalo River,
W75-04248 5C

Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved).
W75-04299 6E

People (N.Y.) V. Cudak (Prosecution for Violating Moratorium on Alteration of Tidal Wetlands),
W75-04304 6E

NEW YORK BIGHT
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

NIGERIA
Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

NITRATES
Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

NITRIFICATION
Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

NITROGEN
Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

NITROGEN FIXATION
Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

NITROGEN FIXING BACTERIA
Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

NITROSOMONA
Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

NOBLE GASES
Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

NONLINEAR RAINFALL RESPONSE
The Nonlinear Rainfall Response of Watersheds With Time Dependent Storage and Conveyance Properties,
W75-04240 2A

NORTH CAROLINA
Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

NORTH DAKOTA
Shallow Ground Water in Selected Areas in the Fort Union Coal Region,
W75-03974 5B

NORTH RUN (VIRGINIA)
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

NORTH SEA (NETHERLANDS)
Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

NORTH TYGER RIVER (SC)
Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

NUCLEAR ENERGY
Nuclear Meteorology,
W75-04054 5B

Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

Calculation of Fractionation Effects in Atmospheric Nuclear Bursts,
W75-04068 5B

The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

Population Exposure from High-Energy Accelerators,
W75-04183 5C

NUCLEAR EXPLOSIONS
Nuclear Meteorology,
W75-04054 5B

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

Accumulation of Strontium-90 in Soils,
W75-04062 5B

Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

Calculation of Fractionation Effects in Atmospheric Nuclear Bursts,
W75-04068 5B

The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

UCLEAR FUELS
Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

UCLEAR MOISTURE METERS
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

UCLEAR PHYSICS
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

UCLEAR POWERPLANTS
Symposium on Population Exposures,
W75-04152 5C

The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Doses from Operating Facilities,
W75-04166 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

Thermal Pollution Aspects in Europe,
W75-04226 5B

Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

NUCLEAR REACTORS
Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

NUCLEATION
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

NUDIBRANCH
Enhancement of Recreational Uses of Estuarine Waters Through Study of Potential Control Methods for Stinging Sea Nettles,
W75-04037 5C

NUISANCE (LEGAL ASPECTS)
Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved),
W75-04299 6E

NUMERICAL ANALYSIS
Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

Open Channel Flow Evaporation Study,
W75-04273 2D

Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

NUTRIENT REMOVAL
Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

NUTRIENT REQUIREMENTS
Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

NUTRIENTS
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

OBSERVATION WELLS
The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

OCEAN CIRCULATION
A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

OCEAN CURRENTS
A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

OCEAN FLOOR
Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

OCEANOGRAPHY
A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

OCEANS
Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

An Analysis of Oil Outflows Due to Tanker Accidents, 1971-1972.
W75-04260 5B

OHIO
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

United States v. Republic Steel Corporation (Prosecution for Unlawful Discharge of Coal Tar into a River).
W75-03992 5G

Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

OHIO RIVER
Lemmons v. United States (Action for Damages for Revocation of Dredge Permit).
W75-04003 6E

OIL
Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

OIL POLLUTION
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

Skimming Apparatus,
W75-03870 5G

Apparatus and Method for Effecting Separations,
W75-03872 5G

On Pollution Control.
W75-04024 5G

An Analysis of Oil Outflows Due to Tanker Accidents, 1971-1972.
W75-04260 5B

Disposal/Recycle Management System Development for Air Force Waste Petroleum Oils and Lubricants.
W75-04268 5E

OIL SLICKS
Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

OIL SPILLS
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

Skimming Apparatus,
W75-03870 5G

Apparatus and Method for Effecting Separations,
W75-03872 5G

Spill Prevention and Control Aspects of Paper Industry Waste Water Management Programs,
W75-03912 5G

On Pollution Control.
W75-04024 5G

Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

An Analysis of Oil Outflows Due to Tanker Accidents, 1971-1972.
W75-04260 5B

U.S. V. Lebeouf Bros. Towing Co., Inc. (Government Action to Recover Penalty Imposed by Coast Guard for Gasoline Spill in Ocean).
W75-04292 6E

United States V. Boyd (Discharge of Oil into Navigable Waters).
W75-04298 6E

United States V. Ira. S. Bushey and Sons, Inc. (Discharge of Refuse into Navigable Waters-Oil Spills).
W75-04300 6E

Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

OIL WASTES
Disposal/Recycle Management System Development for Air Force Waste Petroleum Oils and Lubricants
W75-04268 5E

OILY WASTES
Non-Transportation Oil Spill Regulations.
W75-04303 5G

ON-SITE DATA COLLECTIONS
Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

ON-SITE INVESTIGATIONS
A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

Effect of Turbidity on Algal Growth,
W75-04306 5C

ON-SITE TESTS
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

OPEN CHANNEL FLOW
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

OPERATING RULES
Evaluating Multireservoir Operating Rules,
W75-03932 4A

OPERATIONS
Operational Aspects of Urban Sewage Works,
W75-04114 5D

OPHIOBOLUS-GRAMINIS
The Effect of Salinity on a Marine and a Freshwater Ascomycete,
W75-04267 5C

OPTIMIZATION
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

OPTIMUM DEVELOPMENT PLANS
Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

OREGON
Lakes of Oregon. Volume 2. Benton, Lincoln, and Polk Counties,
W75-03968 2H

Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

Open Channel Flow Evaporation Study,
W75-04273 2D

Senate Subcommittee Hears Complaints on EPA Water Programs.
W75-04302 5C

Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2C

ORGANIC CARBON
Apparatus for Determining Organic Carbon Content of Polluted Liquids,
W75-03861 5A

ORGANIC COMPOUNDS
Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung),
W75-03889 5F

Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

ORGANIC LOADING
Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

ORGANIC MATTER
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

ORGANOLEPTIC PROPERTIES
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

ORGANOPHOSPHORIS PESTICIDES
Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

OSTEOPATHIES
Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

OXIDATION
Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

Hydrogen Peroxide Treatment of Effluent Resulting from Wet Air Oxidation of Shipboard Wastes,
W75-04261 5D

OXYGEN ACTIVATED SLUDGE
Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

OXYGEN TRANSFERS
Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

OXYGENATION
Oxygenation of Waste Water,
W75-03858 5D

Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

OYSTERS
Marine Conservation Commission (As Amended),
W75-04004 6E

OZONE
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung),
W75-03889 5D

Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

PALOUSE REGION (IDA)
Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

PASTURE MANAGEMENT
The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

PATENTS
Improved Process for Treating Water and Wastewater,
W75-03857 5D

Oxygenation of Waste Water,
W75-03858 5D

Process and Device for Purification of Effluents Containing Phenols and Ammonium Salts,
W75-03859 5D

Milti-Stage Flash Evaporator,
W75-03860 3A

Apparatus for Determining Organic Carbon Content of Polluted Liquids,
W75-03861 5A

Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

Irrigation Ditch Liner and Method for Making Same,
W75-03863 4A

Self-Cleaning Filter for Hydrological Regeneration,
W75-03864 5D

Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

Apparatus for Separating Solids from Liquids,
W75-03866 5D

Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

Method and Apparatus for Breaking Waves,
W75-03868 8B

Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

Skimming Apparatus,
W75-03870 5G

Device for Producing and Protecting Deposits of Sedimentary Material on the Floor of Bodies of Water,
W75-03871 8B

Apparatus and Method for Effecting Separations,
W75-03872 5G

Dam Building System,
W75-03873 8A

Method and Apparatus for Use in Water Purification by Reverse Osmosis,
W75-03874 5D

Liquid Aerating Apparatus,
W75-03875 5D

Apparatus for Solar Distillation,
W75-03876 3A

Trickle Irrigation System,
W75-03877 3F

Hot Ball Desalination Process,
W75-03878 3A

Waste Water Treatment System,
W75-03879 5D

PATH OF POLLUTANTS
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

Degradation in Groundwater and Mobility of Herbicides,
W75-04045 5B

The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

Horizontal Water Migration of Strontium-90,
W75-04066 5B

Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

An Analysis of Oil Outflows Due to Tanker Accidents, 1971-1972.
W75-04260 5B

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

PATORAN
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

PEA RIVER
Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

PEAK DISCHARGE
Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

PEDOLOGICAL CHANGES
Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

PENALTIES (LEGAL)
U.S. V. Lebeouf Bros. Towing Co., Inc. (Government Action to Recover Penalty Imposed by Coast Guard for Gasoline Spill in Ocean).
W75-04292 6E

PENNSYLVANIA
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

Water Resources Appraisal for Hydroelectric Licensing, The Clarion River Basin, Pennsylvania.
W75-04274 6G

Courts Back State's Power to Halt Acid Mine Drainage,
W75-04301 5G

The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

PERCOLATION
Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

Influence of Tobacco Plant Canopy on Percolation,
W75-03931 3F

Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

PERSONNEL EXPOSURE
Population Exposure from High-Energy Accelerators,
W75-04183 5C

PERU
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

PESTICIDE RESIDUES
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

PESTICIDES
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

PHENOLS
Process and Device for Purification of Effluents Containing Phenols and Ammonium Salts,
W75-03859 5D

A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

PHILADELPHIA (PENN)
Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

PHOSPHATES
Rejuvenation of the Buffalo River,
W75-04248 5C

Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

PHOSPHOROUS
Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

PHOSPHORUS
Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

Phosphorus Detergent Ban-How Effective,
W75-04109 5D

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

PHOSPHORUS COMPOUNDS
Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

PHOTOGRAMMETRY
Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

PHOTOSYNTHESIS
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

PHTHALATE ESTERS
Effects of Phthalate Esters on Shrimp,
W75-04285 5C

PHYTOPLANKTON
The Eutrophication and Pollution of Lake Paijanne, Central Finland,
W75-04264 5C

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

Preliminary Study of Phytoplankton of Lake St. Louis, A Broadening of the St. Lawrence River near Montreal, Quebec, (In French),
W75-04335 5C

PIPELINES
Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

Design of a Conduit System with Diverging Branches,
W75-03930 8A

PLANNING
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

More Responsive Water Planning is Possible,
W75-04203 6A

Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

Conservation and Flooding Easements: A Case Study,
W75-04211 6E

Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

PLANT DISEASES
More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

PLANT GROWTH
Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

LANT MORPHOLOGY
Agronomic Survey of Jojoba in California,
W75-03960 3F

LATFORM DESIGN
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

LUTONIUM
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

NEUMATIC BARRIERS
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

OECILIA RETICULATUS
The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

OINT BEACH PLANT
Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

OLAND
Thermal Pollution Problems in Poland,
W75-04218 5C

OLITICAL ASPECTS
nstitutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
V75-03851 5G

OLLUTANT IDENTIFICATION
Apparatus for Determining Organic Carbon Content of Polluted Liquids,
V75-03861 5A

Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis,
W75-03908 5A

Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5A

Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

Radiochemical Method of Determining Low Strontium-90 Concentration Levels in Environmental Samples,
W75-04102 5A

An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

POLLUTANTS
Pollution Potential of Aquatic Sediments,
W75-04150 5B

Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

POLLUTION
Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

POLLUTION ABATEMENT
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

Skimming Apparatus,
W75-03870 5G

How to Reduce BOD Levels From Size-Press Starches,
W75-03906 5G

Cutback in Costruction Funding Stirs Doubt on Water Quality Goals.
W75-03999 5G

Rejuvenation of the Buffalo River,
W75-04248 5C

Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

Reserve Mining Co. Et. Al. V. United States (Motion for Stay of Injunction).
W75-04296 6E

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

POLONIUM
Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

PONDS
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

POPULATION
Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

POPULATION EXPOSURE
Symposium on Population Exposures,
W75-04152 5C

The Historical Development of Concepts of Radiation Dose Commitment,
W75-04153 5C

The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

POROSITY

The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

POROUS MEDIA

Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

Models of Dispersion in a Granular Medium,
W75-04340 2F

POTABLE WATER

Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report,
W75-04140 4B

Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

POWDER RIVER BASIN (MONT)

Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

POWERPLANTS

Thermal Pollution Problems in Poland,
W75-04218 5C

Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

Cooling Pond Temperature Prediction,
W75-04222 5B

Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

Water Resources Appraisal for Hydroelectric Licensing, The Clarion River Basin, Pennsylvania,
W75-04274 6G

PRECIPITATION

Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

PRECIPITATION (ATMOSPHERIC)

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

Objective Double-Mass Analysis,
W75-04307 2B

Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

PRESSURE-DRIVEN MEMBRANE PROCESSES

Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

PRICING

Pricing Irrigation Water in Iran,
W75-03936 3F

PRIMARY PRODUCTIVITY

Biological Processes Involved in Pollution of Coastal Aquaculture Waters,
W75-04281 5C

PROBABILITY

Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

The Approximate Probability Density Function of Range and Adjusted Range,
W75-04246 6A

PRODUCTION

The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

PROJECT POST-EVALUATION

The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

PROJECTS

Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

PSYCHOLOGICAL ASPECTS

Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

PUBLIC ACCESS

Opinion of the Justices to the House of Representatives (Relating to the Constitutionality of a Bill Creating a Public 'On-Foot Free Right-of-Passage' Along Shore of Coastline),
W75-04294 6E

PUBLIC HEALTH

Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

Symposium on Population Exposures,
W75-04152 5C

The Historical Development of Concepts of Radiation Dose Commitment,
W75-04153 5C

The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

As Low as Practicable. A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5E

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Dose from Operating Facilities,
W75-04166 5I

Exposures to Five Target Health Hazards,
W75-04190 5A

Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5C

Control of Water Pollution: Miscellaneous Provisions,
W75-04323 5

Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

PUBLIC LANDS
Minnesota Public Interest Research Group V. Butz (Action for Injunctions Against Logging in Boundary Waters Canoe Area).
W75-04293 6E

PUBLIC PARTICIPATION
More Responsive Water Planning is Possible,
W75-04203 6A

PUBLIC RIGHTS
Boats and Riparian Rights,
W75-04006 6E

PUERTO RICO
Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

PULP AND PAPER INDUSTRY
An Example of Treatment of Effluents From Papermaking With a View Toward Recycling (Un exemple de traitement des effluents de papeterie en vue du recyclage),
W75-03887 5D

Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

Spill Prevention and Control Aspects of Paper Industry Waste Water Management Programs,
W75-03912 5G

PULP WASTES
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia tevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

Microflotation, New-Old Water Purification Technique (Mikroflotation, nygammal vattenreningsteknik),
W75-03888 5D

Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung),
W75-03889 5D

Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

Possibilities for Purifying Recycled or Waste Waters from Paper Mills, Taking Physical-Chemical Processes into Account (Les possibilites d'epuration des eaux recyclees ou residuaires des papeteries, compte-tenu des procedes chimico-physiques),
W75-03893 5D

Biological Purification of Effluents from Bleached Kraft Pulp: The Case of La Cellulose Des Ardennes (Epuration biologique d'effluents de pate Kraft blanchie: Le cas de la Cellulose des Ardennes),
W75-03895 5D

On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components or Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki),
W75-03896 5D

Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

Treatment of Residual Sludges: Generalities and Applications in the Paper Industry (Traitement des boues residuaires: Generalites et applications a l'industrie du papier),
W75-03898 5D

An Alarming System for High-Solids White Water,
W75-03901 5G

Improved Clarification of Book Mill Effluent,
W75-03902 5D

Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

Effectiveness of the Pre-Aerator (Effektivnost' raboty pre-aeratora),
W75-03905 5D

How to Reduce BOD Levels From Size-Press Starches,
W75-03906 5G

Corrugated Ink and Starch Wastes Meet EPA Standards at St. Regis.
W75-03907 5D

Static Mixing Concept for Aerators Wins Acceptance,
W75-03914 5D

Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

PUMPING
Design of a Conduit System with Diverging Branches,
W75-03930 8A

QUALITY CONTROL
Quality Control in River Management of the Bristol Avon,
W75-04324 5G

RADAR
Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

RADIATION
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

RADIATIVE TRANSFER THEORY
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

RADIOACTIVITY
Nuclear Meteorology,
W75-04054 5B

Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

Distribution and Migration of Strontium-90 in Soils,
W75-04065 5B

The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

RADIOACTIVITY

State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

Symposium on Population Exposures,
W75-04152 5C

The Historical Development of Concepts of Radiation Dose Commitment,
W75-04153 5C

The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

Consideration of Background in Development of Environmental Standards,
W75-04155 5G

Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Doses from Operating Facilities,
W75-04166 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

Decay Scheme Data for Radiation Dose Calculations,
W75-04174 5A

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

Population Exposure from High-Energy Accelerators,
W75-04183 5C

Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

RADIOACTIVITY EFFECTS

Calculation of Fractionation Effects in Atmospheric Nuclear Bursts,
W75-04068 5B

Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

RADIOCHEMICAL ANALYSIS

Radiochemical Method of Determining Low Strontium-90 Concentration Levels in Environmental Samples,
W75-04102 5A

RADIOISOTOPES

Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

Accumulation of Strontium-90 in Soils,
W75-04062 5B

Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

Horizontal Water Migration of Strontium-90,
W75-04066 5B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

RADIUM

Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

RADIUM RADIOISOTOPES

The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

RADON

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

Vertical Distribution of the Concentration of Radon Decay Products in the 0-300-m Layer,
W75-04106 5B

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

RAIN

Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

RAIN GAGES

The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

RAINDROPS

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

RAINFALL

Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

RAINFALL DISPOSITION

Stochastic Simulation of Daily Rainfall,
W75-04036 2B

RAINFALL-ELEVATION RELATIONSHIPS

The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

RAINFALL-RUNOFF RELATIONSHIPS

The Nonlinear Rainfall Response of Watersheds With Time Dependent Storage and Conveyance Properties,
W75-04240 2A

A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

RANGE GRASSES

Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

RANGE MANAGEMENT

Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

RECHARGE

Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2I

RECIRCULATED WATER
An Example of Treatment of Effluents From Papermaking With a View Toward Recycling (Un exemple de traitement des effluents de papeterie en vue du recyclage),
W75-03887 5D

RECLAIMED WATER
New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

RECLAMATION
A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

RECREATION
Evaluating Multireservoir Operating Rules,
W75-03932 4A

The Elements of Carrying Capacity in the Recreation Utilization of Reservoirs,
W75-04249 6B

RECREATION DEMAND
The Elements of Carrying Capacity in the Recreation Utilization of Reservoirs,
W75-04249 6B

RECYCLING
Possibilities for Purifying Recycled or Waste Waters from Paper Mills, Taking Physical-Chemical Processes into Account (Les possibilites d'epuration des eaux recyclees ou residuaires des papeteries, compte-tenu des procedes chimico-physiques),
W75-03893 5D

REEDY RIVER (SC)
Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

REFUSE ACT OF 1899
United States v. Kennebec Log Driving Co. Et Al. (Suit by Government to Enjoin Log-Driving Activities on Upper Kennebec River).
W75-03996 6E

United States V. Ira. S. Bushey and Sons, Inc. (Discharge of Refuse into Navigable Waters--Oil Spills),
W75-04300 6E

REGIONAL ANALYSIS
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

Regional Management of Waste Systems,
W75-04000 5D

REGRESSION ANALYSIS
Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

A Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regression Model,
W75-04309 2E

REGULATION
Guide to Water Cleanup Materials and Methods,
W75-03880 5D

The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

Exploitation of Deep Ocean Minerals: Regulatory Mechanisms and United States Policy,
W75-04007 6E

Pollution Control in Japan-A Survey.
W75-04017 5G

Progress in Satisfying Environmental Requirements,
W75-04018 5G

Non-Transportation Oil Spill Regulations.
W75-04303 5G

People (N.Y.) V. Cudak (Prosecution for Violating Moratorium on Alteration of Tidal Wetlands),
W75-04304 6E

RELOCATION
Objective Double-Mass Analysis,
W75-04307 2B

REMOTE SENSING
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

A Review of Desertization in Africa--Water, Vegetation, and Man,
W75-04142 2J

Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

RESEARCH FACILITIES
Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

RESERVOIR OPERATION
Evaluating Multireservoir Operating Rules,
W75-03932 4A

Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

RESERVOIR RELEASES
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

RESERVOIRS
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

The Elements of Carrying Capacity in the Recreation Utilization of Reservoirs,
W75-04249 6B

RESISTANCE
Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

REVERSE OSMOSIS
Method and Apparatus for Use in Water Purification by Reverse Osmosis,
W75-03874 5D

Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

REVIEWS
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

Treatment of Residual Sludges: Generalities and Applications in the Paper Industry (Traitement des boues residuaires: Generalites et applications a l'industrie du papier),
W75-03898 5D

Standards, Administration, and Surveys, (Literature Review),
W75-04014 5G

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

Law, (Literature Review),
W75-04020 5G

Microbiology of Waste Treatment, (Literature Review),
W75-04117 5D

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

CE
Cropping Patterns Involving Rice and Their Management,
W75-04127 3F

Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

GHT-OF-WAY
Opinion of the Justices to the House of Representatives (Relating to the Constitutionality of a Bill Creating a Public 'On-Foot Free Right-of-Passage' Along Shore of Coastline).
W75-04294 6E

ARIAN PLANTS
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

ARIAN RIGHTS
Boats and Riparian Rights,
W75-04006 6E

The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

ER BASIN COMMISSION
The Next Ten Years: Some Recommendations for the Delaware River Basin Commission,
W75-04210 6B

ER BASIN COMMISSIONS
Okhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

ER BASINS
Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

R FLOW
The Ultrasonic Method of River Gauging,
W75-04026 4A

Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regressive Model,
W75-04309 2E

Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

R REGULATION
Run-Off Regulation of the St. Lawrence and Its Liability,
W75-04243 4A

RIVER SYSTEMS
Evaluating Multireservoir Operating Rules,
W75-03932 4A

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

RIVERS
Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

Open Channel Flow Evaporation Study,
W75-04273 2D

RIVERS AND HARBORS ACT
United States v. Republic Steel Corporation (Prosecution for Unlawful Discharge of Coal Tar into a River).
W75-03992 5G

United States v. Kennebec Log Driving Co. Et Al. (Suit by Government to Enjoin Log-Driving Activities on Upper Kennebec River).
W75-03996 6E

U.S. V. Rohm and Haas Co. (Continuous Discharge Pollution Action Under Refuse Act).
W75-04290 6E

United States V. Ira. S. Bushey and Sons, Inc. (Discharge of Refuse into Navigable Waters--Oil Spills),
W75-04300 6E

ROCKY BRANCH (VIRGINIA)
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

ROCKY MOUNTAIN REGION
Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

ROOT ZONE
Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

ROOTS
Corn Root-Configuration Response to Soil Temperature and Matric Suction,
W75-04288 3F

RUNOFF
Run-Off Regulation of the St. Lawrence and Its Liability,
W75-04243 4A

SAFE DRINKING WATER ACT
Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

SAFE DRINKING WATER ACT OF 1973
National Drinking Water Standards.
W75-03998 5G

SAFETY
Consideration of Background in Development of Environmental Standards,
W75-04155 5G

Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

SAGINAW BAY (MICH)
Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

SALINE SOILS
Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

SALINE WATER
Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

SALINE WATER BARRIERS
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

SALINE WATER-FRESHWATER INTERFACES
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

SALINE WATER INTRUSION
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

SALINITY
The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

The Effect of Salinity on a Marine and a Freshwater Ascomycete,
W75-04267 5C

Marine Studies of San Pedro Bay, California, Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973.
W75-04272 5B

SALMONIDS
Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

SALT MARSHES
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

SAN FRANCISCO BAY AREA (CALIF)
Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

SAN JUAN MOUNTAINS (COLO)
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

SANDS
Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

SANDSTONES
Lysimeter Installations in Sandstone at Styrrup, Nottinghamshire,
W75-04332 2G

SANDY SOILS
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

SANTEE RIVER (SOCAR)
The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

SASKATCHEWAN WATER RESOURCES
Control of Water Pollution: Miscellaneous Provisions.
W75-04323 5G

SATURATED FLOW
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

SCENEDESMUS QUADRACAUDA
The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

SCHEDULING
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

SCOTLAND
Water Pollution and Control,
W75-03915 5B

SCOUR
Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

SEA NETTLES
Enhancement of Recreational Uses of Estuarine Waters Through Study of Potential Control Methods for Stinging Sea Nettles,
W75-04037 5C

SEA WATER
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

Radiochemical Method of Determining Low Strontium-90 Concentration Levels in Environmental Samples,
W75-04102 5A

Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

Investigation for the Marine Disposal of Effluents,
W75-04289 5B

SEASONAL
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

SECCHI DEPTH
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

SECONDARY RECOVERY (OIL)
Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

SEDIMENT DISTRIBUTION
Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

SEDIMENT TRANSPORT
Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

SEDIMENTS
Pollution Potential of Aquatic Sediments,
W75-04150 5B

Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

SEEDBED CONFIGURATION
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

SEEDS
Agronomic Survey of Jojoba in California,
W75-03960 3F

SEICHES
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

SELECTIVE WITHDRAWAL
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

SELENASTRUM CAPRICORNUTUM
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

SEMIARID CLIMATES
Agronomic Survey of Jojoba in California,
W75-03960 3F

Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

SEMIPERMEABLE MEMBRANES
Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

SENSITIVITY ANALYSIS
Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

SEPARATION TECHNIQUES
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

Apparatus for Separating Solids from Liquids,
W75-03866 5D

Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

Apparatus and Method for Effecting Separations,
W75-03872 5G

Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

Solving Effluent Problems by the Use of Centrifuges,
W75-03942 5D

Filtration - Media Selection is the Key to Success.
W75-03943 5F

Filtration Engineering's Symposium on Membrane Separation.
W75-04122 5D

SETTLED DOMESTIC SEWAGE
Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

SEVIER LAKE (UTAH)
Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

SEVIER RIVER (UTAH)
Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

SEWAGE
An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

SEWAGE DISPOSAL
Investigation for the Marine Disposal of Effluents,
W75-04289 5B

SEWAGE EFFLUENTS
Hydrogen Peroxide Treatment of Effluent Resulting from Wet Air Oxidation of Shipboard Wastes,
W75-04261 5D

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

SEWAGE SLUDGE DISPOSAL
Containing the Flow of Sewage Sludge.
W75-04336 5D

SEWAGE SYSTEMS
Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5G

SEWAGE TREATMENT
Oxygenation of Waste Water,
W75-03858 5D

Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

Waste Water Treatment System,
W75-03879 5D

Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

Phosphorus Detergent Ban-How Effective,
W75-04109 5D

Operational Aspects of Urban Sewage Works,
W75-04114 5D

Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

Hydrogen Peroxide Treatment of Effluent Resulting from Wet Air Oxidation of Shipboard Wastes,
W75-04261 5D

Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

Containing the Flow of Sewage Sludge.
W75-04336 5D

Application of Micro-Controllers Melmic 100 to Water Treatment Facilities, (In Japanese),
W75-04338 5D

SEWERAGE
Operational Aspects of Urban Sewage Works,
W75-04114 5D

Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

SEWERS
Self-Cleaning Filter for Hydrological Regeneration,
W75-03864 5D

Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

SHELLFISH FARMING
Marine Conservation Commission (As Amended).
W75-04004 6E

SHIPPING
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

SHIPS
Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

SHORE PROTECTION
Method and Apparatus for Breaking Waves,
W75-03868 8B

Device for Producing and Protecting Deposits of Sedimentary Material on the Floor of Bodies of Water,
W75-03871 8B

SHRIMP
Effects of Phthalate Esters on Shrimp,
W75-04285 5C

SIERRA NEVADA MOUNTAINS
Project Skywater.
W75-04265 3B

SILVER IODIDE
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

SIMULATION ANALYSIS
Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

Identification of a Distributed Parameter System in Hydrology,
W75-04280 2F

SITES
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

SKIMMING
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

Skimming Apparatus,
W75-03870 5G

SLUDGE
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

SLUDGE INCINERATION
Containing the Flow of Sewage Sludge.
W75-04336 5D

SLUDGE REMOVAL
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

SLUDGE TREATMENT
Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

Treatment of Residual Sludges: Generalities and Applications in the Paper Industry (Traitement des boues residuaires: Generalites et applications a l'industrie du papier),
W75-03898 5D

Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

SMALL WATERSHEDS
Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

Protecting Creeksheds, Analysis and Action,
W75-03948 4D

Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

SNAKE RIVER (IDA)
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

SNOW
Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

Horizontal Water Migration of Strontium-90,
W75-04066 5B

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

SNOW COVER
Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

SNOW MANAGEMENT
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

SNOWFLAKES
Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

SOCIAL CHANGE
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

SOCIAL IMPACT
Irrigation's Impact on Society.
W75-04138 3F

SOCIAL PARTICIPATION
Protecting Creeksheds, Analysis and Action,
W75-03948 4D

SOCIOECONOMIC MODELS
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

SODIUM
Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

SOIL ADSORPTION BEDS
Soil Adsorption of Humic Color,
W75-04043 5D

SOIL AGGREGATES
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

SOIL CHEMICAL PROPERTIES
Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

SOIL CLASSIFICATION
Temperature Regimes and Classification of Some Well-Drained Alpine Soils in Alaska,
W75-04314 2G

SOIL COLUMNS
Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

SOIL CONSERVATION
Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

SOIL CONTAMINATION
Accumulation of Strontium-90 in Soils,
W75-04062 5B

Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

SOIL DENSITY
A Flotation Method for the Rapid Measurement of the Wet Bulk Density of Soil Clods,
W75-04135 2G

SOIL EROSION
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

SOIL MOISTURE
The Three Stages of Drying A Field Soil,
W75-03965 2D

Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

SOIL MOISTURE METERS
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

SOIL PROFILES
Distribution and Migration of Strontium-90 in Soils,
W75-04065 5B

Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

SOIL PROPERTIES
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

SOIL STABILITY
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

SOIL SURFACE.S
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

SOIL TEMPERATURE
Effect of Soil Temperature on Direction of Corn Root Growth,
W75-03954 3F

Corn Root-Configuration Response to Soil Temperature and Matric Suction,
W75-04288 3F

SOIL TERPERATURE
Temperature Regimes and Classification of Some Well-Drained Alpine Soils in Alaska,
W75-04314 2G

SOIL TESTS
Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

SOIL TEXTURE
Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

SOIL TREATMENT
The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

SOIL TYPES
Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

SOIL WATER
The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

SOIL-WATER-PLANT RELATIONSHIPS
Steady Flows of Water and Salt in Uniform Soil Profiles with Plant Roots,
W75-03956 2I

Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

Some Considerations on Plant Types for Dryland Agriculture,
W75-04126 2I

The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

SOIL WATER POTENTIAL
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

SOIL WATER SUCTION
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

SOILS
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

SOLAR CELLS
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

SOLAR DISTILLATION
Apparatus for Solar Distillation,
W75-03876 3A

SOLAR ENERGY SYSTEMS
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

SOLAR RADIATION
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

SOLAR STILLS
Apparatus for Solar Distillation,
W75-03876 3A

Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

SOLAR THERMAL ENERGY
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

SOLAR WATER HEATERS
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

SOLID-LIQUID SEPARATION
Apparatus for Separating Solids from Liquids,
W75-03866 5D

SOLID WASTES
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

SOLIDS TRANSPORT CAPACITY
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

SORPTION
Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

SOUTH CAROLINA
The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

SOUTHEAST US
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

SOYBEANS
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

SPAIN
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

SPALLATION
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

SPECIFIC ACTIVITY CONCEPT
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

SPECIFIC RADIOACTIVITY
Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

SPECTROMETER
A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

SPECTROMETERS
Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

SPECTROPHOTOMETRY
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer,
W75-04093 5A

A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

SPECTROSCOPY
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

SPILLWAYS
The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

SPLASH EROSION
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

SPOIL BANKS
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

SPOIL DISPOSAL
Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

SPRECTOSCOPY
Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

SPRING WATER
Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report.
W75-04140 4B

SPRINGS
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report.
W75-04140 4B

ST. LAWRENCE RIVER
Run-Off Regulation of the St. Lawrence and Its Liability,
W75-04243 4A

Preliminary Study of Phytoplankton of Lake St. Louis, A Broadening of the St. Lawrence River near Montreal, Quebec, (In French),
W75-04335 5C

ST. PETERSBURG RESERVOIR (PENN)
Water Resources Appraisal for Hydroelectric Licensing, The Clarion River Basin, Pennsylvania.
W75-04274 6G

STABLE ISOTOPES
Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

STACK HEIGHT
Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

STANDARDS
Consideration of Background in Development of Environmental Standards,
W75-04155 5G

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

STANNOUS FLUORIDE TREATMENT
Phosphorus Detergent Ban-How Effective,
W75-04109 5D

STARCH
How to Reduce BOD Levels From Size-Press Starches,
W75-03906 5G

STATE GOVERNMENTS
The Philosophy of S.2770,
W75-04001 5G

Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

STATE LEGISLATION
Regional Management of Waste Systems,
W75-04000 5D

STATE POLICY
Opinion of the Justices to the House of Representatives (Relating to the Constitutionality of a Bill Creating a Public 'On-Foot Free Right-of-Passage' Along Shore of Coastline)
W75-04294 6E

Courts Back State's Power to Halt Acid Mine Drainage,
W75-04301 5G

STATISTICAL ANALYSIS
A Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regression Model,
W75-04309 2E

CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

STATISTICAL MODELS
Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

STATISTICS
The Approximate Probability Density Function of Range and Adjusted Range,
W75-04246 6A

STEADY FLOW
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

STEREO ORIFICES
The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

STOCHASTIC MODELS
Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

STOCHASTIC PROCESSES
Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

Stochastic Simulation of Daily Rainfall,
W75-04036 2B

Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

STOPPING MANEUVER
Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

STORAGE
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

STORM RUNOFF
The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

STORMS
Project Skywater.
W75-04265 3B

STRATIFICATION
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

STRATOSPHERE
Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

STREAMFLOW
Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

STREAMS
Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

STRIP MINES
Shallow Ground Water in Selected Areas in the Fort Union Coal Region.
W75-03974 5B

STRONTIUM
Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

Accumulation of Strontium-90 in Soils,
W75-04062 5B

Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

Distribution and Migration of Strontium-90 in Soils,
W75-04065 5B

Horizontal Water Migration of Strontium-90,
W75-04066 5B

State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

Radiochemical Method of Determining Low Strontium-90 Concentration Levels in Environmental Samples,
W75-04102 5A

SUBSOIL
Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

SUBSURFACE WATERS
Identification of a Distributed Parameter System in Hydrology,
W75-04280 2F

SULFATE REDUCTION
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

SULFIDE OXIDATION
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

SULFIDE-SELECTIVE ELECTRODE
Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5

SULFIDES
Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5

SULFITE LIQUORS
Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Woven Chemical Membranes,
W75-03890

SULFUR
Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

SULFUR COMPOUNDS
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

SUNFISHES
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

SUPPLEMENTAL IRRIGATION
The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

SURFACE DRAINAGE
Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

SURFACE-GROUNDWATER RELATIONSHIPS
Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

SURFACE RUNOFF
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

Ford Motor Co. V. Dallas Power and Light Co. (Action for Property Damage Resulting from Release of Waters from Dam During Time of Flooding).
W75-04297 6E

SURFACE WATER AVAILABILITY
Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

SURFACE WATERS
Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

Water-Resources Investigations of the U.S. Geological Survey in the Northern Great Plains Coal Region of Eastern Montana, 1974-75.
W75-03977 7C

Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

Some Results from Experimental Data on Surface Jet Discharge of Heated Water,
W75-04220 5B

URVEILLANCE PROGRAM
Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

SURVEYS
Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

SUSPENDED SOLIDS
On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

SWITZERLAND (BAYE DE MONTREUX)
The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

SYNTHETIC HYDROLOGY
A Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regression Model,
W75-04309 2E

SYSTEMS ANALYSIS
Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

Applications of Systems Analysis to International Water Resources Projects,
W75-04232 6A

Toward a Science Policy for Computers in Water Resources: Trends and Issues,
W75-04257 6A

TACONITE TAILINGS
Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

TCDD
The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

TEMPERATURE
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

Marine Studies of San Pedro Bay, California, Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973.
W75-04272 5B

TEMPERATURE-TOXICITY RELATIONSHIPS
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

TERRACES
Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

TERRITORIAL WATERS
Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

TESTING PROCEDURES
A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

TEXAS
Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

U.S. V. Rohm and Haas Co. (Continuous Discharge Pollution Action Under Refuse Act).
W75-04290 6E

Ford Motor Co. V. Dallas Power and Light Co. (Action for Property Damage Resulting from Release of Waters from Dam During Time of Flooding).
W75-04297 6E

TEXAS (SOUTHERN HIGH PLAINS)
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

TEXTILES
Water Pollution and Control,
W75-03915 5B

THEORETICAL ANALYSIS
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

THERMAL BARS
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

THERMAL COOLING SYSTEMS
Design of Thermal Cooling Systems Using the Cascade of Energy Concept,
W75-04228 5D

THERMAL POLLUTION
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

Thermal Pollution Problems in Poland,
W75-04218 5C

Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

Some Results from Experimental Data on Surface Jet Discharge of Heated Water,
W75-04220 5B

Cooling Pond Temperature Prediction,
W75-04222 5B

Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

Thermal Pollution Aspects in Europe,
W75-04226 5B

Design of Thermal Cooling Systems Using the Cascade of Energy Concept,
W75-04228 5D

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

Thermal Pollution of the Great Lakes -- A Non-Problem,
W75-04231 5B

Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

THERMAL POWERPLANTS
Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

Thermal Pollution Aspects in Europe,
W75-04226 5B

THERMAL RADIATION
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

THERMAL SPRINGS
Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report.
W75-04140 4B

THERMAL STRATIFICATION
Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

THERMAL TOLERANCE
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

THERMAL WATER
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

THERMODYNAMIC BEHAVIOR
Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

THERMODYNAMICS
Calculation of Fractionation Effects in Atmospheric Nuclear Bursts,
W75-04068 5B

Open Channel Flow Evaporation Study,
W75-04273 2D

THERMOMETERS
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

THORIUM
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

THORON
Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

THORPE BRANCH (VIRGINIA)
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

THREE-DIMENSIONAL FLOW
Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

TIDAL MARSHES
People (N.Y.) V. Cudak (Prosecution for Violating Moratorium on Alteration of Tidal Wetlands),
W75-04304 6E

TIDES
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

TILE DRAINS
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

TIME DEPENDENCE
The Nonlinear Rainfall Response of Watersheds With Time Dependent Storage and Conveyance Properties,
W75-04240 2A

TIME SERIES ANALYSIS
The Nonlinear Rainfall Response of Watersheds With Time Dependent Storage and Conveyance Properties,
W75-04240 2A

Objective Double-Mass Analysis,
W75-04307 2B

CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

TOBACCO
Influence of Tobacco Plant Canopy on Percolation,
W75-03931 3F

Flue-Cured Tobacco Yield and Oxygen Content of Soil in Lysimeters Flooded for Various Periods,
W75-04111 3F

TOMATO
Use of Black Polyethylene Mulch to Reduce Flooding Effects on Tomato Yields,
W75-04030 3F

TOPSOILS
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

TOXICITY
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

Exposures to Five Target Health Hazards,
W75-04190 5A

Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

Effects of Phthalate Esters on Shrimp,
W75-04285 5C

Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

TOXICITY AROCLOR
Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

TOXINS
Exposures to Five Target Health Hazards,
W75-04190 5A

TRACE ELEMENTS
Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

TRACERS
Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

TRACTOR TRAFFIC
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

TRANSMISSIVITY
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

TRANSPIRATION
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L,
W75-04011 3F

TRANSPORTATION
Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

TRANSVERSE MIXING
Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

TREATMENT FACILITIES
Guide to Water Cleanup Materials and Methods,
W75-03880 5D

An Example of Treatment of Effluents From Papermaking With a View Toward Recycling (Un exemple de traitement des effluents de papeterie en vue du recyclage),
W75-03887 5D

Biological Purification of Effluents from Bleached Kraft Pulp: The Case of La Cellulose Des Ardennes (Epuration biologique d'effluents de pate Kraft blanchie: Le cas de la Cellulose des Ardennes),
W75-03895 5D

New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

Effectiveness of the Pre-Aerator (Effektivnost' raboty pre-aeratora),
W75-03905 5D

Corrugated Ink and Starch Wastes Meet EPA Standards at St. Regis.
W75-03907 5D

TREE RINGS
Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

TREES
Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

TRENT RIVER AUTHORITY (UK)
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

TRICKLE IRRIGATION
Trickle Irrigation System,
W75-03877 3F

TRITIUM
Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

TROPOSPHERE
Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

TROUT
Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

TURBIDITY
Effect of Turbidity on Algal Growth,
W75-04306 5C

TURBULENCE
Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

TURBULENT FLOW
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

TURTLES
Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

TWO LAYER SYSTEMS
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

TYPIC TORRIFLUVENT SOILS
Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

TYPIC TORRIORTHENT SOILS
Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

UDIC MOISTURE REGIME
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

ULTRAFILTRATION
Filtration Engineering's Symposium on Membrane Separation.
W75-04122 5D

ULTRASONIC METHODS
The Ultrasonic Method of River Gauging,
W75-04026 4A

ULTRAVIOLET RADIATION
Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

UNGAGED WATERSHEDS
A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

UNIT HYDROGRAPHS
The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

UNITED KINGDOM
Whither Water.,
W75-04025 6B

UNITED KINGDOM (HULL RIVER)
Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

UNITED STATES
Exploitation of Deep Ocean Minerals: Regulatory Mechanisms and United States Policy,
W75-04007 6E

U.S. V. Rohm and Haas Co. (Continuous Discharge Pollution Action Under Refuse Act).
W75-04290 6E

U.S. V. Lebeouf Bros. Towing Co., Inc. (Government Action to Recover Penalty Imposed by Coast Guard for Gasoline Spill in Ocean).
W75-04292 6E

UNSTEADY FLOW
Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

URANIUM
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

URBAN ENVIRONMENTAL ENHANCEMENT
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

URBAN HYDROLOGY
A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

URBAN SOCIOLOGY
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

URBANIZATION
Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

UREA (SULFURCOATED)
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

USSR
Nuclear Meteorology,
W75-04054 5B

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

USSR (LENINGRAD)
Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

UTAH
The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

VERMONT
Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved).
W75-04299 6E

VERTICAL MIGRATION
Vertical Distribution of the Concentration of Radon Decay Products in the 0-300-m Layer,
W75-04106 5B

VIRGIN RIVER (UTAH)
Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

VISCOSITY
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

VOTING
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

WASHINGTON
More Responsive Water Planning is Possible,
W75-04203 6A

WASTE DILUTION
The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

Some Characteristics of Counterjet Flow,
W75-04217 5B

WASTE DISPOSAL
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

Disposal/Recycle Management System Development for Air Force Waste Petroleum Oils and Lubricants.
W75-04268 5E

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

WASTE MANAGEMENT
Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

WASTE MANAGEMENT SYSTEMS
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

WASTE TREATMENT
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components of Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki).
W75-03896 5D

Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5C

Design of Thermal Cooling Systems Using the Cascade of Energy Concept.
W75-04228 5D

Industrial Wastewaters, Red River Army Depot Texarkana, Texas.
W75-04263 5D

WASTE VAPOR
Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West.
W75-04162 5

WASTE WATER DISPOSAL
Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5C

A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5

Investigation for the Marine Disposal of Effluents.
W75-04289 5

WASTE WATER POLLUTION
Regional Management of Waste Systems.
W75-04000 5

WASTE WATER TREATMENT
Improved Process for Treating Water and Wastewater,
W75-03857 5

Oxygenation of Waste Water,
W75-03858 5D

Process and Device for Purification of Effluents Containing Phenols and Ammonium Salts,
W75-03859 5D

Apparatus for Determining Organic Carbon Content of Polluted Liquids,
W75-03861 5A

Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

Self-Cleaning Filter for Hydrological Regeneration,
W75-03864 5D

Apparatus for Separating Solids from Liquids,
W75-03866 5D

Method and Apparatus for Use in Water Purification by Reverse Osmosis,
W75-03874 5D

Liquid Aerating Apparatus,
W75-03875 5D

Apparatus for Solar Distillation,
W75-03876 3A

Hot Ball Desalination Process,
W75-03878 3A

Waste Water Treatment System,
W75-03879 5D

Guide to Water Cleanup Materials and Methods,
W75-03880 5D

The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

An Example of Treatment of Effluents From Papermaking With a View Toward Recycling (Un exemple de traitement des effluents de papeterie en vue du recyclage),
W75-03887 5D

Microflotation, New-Old Water Purification Technique (Mikroflotation, nygammal vattenreningsteknik),
W75-03888 5D

Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung),
W75-03889 5D

Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

Possibilities for Purifying Recycled or Waste Waters from Paper Mills, Taking Physical-Chemical Processes into Account (Les possibilites d'epuration des eaux recyclees ou residuaires des papeteries, compte-tenu des procedes chimico-physiques),
W75-03893 5D

Biological Purification of Effluents from Bleached Kraft Pulp: The Case of La Cellulose Des Ardennes (Epuration biologique d'effluents de pate Kraft blanchie: Le cas de la Cellulose des Ardennes),
W75-03895 5D

On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components or Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki),
W75-03896 5D

Treatment of Residual Sludges: Generalities and Applications in the Paper Industry (Traitement des boues residuaires: Generalites et applications a l'industrie du papier),
W75-03898 5D

Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

Improved Clarification of Book Mill Effluent,
W75-03902 5D

Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

Effectiveness of the Pre-Aerator (Effektivnost' raboty pre-aeratora),
W75-03905 5D

Corrugated Ink and Starch Wastes Meet EPA Standards at St. Regis.
W75-03907 5D

Static Mixing Concept for Aerators Wins Acceptance,
W75-03914 5D

Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

Quality Water for Human Consumption and Industry,
W75-03941 5D

Solving Effluent Problems by the Use of Centrifuges,
W75-03942 5D

Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

EPA's Pollution Control Goals Take Broadside in Seattle.
W75-04023 5G

Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

Soil Adsorption of Humic Color,
W75-04043 5D

Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

Phosphorus Detergent Ban-How Effective,
W75-04109 5D

Operational Aspects of Urban Sewage Works,
W75-04114 5D

Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

Microbiology of Waste Treatment, (Literature Review),
W75-04117 5D

Mixing in Anaerobic Digestion,
W75-04120 5D

Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

Filtration Engineering's Symposium on Membrane Separation.
W75-04122 5D

An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

Hydrogen Peroxide Treatment of Effluent Resulting from Wet Air Oxidation of Shipboard Wastes,
W75-04261 5D

Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

Containing the Flow of Sewage Sludge.
W75-04336 5D

Application of Micro-Controllers Melmic 100 to Water Treatment Facilities, (In Japanese),
W75-04338 5D

WASTES
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

WATER ANALYSIS
The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis,
W75-03908 5A

Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

WATER CIRCULATION
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

WATER CONSERVATION
Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

WATER CONSUMPTION
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

WATER CONVEYANCE
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

WATER COOLING
Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

WATER COSTS
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

WATER DELIVERY
How Chicago Manages its Distribution System,
W75-04197 6C

WATER DEMAND
Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

WATER DISTRIBUTION
Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

How Chicago Manages its Distribution System,
W75-04197 6C

WATER DISTRIBUTION (APPLIED)
Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

Design of a Conduit System with Diverging Branches,
W75-03930 8A

A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

WATER DISTRIBUTION DIVISION
How Chicago Manages its Distribution System,
W75-04197 6C

WATER DISTRIBUTIONS (APPLIED)
Irrigation Ditch Liner and Method for Making Same,
W75-03863 4A

WATER DISTRICTS
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

WATER EQUIVALENT
Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

WATER IMPORTING
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

WATER LAW
WPCF Adopts Resolutions Aimed at Easing Problems of Water Law.
W75-04009 5G

The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

WATER LAWS
Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

Control of Water Pollution: Miscellaneous Provisions.
W75-04323 5G

WATER LEVELS
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

WATER LOSS
More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

WATER MANAGEMENT
How Chicago Manages its Distribution System,
W75-04197 6C

Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

Application of Analog Techniques to Water Management,
W75-04202 6A

The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

WATER MANAGEMENT (APPLIED)
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

Spill Prevention and Control Aspects of Paper Industry Waste Water Management Programs,
W75-03912 5G

Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

Protecting Creeksheds, Analysis and Action,
W75-03948 4D

Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5G

Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

Conservation and Flooding Easements: A Case Study,
W75-04211 6E

WATER PERMITS
The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

WATER POLICY
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5C

Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6

Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission.
W75-03921 6

How Chicago Manages its Distribution System
W75-04197 6

More Responsive Water Planning is Possible,
W75-04203 6

WATER POLLUTION
United States v. Kennebec Log Driving Co. Et Al. (Suit by Government to Enjoin Log-Driving Activities on Upper Kennebec River).
W75-03996 6E

Cutback in Costruction Funding Stirs Doubt on Water Quality Goals.
W75-03999 5G

United States v. Holland (Action to Enjoin Unlawful Filling Operations).
W75-04005 6E

WPCF Adopts Resolutions Aimed at Easing Problems of Water Law.
W75-04009 5G

Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

Pollution Control in Japan-A Survey.
W75-04017 5G

Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5A

Phosphorus Detergent Ban-How Effective,
W75-04109 5D

The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

United States V. Ira. S. Bushey and Sons, Inc. (Discharge of Refuse into Navigable Waters--Oil Spills),
W75-04300 6E

Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

WATER POLLUTION CONTROL
Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

Apparatus and Method for Effecting Separations,
W75-03872 5G

Guide to Water Cleanup Materials and Methods,
W75-03880 5D

Water Pollution and Control,
W75-03915 5B

Cutback in Costruction Funding Stirs Doubt on Water Quality Goals.
W75-03999 5G

Regional Management of Waste Systems,
W75-04000 5D

The Philosophy of S.2770,
W75-04001 5G

Standards, Administration, and Surveys, (Literature Review),
W75-04014 5G

Pollution Control in Japan-A Survey.
W75-04017 5G

Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

EPA's Pollution Control Goals Take Broadside in Seattle.
W75-04023 5G

On Pollution Control.
W75-04024 5G

Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5G

Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

Vermont V. New York, Et Al. (Proposed Consent Decree Disapproved).
W75-04299 6E

Control of Water Pollution: Miscellaneous Provisions.
W75-04323 5G

Quality Control in River Management of the Bristol Avon,
W75-04324 5G

Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

WATER POLLUTION CONTROL ACT
National Drinking Water Standards.
W75-03998 5G

WATER POLLUTION EFFECTS
The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water,
W75-03913 5C

Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

WATER POLLUTION SOURCES
Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

How to Reduce BOD Levels From Size-Press Starches,
W75-03906 5G

Shallow Ground Water in Selected Areas in the Fort Union Coal Region.
W75-03974 5B

Pollution Potential of Aquatic Sediments,
W75-04150 5B

Investigation for the Marine Disposal of Effluents,
W75-04289 5B

Freeman Coal Mining Corp. V. Illinois Pollution Control Board (Appeal from of Pollution Control Board Holding That Defendant Made Illegal Discharges).
W75-04295 6E

WATER POLLUTION TREATMENT
Self-Cleaning Filter for Hydrological Regeneration,
W75-03864 5D

WATER PROPERTIES
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

Marine Studies of San Pedro Bay, California, Part V; Data Report, Temperature, Salinity, Oxygen and Hydrogen Ion Concentration in outer Los Angeles Harbor, June 1971 to November 1973.
W75-04272 5B

WATER PURIFICATION
Method and Apparatus for Use in Water Purification by Reverse Osmosis,
W75-03874 5D

Microflotation, New-Old Water Purification Technique (Mikroflotation, nygammal vattenreningsteknik),
W75-03888 5D

Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung),
W75-03889 5D

Possibilities for Purifying Recycled or Waste Waters from Paper Mills, Taking Physical-Chemical Processes into Account (Les possibilites d'epuration des eaux recyclees ou residuaires des papeteries, compte-tenu des procedes chimico-physiques),
W75-03893 5D

A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5G

WATER QUALITY
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

Quality Water for Human Consumption and Industry,
W75-03941 5D

Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

Thermal Pollution Problems in Poland,
W75-04218 5C

Applications of Systems Analysis to International Water Resources Projects,
W75-04232 6A

A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5G

Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

Control of Water Pollution: Miscellaneous Provisions.
W75-04323 5G

WATER QUALITY ADMINISTRATION
The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

WATER QUALITY CONTROL
United States v. Republic Steel Corporation (Prosecution for Unlawful Discharge of Coal Tar into a River).
W75-03992 5G

National Drinking Water Standards.
W75-03998 5G

Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

EPA's Pollution Control Goals Take Broadside in Seattle.
W75-04023 5G

An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

Conservation and Flooding Easements: A Case Study,
W75-04211 6E

Quality Control in River Management of the Bristol Avon,
W75-04324 5G

WATER QUALITY IMPROVEMENT ACT
United States v. Republic Steel Corporation (Prosecution for Unlawful Discharge of Coal Tar into a River).
W75-03992 5G

WATER QUALITY STANDARDS
Water Pollution and Control,
W75-03915 5B

National Drinking Water Standards.
W75-03998 5G

The Philosophy of S.2770,
W75-04001 5G

Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

WATER REQUIREMENTS
Report on: Arizona Indian Water Rights Conference,
W75-04143 6E

WATER RESOURCES
Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

Geology and Ground-Water Resources of Gordon, Whitfield, and Murray Counties, Georgia,
W75-03984 2F

Geohydrology of Nemaha County, Northeastern Kansas,
W75-03986 2F

Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas,
W75-03987 2F

More Responsive Water Planning is Possible,
W75-04203 6A

Water for the Human Environment, Volume IV, Special Sessions.
W75-04213 5B

Applications of Systems Analysis to International Water Resources Projects,
W75-04232 6A

Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

Toward a Science Policy for Computers in Water Resources: Trends and Issues,
W75-04257 6A

WATER RESOURCES ACT OF 1971 (WASHINGTON)
More Responsive Water Planning is Possible,
W75-04203 6A

WATER RESOURCES DEVELOPMENT
Whither Water.,
W75-04025 6B

Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

Conservation and Flooding Easements: A Case Study,
W75-04211 6E

A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A.,
W75-04258 6B

Water Resources Appraisal for Hydroelectric Licensing, The Clarion River Basin, Pennsylvania.
W75-04274 6G

Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

WATER REUSE
An Example of Treatment of Effluents From Papermaking With a View Toward Recycling (Un exemple de traitement des effluents de papeterie en vue du recyclage),
W75-03887 5D

Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

WATER RIGHTS
Report on: Arizona Indian Water Rights Conference,
W75-04143 6E

The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

WATER RIGHTS (NON-RIPARIANS)
Opinion of the Justices to the House of Representatives (Relating to the Constitutionality of a Bill Creating a Public 'On-Foot Free Right-of-Passage' Along Shore of Coastline).
W75-04294 6E

WATER SAMPLE PRESERVATION
Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

WATER SOURCES
Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

WATER STORAGE
Hydrogeology of the Carefree Ranch Area, Maricopa County, Arizona,
W75-04145 2F

Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

WATER SUPPLY
Pricing Irrigation Water in Iran,
W75-03936 3F

Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5G

Application of Micro-Controllers Melmic 100 to Water Treatment Facilities, (In Japanese),
W75-04338 5D

WATER SUPPLY DEVELOPMENT
Whither Water.,
W75-04025 6B

Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

WATER TABLE
Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

WATER TEMPERATURE
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

Cooling Pond Temperature Prediction,
W75-04222 5B

WATER TRANSFER
Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

WATER TREATMENT
Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

Quality Water for Human Consumption and Industry,
W75-03941 5D

Filtration - Media Selection is the Key to Success,
W75-03943 5F

Regional Management of Waste Systems,
W75-04000 5D

WPCF Adopts Resolutions Aimed at Easing Problems of Water Law.
W75-04009 5G

Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

WATER USES
Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

WATER UTILIZATION
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

A Field Study of the Heat and Drought Tolerance of Grain Sorghum (Sorghum Bicolor (L.) Moench) as an Approach to Genetic Improvement,
W75-04044 2I

Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5G

WATER WORKS
How Chicago Manages its Distribution System,
W75-04197 6C

WATER YIELD IMPROVEMENT
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

WATERCOURSES
Kelso v. C.B.K. Agronomics, Inc. (Action by Upstream Landowners for Damages Due to Construction of Concrete Structure Across River by Downstream Owners).
W75-03997 6E

WATERSHED MANAGEMENT
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

WATERSHEDS (BASINS)
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

WATERWAYS
Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

WAVE ACTION
Method and Apparatus for Breaking Waves,
W75-03868 8B

Device for Producing and Protecting Deposits of Sedimentary Material on the Floor of Bodies of Water,
W75-03871 8B

WAVE FORCES
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

WAVES
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

WAVES (WATER)
Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

WEATHER
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

WEATHER MODIFICATION
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

Project Skywater.
W75-04265 3B

WEST VIRGINIA
United States v. 21.54 Acres of Land, Marshall County, West Virginia (Condemnation Case for Flowage Easements Near Dam Site).
W75-03993 6E

WET AIR OXIDATION
Hydrogen Peroxide Treatment of Effluent Resulting from Wet Air Oxidation of Shipboard Wastes,
W75-04261 5D

WETTING
The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

WHEAT
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L,
W75-04011 3F

WHEAT YIELD
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

WHITE WATER
An Alarming System for High-Solids White Water,
W75-03901 5G

WHITE WATERS (PAPER MACHINE EFFLUENTS)
On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

WINDS
Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows,
W75-04059 2B

Mean and Turbulent Transfer of Substances Over the USSR,
W75-04060 2B

WISCONSIN
Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

An Alarming System for High-Solids White Water,
W75-03901 5G

Improved Clarification of Book Mill Effluent,
W75-03902 5D

Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

WITHDRAWAL
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

WONDER (NEV)
The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

WOOD WASTES
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water,
W75-03913 5C

WYOMING
Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

Shallow Ground Water in Selected Areas in the Fort Union Coal Region.
W75-03974 5B

XENON
Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

XERIC MOISTURE REGIME
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

YIELD EQUATIONS
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

YOCKANOOKANY RIVER (MISS)
Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

ZEBRAFISH
Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

ZINC
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

ZINC RADIOISOTOPES
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

AUTHOR INDEX

ABDULLAH, S. A.
Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

ABRAHAM, G.
Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

ADAIR, J. E.
Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

AHLSTROM, S. W.
Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

AKAMATSU, I.
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

ALAERTS-SMEESTERS, E.
Preliminary Study of Phytoplankton of Lake St. Louis, A Broadening of the St. Lawrence River near Montreal, Quebec, (In French),
W75-04335 5C

ALLEN, D. M.
Stochastic Simulation of Daily Rainfall,
W75-04036 2B

ALLMARAS, R. R.
Corn Root-Configuration Response to Soil Temperature and Matric Suction,
W75-04288 3F

ANDERS, L.
Apparatus for Separating Solids from Liquids,
W75-03866 5D

ANDERSON, W.
Report on: Arizona Indian Water Rights Conference,
W75-04143 6E

ANPILOGOV, A. K.
On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components or Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki),
W75-03896 5D

ANTROPOVA, Z. G.
Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

ARDIS, C. V. JR.
A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

ARDMAN, A.
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

ARMSTRONG, D. E.
Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

ARMSTRONG, E. T.
Waste Water Treatment System,
W75-03879 5D

ASKEW, A. J.
Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

ATHEY, T. W.
The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

AVERETT, R. C.
Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

AVRAMENKO, A. S.
Application of the Stochastic Approach to the Problem of the Radioactivity of Raindrops and Cloud-Borne Drops,
W75-04074 5B

Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

AXTELL, R.
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

AYLESWORTH, J. W.
Use of Black Polyethylene Mulch to Reduce Flooding Effects on Tomato Yields,
W75-04030 3F

BACHER, K.
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

BAGNULO, L.
Skimming Apparatus,
W75-03870 5G

BAKULIN, V. N.
Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

BANASZAK, K. J.
Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

BANKS, H. O.
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

BANSAL, I. K.
Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

BARD, S. T.
Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

BARNES, I.
Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

BARTON, C. J.
Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

BASSOCO, L. M.
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

BAUMANN, E.
Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5A

BAUMANN, F. J.
Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

BEAR, J.
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

BEARDEN, H. W.
Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

BEATTY, K. W.
Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

BEAVER, D. W.
Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

BECKER, L.
Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

BEDFORD, W. K.
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

BELFORT, G.
Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

BELOVA, E. I.
Comparative Distribution of Strontium-90 and Cesium-137 in Different Types of Soils,
W75-04064 5B

BENEDICT, B. A.
Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

BERKHOFF, J. C. W.
Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

BERNARD, S. R.
A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

BERRY, J. W.
A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

BERTRAND, G. L.
Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

BEST, G. A.
Water Pollution and Control,
W75-03915 5B

BETHLAHMY, N.
More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

BHARARA, L. P.
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

BHARGAVA, G. P.
Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

BHATI, N. S.
Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

BHUIYA, Z. H.
Conversion of DDT to DDD in Flooded Soil,
W75-04348 5B

BILDER, R. B.
The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

BISSELL, V. C.
Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

BISWAS, T. D.
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

BLASKOVICH, D. D.
A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

BLEAK, A. T.
Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

BLEVINS, R. L.
Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

BLOMEKE, J. O.
Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

BOERSMA, L.
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

BOHN , H. L.
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

BOLTON, E. F.
Use of Black Polyethylene Mulch to Reduce Flooding Effects on Tomato Yields,
W75-04030 3F

BOON, A. G.
Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

BORISEK, R.
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

BOSSHARDT, E.
Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

BOX, G. F.
Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

BOYER, J. A.
Hydrogeology of the Carefree Ranch Area, Maricopa County, Arizona,
W75-04145 2F

BRADY, R. A.
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

BRECHER, E. M.
Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

BRIDGE, B. J.
The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

BRIDGE, L. R.
Lysimeter Installations in Sandstone at Styrrup, Nottinghamshire,
W75-04332 2G

BRIERE, F.
Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

BRISTOL, K.
How to Reduce BOD Levels From Size-Press Starches,
W75-03906 5G

BRITTON, L. J.
Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

BROADWAY, J. A.
An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

BROCK, R. E.
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

BRULAND, K. W.
The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

BRUNNER, D. R.
Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

BRUTSAERT, W.
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

BUCK, W.
Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

BUDDE, W. L.
Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

BUGLIARELLO, G.
Toward a Science Policy for Computers in Water Resources: Trends and Issues,
W75-04257 6A

BURGESS, D. R.
Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

BURKE, O. W.
Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5

BURSON, Z. G.
Deep Snow Measurements Suggested Using Cosmic Radiation,
W75-04331 2C

Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

BURTSEV, I. I.
Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

BURTSEVA, L. V.
Comparison of the Characteristics of Hygroscopic and Non-Hygroscopic Aersol Washout by Cloud-Borne Drops,
W75-04075 5B

BUSBY, M. W.
Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

BYSTROVA, L. P.
Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

CALLAWAY, R.
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

CAMERON, D. R.
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

CAMPBELL, D. J.
A Flotation Method for the Rapid Measurement of the Wet Bulk Density of Soil Clods,
W75-04135 2G

CAMPBELL, R. B.
Flue-Cured Tobacco Yield and Oxygen Content of Soil in Lysimeters Flooded for Various Periods,
W75-04111 3F

CARDENAS, M. A.
Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

CARGO, D. G.
Enhancement of Recreational Uses of Estuarine Waters Through Study of Potential Control Methods for Stinging Sea Nettles,
W75-04037 5C

CARLSON, G. A.
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

CARNAHAN, C. L.
Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

CARNEGGIE, D. M.
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

CARTER, L. J.
Pollution and Public Health: Taconite Case Poses Major Test,
W75-04326 5G

CARTER, M. W.
Consideration of Background in Development of Environmental Standards,
W75-04155 5G

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

CARTER, R. F.
Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

CASAS, J. L. O.
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

CEARLOCK, D. B.
Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

CHANDRA, S.
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

CHANG, M.
Objective Double-Mass Analysis,
W75-04307 2B

CHANG, Y. C.
Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

CHARBENEAU, R. J.
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

CHAUBE, U. C.
A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

CHEKA, J. S.
Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

CHILDERS, W. N.
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

CHIRKOV, V. P.
Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

CHOWDHURY, M. Y.
Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

CHRISTIANSON, A. G.
A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

CHUNICHEV, V. B.
Radiochemical Method of Determining Low Strontium-90 Concentration Levels in Environmental Samples,
W75-04102 5A

CHURKIN, V. N.
Graphoanalytical Method for Determining Cesium-137 Concentration in Soil Samples from the Gamma Spectrum,
W75-04101 5A

Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

CLANCY, M.
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

CLARK, F. H.
Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

COCHRAN, D. A.
Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

COHEN, A.
Apparatus for Determining Organic Carbon Content of Polluted Liquids,
W75-03861 5A

COLWELL, R. N.
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

COMBS, P. G.
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

CONROY, L. E.
A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

COPP, H. D.
More Responsive Water Planning is Possible,
W75-04203 6A

CREEL, B. J.
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

CRESSLER, C. W.
Geology and Ground-Water Resources of Gordon, Whitfield, and Murray Counties, Georgia,
W75-03984 2F

CROCKER, J. D.
Liquid Aerating Apparatus,
W75-03875 5D

CROLEY, T. E. II.
Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

CRYSDALE, R. A.
The Elements of Carrying Capacity in the Recreation Utilization of Reservoirs,
W75-04249 6B

CULLEN, T. H.
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

D'ANGIURO, L.
Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

DABADGHAO, P. M.
The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

DALL, B. V.
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

DANON, S.
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

DARGENE, N. P.
Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

DARR (DALINSKY), P.
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

DAS, H. A.
The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis,
W75-03908 5A

DAVIDSON, D. E.
The Effect of Salinity on a Marine and a Freshwater Ascomycete,
W75-04267 5C

DAVYDOV, E. N.
Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

DAYAL, R.
Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

DE BOODT, M.
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

DE LA TORRE, J. R.
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

DE VOS, P.
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

DEB ROY, R.
The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

DEGLORIA, S. D.
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

DHIR, R. P.
Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

DICKSON, H. W.
Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

DIGIANE, F. A.
Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

DILLEY, A. C.
An Energy Partition Evaporation Recorder,
W75-03937 2D

DINES, A. J.
Protecting Creeksheds, Analysis and Action,
W75-03948 4D

Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

DINOEVA, S.
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

DMITRIEVA, G. V.
Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

DOBSON, H. F. H.
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

DODSON, A. N.
Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

DOJLIDO, J.
Thermal Pollution Problems in Poland,
W75-04218 5C

DOLEY, D.
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

DOMENICO, P. A.
Application of Analog Techniques to Water Management,
W75-04202 6A

DONG, A. E.
Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

DRABKOWSKI, E. F.
Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

DRUFFEL, L.
Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

DUKES, J. C.
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

DURBIN, T. J.
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

DUTT, G. R.
Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

EARHART, J. R.
Liquid Aerating Apparatus,
W75-03875 5D

ECHELBERGER, W. F.
Mixing in Anaerobic Digestion,
W75-04120 5D

ECKERT, R. D.
Exploitation of Deep Ocean Minerals: Regulatory Mechanisms and United States Policy,
W75-04007 6E

EDWARDS, A. B.
Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

EDWARDS, M. D.
The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

EDWARDS, M. L.
Method and Apparatus for Breaking Waves,
W75-03868 8I

EFREMOVA, G. P.
Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5

EGLI, P.
Evaluating Multireservoir Operating Rules,
W75-03932 4

EICHELBERGER, J. W.
Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5

ELIAS, V.
Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

ENGLER, R. M.
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

ENVOLDSEN, J.
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

FASTMAN, S. M.
Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

FAZZOLARE, R. A.
A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

FERGUSSON, J. R.
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

FERREIRA, R. F.
Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

FETISOV, V. A.
Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

FFOLLIOTT, P. F.
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

FILECCIA, R. J.
Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

FISETTE, G. R.
Static Mixing Concept for Aerators Wins Acceptance,
W75-03914 5D

FLEGONTOV, V. M.
Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

FLORES, A.
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

FOGARTY, W. J.
Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

FOLCHETTI, J. R.
Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

FOLEY, J. W.
Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

FOLLEA, B.
An Example of Treatment of Effluents From Papermaking With a View Toward Recycling (Un exemple de traitement des effluents de papeterie en vue du recyclage),
W75-03887 5D

FOSTER, S. S. D.
Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

FREEDMAN, P. L.
Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

FRENCH, J. J.
Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

FRETWELL, G.
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

FRIDAY, J.
Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

FRIEDLANDER, J.
Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

FRITTS, H. C.
Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

FRYREAR, D. W.
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

FUJII, T.
Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

FURUKAWA, Y.
On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

GABRIELS, D.
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

GAIKWAD, V. R.
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

GAJBHIYE, K. E.
Distribution of Humus and Avalable Nutrients in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3F

GALINATO, G. D.
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

GALLAGHER, B. J.
Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

GAMBOLATI, G.
Second-Order Theory of Flow in Three-Dimensional Deforming Media,
W75-04308 2F

GAMMAGE, R. B.
Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

GARBO, P. W.
Oxygenation of Waste Water,
W75-03858 5D

GARCIA, J. A.
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

GARDNER, B. D.
Pricing Irrigation Water in Iran,
W75-03936 3F

GARRY, S. M.
Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

GASPAR, M. J.
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

GASPAR, R. D.
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

GAST, R. G.
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

GASYUNAS, V. N.
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

GATES, J. S.
Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

GATZ, A.J.

GATZ, A. J.
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

GAVIDIAO, A.
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

GAZIEV, Y. I.
Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

GEDENOV, L. I.
Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

GEDEONOV, L. I.
Distribution and Migration of Strontium-90 in Soils,
W75-04065 5B

Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

GEL'FAND, E. D.
On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components or Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki),
W75-03896 5D

GEORGE, P. S.
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

GESSELL, T. F.
Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

GIBBS, E. L.
Method and Apparatus for Use in Water Purification by Reverse Osmosis,
W75-03874 5D

GILBERTSON, M.
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

GILEADI, A. E.
Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

GINN, J. R.
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

GLUECKSTERN, P.
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

GOETTE, J. P. JR.
Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

GOGOLAK, C. V.
Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

GOLDBERG, E. D.
The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

GOLDEN, J. C.
A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

GOLTZ, S. M.
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

GONZALES, L. E.
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

GONZALEZ, F. I. JR.
Classic Canal Theory with Graphs and Tables Volume I,
W75-04269 8B

Classical Canal Theory with Graphs and Tables. Volume II,
W75-04270 8B

GOODALL, M. R.
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

GOPALAKRISHNAN, V.
Biological Processes Involved in Pollution of Coastal Aquaculture Waters,
W75-04281 5C

GOTTSCHLING, R. D.
Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

GOVE, G.
Spill Prevention and Control Aspects of Paper Industry Waste Water Management Programs,
W75-03912 5G

GRANBERG, K.
The Eutrophication and Pollution of Lake Paijanne, Central Finland,
W75-04264 5C

GRASS, L. B.
Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

GRAVES, W. L. JR.
Cooling Pond Temperature Prediction,
W75-04222 5B

GREENWAY, H.
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L,
W75-04011 3F

GRENNEY, W. J.
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

GRIBBIN, J.
Whither Water.,
W75-04025 6E

GRITCHENKO, Z. G.
Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

Penetration of Radioactive Fission Products from 1964-1967 Nuclear Tests into the Ground Layer of the Atmosphere in the Leningrad Area,
W75-04104 5B

Seasonal Beryllium-7 Variations in Ground Level Air,
W75-04084 5A

GROSS, S. P.
Standards, Administration, and Surveys, (Literature Review),
W75-04014 5G

GUARINO, C. F.
Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

GULI, F. P.
Thermal Pollution Aspects in Europe,
W75-04226 5B

GUNTHER, F. J.
Toward a Science Policy for Computers in Water Resources: Trends and Issues,
W75-04257 6A

GUPTA, I. C.
Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

GUPTA, V. K.
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3

GUSTAFSON, P. F.
Thermal Pollution of the Great Lakes -- A Non Problem,
W75-04231 5

GUTER, K. J.
Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5

GUTERMAN, I. G.
Mean and Turbulent Transfer of Substance Over the USSR,
W75-04060 2

HAAN, C. T.
Stochastic Simulation of Daily Rainfall,
W75-04036

HAIMES, Y. Y.
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

HALE, L. A.
Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

HALL, G. F.
Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

HALL, T.
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

HALTSMAN, J. G.
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

HAMILTON, L. D.
Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

HARDEN, D. G.
Design of Thermal Cooling Systems Using the Cascade of Energy Concept,
W75-04228 5D

HARDT, W. F.
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

HARLEY, J. H.
Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

HARRIS, L. E.
Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

HARRIS, R. F.
Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

HARRIS, R. H.
Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

HATFIELD, J.
Operational Aspects of Urban Sewage Works,
W75-04114 5D

HAY, H. R.
Apparatus for Solar Distillation,
W75-03876 3A

HAZRA, C. R.
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

HEALY, H. G.
The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

HECKROTH, C.
Water Reuse...Safe Drinking Act...How Soon...How Good.
W75-04322 5G

HEERDEGEN, R. G.
The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

HEIDMAN, J. A.
Solid Waste and Water Quality, (Literature Review),
W75-04016 5B

HENRI-ROBERT, M. P.
Biological Purification of Effluents from Bleached Kraft Pulp: The Case of La Cellulose Des Ardennes (Epuration biologique d'effluents de pate Kraft blanchie: Le cas de la Cellulose des Ardennes),
W75-03895 5D

HERSCHY, R. W.
The Ultrasonic Method of River Gauging,
W75-04026 4A

HILLSBERG, J.
The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

HINKLE, L. A.
Pollution Potential of Aquatic Sediments,
W75-04150 5B

HIRSCH, W. Z.
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

HOBBS, B. B.
The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

HOCK, A. G.
Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

HOLLEY, E. R.
Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

HOPSON, N. E.
Phosphorus Detergent Ban-How Effective,
W75-04109 5D

HUANG, J. C.
Pollution Potential of Aquatic Sediments,
W75-04150 5B

HUBBARD, D. W.
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

HULL, A. C. JR.
Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

HULL, A. P.
As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

HYNES, H. B.
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

IBATULLIN, M. S.
Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

IDSO, S. B.
The Three Stages of Drying A Field Soil,
W75-03965 2D

ILICHKINA, A. G.
Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropylbenze in Surface Waters, (In Russian),
W75-04319 5C

INGHAM, G. S. N.
Quality Control in River Management of the Bristol Avon,
W75-04324 5G

INGRAM, H. M.
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

IOKHEL'SON, S. V.
Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

IPINMIDUN, W. B.
Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

IZRAEL', Y. A.
Calculation of Fractionation Effects in Atmospheric Nuclear Bursts,
W75-04068 5B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

JACKSON, R. D.
The Three Stages of Drying A Field Soil,
W75-03965 2D

JAFFEE, H.
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

JAGGI, I. K.
Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

JAISINGHANI, R. A.
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

JAMES, D. E.
The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

JAMIESON, J. B.
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

JANSMA, J. D.
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

JAROS, J.
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

JENSEN, W.
Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

JERNIGAN, E. B.
Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

JOERING, E. A.
A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

JOHNSON, A. M. F.
Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

JOHNSON, G. P.
Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

JOHNSON, G. V.
Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

JOHNSON, J. K.
Liquid Aerating Apparatus,
W75-03875 5D

JOHNSON, J. M.
Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

JONES, L. T.
Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

JONES, L. W.
Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

JORDAAN, J. M. JR.
Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

JORDAN, D.
Stochastic Simulation of Daily Rainfall,
W75-04036 2B

KABEYA, H.
Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

KAHAN, J. P.
A Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regression Model,
W75-04309 2E

KAISER, N.
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

KAMEN, C. S.
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

KAMISHIMA, H.
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

KANTOR, Y.
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

KARADI, G. M.
Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

KARELSE, M.
Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

KASHYAP, R. L.
Stochastic Models for the Interaction of Rainfall and Groundwater Levels,
W75-03949 2A

KAUSHIK, N. K.
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

KAYE, S. V.
The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

KEE, C. W.
Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

KEENE, J. C.
The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

KELLER, W.
Isolated Soil Columns for Plant Research. Procedure and Uniformity Trial,
W75-04321 3F

KENNEDY, V. S.
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

KERR, G. D.
Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

KERR, S. R.
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

KETCHESON, J. W.
Effect of Soil Temperature on Direction of Corn Root Growth,
W75-03954 3F

KETURAH, A.
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

KEVERN, N. R.
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

KHAN, M. U.
Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

KIEFER, W.
Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

KIM, U.
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Ker Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

KIMBALL, B. A.
The Three Stages of Drying A Field Soil,
W75-03965 2I

KIMURA, Y.
Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5I

KING, D. L.
Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5

KING, R.
Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5

KIREMIDJIAN, L.
Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5

KIRICHENKO, L. V.
Vertical Distribution of the Concentration Radon Decay Products in the 0-300-m Layer,
W75-04106 5

KITCHING, R.
Lysimeter Installations in Sandstone at Styrup, Nottinghamshire,
W75-04332 2

KLASS, E.
The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda
W75-04284

KLEIN, D. A.
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

KNIGHT, K. L.
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

KNOWLES, R.
Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

KOIDE, M.
The Comparative Marine Geochemistries of Lead 210 and Radium 226,
W75-04029 5B

KOLERSKII, S. V.
Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

KOLUVEK, P.
Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

KONSTANTINOV, I. E.
Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

KOSHI, P. T.
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

KOSTER, J.
Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

KOUBEK, E.
Hydrogen Peroxide Treatment of Effluent Resulting from Wet Air Oxidation of Shipboard Wastes,
W75-04261 5D

KOVNATSKII, E. F.
A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

KRASNOPEVTSEV, Y. V.
Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

KRAUS, G.
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

KRIZEK, R. J.
Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

KUDISH, A. I.
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

KUNZ, C.
C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

KUPTSOV, V. M.
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

KUZENKOV, A. F.
Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

KUZNETSOV, YU. V.
Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

KUZNETSOVA, G. A.
Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

LABUSHKIN, V. G.
Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

LAEVASTU, T.
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

LANSFORD, R. R.
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

LAROSE, R. H.
A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

LARSEN, O. J. F.
Device for Producing and Protecting Deposits of Sedimentary Material on the Floor of Bodies of Water,
W75-03871 8B

LARSON, J. D.
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

LAWRENCE, A. W.
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

LEADLEY, S. M.
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

LECLERC, A.
Evaluating Multireservoir Operating Rules,
W75-03932 4A

LEE, R.
Objective Double-Mass Analysis,
W75-04307 2B

LEKHTMAKHER, S. O.
Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

LEONARD, M. C.
Boats and Riparian Rights,
W75-04006 6E

LEONE, R. A.
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

LEVINA, G. P.
State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

LEWINGER, K. L.
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

LEWIS, G. L.
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

LI, K. W.
Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

LI, W. C.
Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

LIANG, T.
Design of a Conduit System with Diverging Branches,
W75-03930 8A

LIAW, J. R.
Open Channel Flow Evaporation Study,
W75-04273 2D

LIN, A-L.
Changing Water Use in Selected Manufacturing Industries,
W75-03922 6B

LIN, P.
Improved Process for Treating Water and Wastewater,
W75-03857 5D

LINTON, D.
Stochastic Simulation of Daily Rainfall,
W75-04036 2B

LITVER, B. Y.
Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

LIU, P. J. P.
Milti-Stage Flash Evaporator,
W75-03860 3A

LOCK, M. A.
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

LOFTUS, K. H.
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

LONGENECKER, D. E.
The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

LOO, W.
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

LOUCKS, D. P.
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

LOWDER, W. M.
Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

LUSH, D. L.
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

LUYANAS, V. Y.
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

MACGREGOR, J. M.
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

MACLEOD, M.
An Alarming System for High-Solids White Water,
W75-03901 5G

Mill Achieves Maximum Reuse of Water with Reverse Osmosis,
W75-03899 5D

MADHI, Y.
Pricing Irrigation Water in Iran,
W75-03936 3F

MAGNIN, E.
Preliminary Study of Phytoplankton of Lake St. Louis, A Broadening of the St. Lawrence River near Montreal, Quebec, (In French),
W75-04335 5C

MAHONEY, W. E.
C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

MAIER, M.
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

MAIER, W. J.
A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

MAKHON'KO, E. P.
Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

MAKHON'KO, K. P.
Atmospheric Washout of Radioactive Contaminant in the Mountains of Central Caucasus,
W75-04076 5B

Determination of Radioisotope Fallout From Its Content in Chronological Layers of High Altitude Glaciers,
W75-04057 5A

Natural Snowflake Radioactivity Due to Short-Lived Radon Decay Products,
W75-04107 5A

Some Theoretical Notions of Radioactivity Acquisition by Raindrops,
W75-04072 5B

Trace Elements and Natur Radioactivity in Cloud Water and Atmospheric Precipitation in the Central Caucasus Mountains,
W75-04108 5A

MALAKHOV, S. G.
Distribution of Fission Products Over Oceans in the Tropical Zone and Their Relation to Atmospheric Processes,
W75-04056 5B

Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

Vertical Distribution of the Concentration of Radon Decay Products in the 0-300-m Layer,
W75-04106 5B

MALAN, G. L.
Dam Building System,
W75-03873 8A

MALHOTRA, S. P.
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

MANN, B. J.
Decay Scheme Data for Radiation Dose Calculations,
W75-04174 5A

MARECAUX, P.
Process and Device for Purification of Effluents Containing Phenols and Ammonium Salts,
W75-03859 5D

MARIAPPAN, M.
Pollution Potential of Aquatic Sediments,
W75-04150 5B

MARINO, M. A.
Models of Dispersion in a Granular Medium,
W75-04340 2F

Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

MARSHALL, C. E.
Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

MARTIN, J. A. JR.
Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

MARTIN, J. E.
Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles,
W75-04181 5C

MARTINEZ, R. P.
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

MARWAHA, S. P.
The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

MASSARO, E. J.
The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

MATHERLY, J. E.
Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

MATHIAN, M.
Treatment of Residual Sludges: Generalities and Applications in the Paper Industry (Traitement des boues residuaires: Generalites et applications a l'industrie du papier),
W75-03898 5D

MATULYAVICHYUS, V. P.
Accounting for Some Nonsteady Processes in Recording Natural Air Radioactivity,
W75-04080 5A

MAXWELL, P. A. R.
The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

MAYER, P. G.
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5E

MAZURIN, N. F.
Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

MC'BEAN, E. A.
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

MCCONNELL, H. L.
A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

MCCOY, G. A.
Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

MCDOWELL, C.
Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

MCERLEAN, A. J.
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

MCGUINNESS, W. V. JR.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

MCKAY, L. R.
Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

MCKEOWN, J. J.
Spill Prevention and Control Aspects of Paper Industry Waste Water Management Programs,
W75-03912 5G

MCKEWEN, T. D.
Regional Management of Waste Systems,
W75-04000 5D

MCLAUGHLIN, J. E.
Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

MCMAHON, M. A.
Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

MEHDI, S.
Pricing Irrigation Water in Iran,
W75-03936 3F

MEJIA, J. M.
Evaluating Multireservoir Operating Rules,
W75-03932 4A

MELONI, E.
Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

MENON, A. S.
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

MERCURI, L.
Apparatus and Method for Effecting Separations,
W75-03872 5G

MERRIMAN, D.
Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

METCALF, R. L.
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

MEZHEVOVA, V. A.
Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

MICHEL, J. W.
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

MIDDLEBROOKS, E. J.
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

MIHURSKY, J. A.
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

MILLER, E. L.
Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

MILLER, H. H. JR.
A Demonstration of Waste Heat Use in Agriculture,
W75-04224 5D

MILLER, K. M.
Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

MILLER, R. A.
Soil Adsorption of Humic Color,
W75-04043 5D

The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

MILLER, T. O.
C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

MINGUILLO, F.
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

MINJAUW, D.
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

MISRA, D. K.
Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

MIYAMOTO, S.
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

MODGAL, S. C.
Cropping Patterns Involving Rice and Their Management,
W75-04127 3F

MOGHISSI, A. A.
Consideration of Background in Development of Environmental Standards,
W75-04155 5G

Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

MOHN, F.
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water,
W75-03865 5G

MONROE, H. J.
The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

MOORE, B. R.
Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

MOORE, R. E.
The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

MORGELI, B.
Possibilities for Purifying Recycled or Waste Waters from Paper Mills, Taking Physical-Chemical Processes into Account (Les possibilites d'epuration des eaux recyclees ou residuaires des papeteries, compte-tenu des procedes chimico-physiques),
W75-03893 5D

MORIGUCHI, Z.
Application of Micro-Controllers Melmic 100 to Water Treatment Facilities, (In Japanese),
W75-04338 5D

MORRIS, S. C.
Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

MORTEZA, H.
Pricing Irrigation Water in Iran,
W75-03936 3F

MOSEEVA, D. P.
Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

MOSONYI, E.
Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

MOSS, M. D.
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

MOSSE, H.
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

MOYLE, W. R. JR.
Geohydrologic Map of Southern California,
W75-03973 7C

MUALEM, Y.
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

MUNTEANU, A. G.
Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

MURTY, T. S.
Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

MUSKIE, E. S.
The Philosophy of S.2770,
W75-04001 5G

MUSSELWHITE, C. C.
An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

NAIR, P. K. R.
Cropping Patterns Involving Rice and Their Management,
W75-04127 3F

NAKAYAMA, F. S.
The Three Stages of Drying A Field Soil,
W75-03965 2D

NAZAROV, I. M.
Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

NAZAROV, L. E.
Size Distribution of High-Activity Particles in the Troposphere in September-December 1967,
W75-04070 5B

Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

NEBEL, C.
Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

NEDVETSKAITE, T. N.
New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

NEHRING, R. B.
Acute Toxicity of a Zinc-Polluted Stream to Four Species of Salmonids,
W75-04287 5C

NELSON, C. B.
Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

NELSON, M. D.
Philadelphia Pilots--Builds Oxygen Activated Sludge,
W75-04115 5D

NELSON, W. W.
Corn Root-Configuration Response to Soil Temperature and Matric Suction,
W75-04288 3F

Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

NETTLES, M. E.
Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

NEU, H. J. A.
Run-Off Regulation of the St. Lawrence and Its Liability,
W75-04243 4A

NEUFELD, R.
Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

NIENSTADT, H.
Irrigation Ditch Liner and Method for Making Same,
W75-03863 4A

NIZHNIKOV, A. N.
Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

NORRIS, L. A.
The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

NORTH, R. M.
The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

NORTON, R. D.
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

NOVAK, J. T.
Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

NOVAKOVA, S. P.
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian),
W75-03959 5C

NYE, J. R.
Trickle Irrigation System,
W75-03877 3F

O'CONNOR, H. G.
Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas,
W75-03987 2F

O'DONNELL, F. R.
Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

O'NEILL, H. J.
Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

OGORODNIKOV, B. I.
Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

OGUNLELA, V. B.
A Field Study of the Heat and Drought Tolerance of Grain Sorghum (Sorghum Bicolor (L.) Moench) as an Approach to Genetic Improvement,
W75-04044 2

OHMAN, H. L.
Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2

OKUN, D. A.
Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5

ONDERDONK, J. J.
Effect of Soil Temperature on Direction of Corn Root Growth,
W75-03954 2

ONISHI, H.
Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4

ORLOB, G. T.
Applications of Systems Analysis to International Water Resources Projects,
W75-04232

ORMEROD, K.
Operational Aspects of Urban Sewage Works
W75-04114

PACKARD, F. A.
The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125

PARK, B. K.
Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149

PARKER, F. L.
Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223

PARTOVI, S.
Pricing Irrigation Water in Iran,
W75-03936

PARTRIDGE, J. E.
An Examination of Design Parameters for Field Study for Exposure Evaluation,
W75-04192

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

PARZYCK, D. C.
Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

PATRICK, W. H. JR.
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

PATTEA, C.
Report on: Arizona Indian Water Rights Conference,
W75-04143 6E

PATTERSON, W. D.
Progress in Satisfying Environmental Requirements,
W75-04018 5G

PATWA, F. C.
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

PAVLIC, R. A.
A Review of Effluents, General Population Doses, and Occupational Doses Resulting from Commonwealth Edison's Use of Nuclear Power,
W75-04164 5B

PAVLOTSKAYA, F. I.
State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

PEARSON, S. C.
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

PERDUE, P. T.
Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

PERKINS, E. S.
Self-Cleaning Filter for Hydrological Regeneration,
W75-03864 5D

PERLMUTTER, A.
Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

PETERSON, H. T. JR.
Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents,
W75-04165 5B

PETROV, V. N.
The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

PETRYANOV, I. V.
Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

PETTIGREW, A.
Quality Water for Human Consumption and Industry,
W75-03941 5D

PETTS, K. W.
An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

PFEIFFER, W. C.
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity,
W75-04161 5C

PHILLIPS, C. R.
An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

PHILLIPS, J. R.
Hot Ball Desalination Process,
W75-03878 3A

PHILLIPS, R. E.
Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

PIECZONKA, P.
Phosphorus Detergent Ban-How Effective,
W75-04109 5D

PISKUNOV, L. I.
Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

PITRE, D. L.
Population Exposure to Natural Radiation Background in Puerto Rico,
W75-04160 5B

POGRUND, R. S.
Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

POLEV, N. M.
Measuring the Concentration of Highly-Disperse Radioactive Aerosols by the Diffusion Method,
W75-04094 5A

POLYAKOVA, T. V.
Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

POMERANTS, L. B.
Effectiveness of the Pre-Aerator (Effektivnost' raboty pre-aeratora),
W75-03905 5D

PONCE, S. L.
The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water,
W75-03913 5C

POOK, E. W.
Application of Surface Moderators to Measurement of Water Content in Field Topsoils with a Neutron Moisture Depth Gauge,
W75-03940 2G

POPOV, V. I.
Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols,
W75-04098 5A

PORCELLA, D. B.
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

PORGES, R.
Standards, Administration, and Surveys, (Literature Review),
W75-04014 5G

PORTE, H. A.
Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

POSTON, J. W.
Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

POWERS, W. L.
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

PRASAD, M. V. R.
Some Considerations on Plant Types for Dryland Agriculture,
W75-04126 2I

PRASAD, R.
New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

PREISENDORFER, R. W.
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

Classical Canal Theory with Graphs and Tables. Volume II,
W75-04270 8B

PRESSER, T. S.
Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

PREUL, H. C.
A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics,
W75-04245 2E

PROCTOR, F. B.
Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

PRYOR, W. A.
Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

QUTUB, M. Y.
A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A., W75-04258 6B

RAATS, P. A. C.
Steady Flows of Water and Salt in Uniform Soil Profiles with Plant Roots, W75-03956 2I

RABOTNOVA, F. A.
Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry, W75-04099 5A

RAMAMURTHY, A. S.
Some Characteristics of Counterjet Flow, W75-04217 5B

RAMANUJAM, S.
New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water, W75-04113 5A

RAMASESHAN, S.
A Discrete Linear Model for the Hydrologic Basin, W75-04242 2A

RAMIREZ, G. E.
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru, W75-04313 3F

RAMZAEV, P. V.
Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions, W75-04063 5B

RAO, A. RAMACHANDRA
Stochastic Models for the Interaction of Rainfall and Groundwater Levels, W75-03949 2A

RAO, R. G. SRINIVASA
Stochastic Models for the Interaction of Rainfall and Groundwater Levels, W75-03949 2A

RAPP, A.
A Review of Desertization in Africa--Water, Vegetation, and Man, W75-04142 2J

RATH, A.
Identification of a Distributed Parameter System in Hydrology, W75-04280 2F

RAWAT, B. S.
Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil, W75-04136 2G

RAY, S. B.
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition, W75-04346 3F

REDKIN, Y. N.
Preliminary Data on the Measurement of the Atmospheric Aerosol Characteristics with a Centrifugal Spectrometer, W75-04093 5A

REGIER, H. A.
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation, W75-04116 5C

REGINATO, R. J.
The Three Stages of Drying A Field Soil, W75-03965 2D

REICH, B. M.
The Triangle as a Tentative Unit Hydrograph, W75-04239 4A

REICHERTER, U.
Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung), W75-03889 5D

REIKENIS, R.
Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text, W75-04266 5G

REINBOLD, J. R.
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues, W75-04034 5C

REYNOLDS, J. H.
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae, W75-04052 5C

Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature, W75-03854 5C

RIBEIRO, C. C.
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity, W75-04161 5C

RICHARDSON, A. C. B.
The Historical Development of Concepts of Radiation Dose Commitment, W75-04153 5C

RIEGER, S.
Temperature Regimes and Classification of Some Well-Drained Alpine Soils in Alaska, W75-04314 2G

ROALES, R. R.
Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos, W75-04282 5C

ROBERTS, K.
Microflotation, New-Old Water Purification Technique (Mikroflotation, nygammal vattenreningsteknik), W75-03888 5D

ROBERTSON, G. A.
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L, W75-04011 3F

ROBILLARD, L.
Some Characteristics of Counterjet Flow, W75-04217 5B

ROHWER, P. S.
Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases, W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas, W75-04187 5C

ROMANOV, N. N.
Some Characteristics of Upper Clouds and Suggestions Regarding the Utilization of Radioactive Tracers in Meridional Flows, W75-04059 2B

ROOSENBURG, W. H.
The Thermal Requirements and Tolerances of Key Estuarine Organisms, W75-03944 5C

ROSLYI, E. I.
A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples, W75-04097 5A

ROSYANOV, S. P.
Distribution and Migration of Strontium-90 in Soils, W75-04065 5B

ROTHWELL, D. F.
Conversion of DDT to DDD in Flooded Soil, W75-04348 5B

ROUTSON, R. C.
Experimental Methods for Obtaining Percol Model Input and Verification Data, W75-04276 5B

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems W75-04271 2F

ROVINSKII, F. Y.
Radioactive Isotopes of Europium Produced by Nuclear Blasts, W75-04058 5A

ROWE, D. W.
The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda, W75-04284 5C

RUBLEVSKII, V. P.
Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols, W75-04061 5A

RUHE, R. V.
Solid Waste Disposal by Land Burial in Southern Indiana, W75-04035 5E

RUSSEL, M. B.
Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy, W75-04318 3

RUSSO, E. P.
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway Bonnet Carre, Louisiana, U.S.A., W75-04256 5

RUZER, L. S.
Measuring the Concentration of Highly Disperse Radioactive Aerosols by the Diffusion Method, W75-04094 5

Spectrometric Method of Measuring the Concentration of Natural Radioactive Aerosols, W75-04098 5

RYAN, J.
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

RYCHERT, R. C.
Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

RYDER, R. A.
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation,
W75-04116 5C

RYER, F. H.
Exposures to Five Target Health Hazards,
W75-04190 5A

SAHELI, N.
Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

SAKSENA, R. S.
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

SANBORN, W. F.
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

SANCHEZ, P. A.
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

SANKARAN, K. S.
Mechanistic Response of Expansive Clays,
W75-03955 2G

SARAF, N. H.
Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

SAUERLENDER, O. H.
Criteria for Regionalization of Water and Waste Management Systems,
W75-03946 5D

SAXENA, S. N.
Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

SAY, E. W.
Protecting Creeksheds, Analysis and Action,
W75-03948 4D

Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

SCARAMELLI, A. B.
Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

SCHAUB, S. A.
Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

SEELYE, J. G.
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

SEIBERT, D. L. R.
Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

SEMAKOVA, L. A.
Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

SEN'KO, E. E.
New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

SERNE, R. J.
Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

SEVRUK, B.
The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

SHAFFER, M. J.
Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

SHAH, V. L.
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

SHALAVEYUS, S. S.
Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

SHAMBERGER, H. A.
Application of Analog Techniques to Water Management,
W75-04202 6A

The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

SHARMA, A. K.
A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

SHARMA, H. C.
Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

SHARP, J. V. A.
Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

SHARP, W. E.
The Dilution Capacity of Small Streams in South Carolina,
W75-04050 5B

SHINSHI, D.
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

SHIRAZI, M. A.
Some Results from Experimental Data on Surface Jet Discharge of Heated Water,
W75-04220 5B

SHKURATOVA, I. G.
Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

SHOPAUSKENE, D. A.
Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

SHPIRKAUSKAITE, N. K.
Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

SHRADER, W. D.
Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

SHULEPKO, Z. S.
Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

SHULTERS, M. V.
Lakes of Oregon: Volume 2. Benton, Lincoln, and Polk Counties,
W75-03968 2H

SHVEDOV, V. P.
Concentration of Phosphorus Radioisotopes in the Ground Layers of the Atmosphere and in Precipitation,
W75-04086 5A

SIERKA, R. A.
A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

SILANT'EV, A. N.
Isotope Analysis of Radioactive Fallout and Aerosol Samples by Beta-Spectrometry,
W75-04099 5A

A Simple Two-Dimensional Analyzer of Beta-Gamma Coincidences in the Study of Radioactive Fallout Samples,
W75-04097 5A

SILOS, J. S.
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

SIMONSON, G. H.
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

SIMPSON, S.
Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

SINGH, A.
Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

SINGH, AMBIKA
Cropping Patterns Involving Rice and Their Management,
W75-04127 3F

SINGH, B. P.
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

SINGH, R. C.
Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

SINGH, R. M.
Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

SINGH, S. D.
Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

SINGH, T. A.
Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

SINGHLA, S. K.
Distribution of Boron in Salt Affected and Contiguous Normal Soils,
W75-04141 2G

SISIGINI, T. I.
Assessment of Radon Emanation from the Surface of Extensive Territories,
W75-04090 5B

SITALO, E. A.
Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

SKINNER, E.
Solving Effluent Problems by the Use of Centrifuges,
W75-03942 5D

SKITOVICH, V. I.
Development of a Method for Determining the Size Distribution of Radioactive Aerosols with the Aid of Filtering Materials,
W75-04092 5A

Filtering Aerosols with Natural Atmospheric Radioactivity Through Fibrous Materials,
W75-04091 5A

SKOGLUND, T.
Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

SKUJINS, J.
Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

SLADE, S. K.
Conservation and Flooding Easements: A Case Study,
W75-04211 6E

SLATE, J. E. JR.
Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

SLOTTA, L. S.
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System,
W75-04049 4A

SLY, P. G.
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

SMITH, J. O.
Law, (Literature Review),
W75-04020 5G

SNYDER, W. S.
Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

SOKOLOVA, A. A.
Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

SOLOV'EV, V. P.
Rapid System of Automatic Punch-Tape Output of Information from the AI-100-1 Analyzer,
W75-04100 5A

SOLTIS, R. G.
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

SONENBLUM, S.
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

SONTHEIMER, H.
Studies on the Use of Ozone in Water and Waste Water Purification (Untersuchungen zur Anwendung von Ozon bei der Waser- und Abwasserreinigung),
W75-03889 5D

SORBER, C. A.
Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

SOUTH, C.
Operational Aspects of Urban Sewage Works,
W75-04114 5D

SPAIN, J. D.
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

STAFFORD, D. B.
Determining Land Use Changes in Watersheds by Aerial Photographic Measurements,
W75-04051 4C

STANBURY, P. S.
Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

STAPLES, K. D.
Investigation for the Marine Disposal of Effluents,
W75-04289 5B

STARIKOV, B. G.
Separate Determination of Rn, RaA, RaB, and RaC Concentrations in Air from the Alpha-Activity Decay Curve of a Filter,
W75-04095 5A

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

STARR, J. D.
How Chicago Manages its Distribution System,
W75-04197 6C

STECKEL, F.
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

STEFAN, H.
Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

STEPHENS, L. D.
Population Exposure from High-Energy Accelerators,
W75-04183 5C

STOCKER, Z. S. J.
Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

STONE, L. R.
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

STOTZKY, G.
Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

STRAUSS, A. M.
The Nonlinear Rainfall Response of Watersheds With Time Dependent Storage and Conveyance Properties,
W75-04240 2A

STREEB, J.
Stochastic Simulation of Daily Rainfall,
W75-04036 2B

STROBAND, H. J.
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

STRONG, A. L.
The Next Ten Years: Some Recommendations to the Delaware River Basin Commission,
W75-04210 6B

STROUD, A.
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

STYRO, B. I.
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

Long-Lived Alpha-Radioactivity in Fallout at Vilnius and at Various Atlantic Latitudes,
W75-04083 5A

New Methods of Measuring Rn220 (Thoron) Exhalation and Some Results,
W75-04096 5A

Polonium-210 in the Atmosphere and its Ratio to Lead-210,
W75-04088 5A

Some Features of Atmosphere Cleansing by Ground Condensation,
W75-04078 5A

UGAWARA, N.
Effects of Phthalate Esters on Shrimp,
W75-04285 5C

UROTKEVICHIENE, R.
State of Strontium-90, Cesium-137, and Cerium-144 in Radioactive Fallout,
W75-04071 5B

UTABUTR, P.
The Approximate Probability Density Function of Range and Adjusted Range,
W75-04246 6A

VANSON, E. R.
Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

VEENEY, R. A.
Rejuvenation of the Buffalo River,
W75-04248 5C

VENSON, F. A.
Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

TALLEY, W. J. JR.
New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

TALLIS, J. A.
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

TARASOV, S. I.
Relation Between Atmospheric Precipitation Washout of Radio-Activity and Nonactive Ions,
W75-04079 5B

TELL, R. A.
The Use of an Automated Population Data Base in Population Exposure Calculations,
W75-04157 5A

TELLER, H. L.
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitation Management,
W75-04255 3B

TELUSHKINA, E. L.
Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

TENNEY, M. W.
Mixing in Anaerobic Digestion,
W75-04120 5D

TEOTIA, M.
Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

TEOTIA, S. P. S.
Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

TER-SAAKOV, A. A.
The Atmospheric Formation of Secondary Aerosols During Ventilated Underground Nuclear Tests,
W75-04069 5B

Formation of Radioactive Particles During Nuclear Bursts in the Troposphere,
W75-04067 5B

TERRY, D. L.
Influence of Tobacco Plant Canopy on Percolation,
W75-03931 3F

THOMAS, B. R.
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

THOMAS, G. W.
Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

THOMAS, R. H.
Population Exposure from High-Energy Accelerators,
W75-04183 5C

THOMAS, S. B.
Population Exposure from High-Energy Accelerators,
W75-04183 5C

THOMAS, W. H.
Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

THOMSEN, K. O.
A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A.,
W75-04258 6B

THORUD, D. B.
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

TIERNAN, M. W.
Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

TOMPKINS, P. C.
The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

TORELLI, L.
CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

TOULEMONDE, M.
Biological Purification of Effluents from Bleached Kraft Pulp: The Case of La Cellulose Des Ardennes (Epuration biologique d'effluents de pate Kraft blanchie: Le cas de la Cellulose des Ardennes),
W75-03895 5D

TRELEASE, F. J.
The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

TRIVETT, N. B. A.
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea),
W75-03938 2D

TROITSKAYA, M. N.
Cesium-137, Strontium-90, and Lead-210 in Soil of the Far North Regions,
W75-04063 5B

TRUFAKIN, V. A.
Time Fluctuations of Lead-210 Concentration in the Ground Layer of the Atmosphere,
W75-04089 5A

Utilization of Natural Radioactive Substances in the Study of Turbulent Exchange and Atmospheric Scavenging by Means of Ground Measurement,
W75-04077 5B

TSAI, K. C.
Pollution Potential of Aquatic Sediments,
W75-04150 5B

TSAI, Y. J.
Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

TSAO, K. C.
Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

TSE, A. N.
Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

TSEVELEV, M. A.
Determination of Radioisotope Fallout From Its Content in Chronological Layers of High-Altitude Glaciers,
W75-04057 5A

TUNNY, J.
The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

TYURYUKANOVA, E. B.
Accumulation of Strontium-90 in Soils,
W75-04062 5B

ULLERY, S. J.
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

UNZ, R. F.
Microbiology of Waste Treatment, (Literature Review),
W75-04117 5D

UPCHURCH, W. J.
Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

VAN DER BURGH, P.
Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

VAN DER KUUR, P.
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

VAN DER SLOOT, H. A.
The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis,
W75-03908 5A

VAN DER WEIDE, J.
Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

VAN REES, A. J.
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

VASIL'EVA, N. V.
Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

VEBRENE, B. K.
Distribution of Raindrops with Respect to Specific Radioactivity,
W75-04073 2B

VENKATESHWAR, RAO D.
Mechanistic Response of Expansive Clays,
W75-03955 2G

VERBOOM, G. K.
Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

VERGARA, R.
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

VERHOFF, F. H.
Mixing in Anaerobic Digestion,
W75-04120 5D

VICINI, L.
Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

VIESSMAN, W. JR.
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

VILENSKII, V. D.
Radium-226 in Atmospheric Precipitation, and the Possibilities for Lead-210, Bismuth-210 and Polonium-210 to Penetrate the Atmosphere from the Earth's Surface,
W75-04087 5A

VINOGRADOVA, V. K.
Distribution and Migration of Strontium-90 in Soils,
W75-04065 5B

VODOVOZOVA, I. G.
Horizontal Water Migration of Strontium-90,
W75-04066 5B

VOLOKITINA, L. A.
Vertical Distribution of Radioactive Aerosols in the Troposphere Over the European USSR in 1964-1967,
W75-04055 5B

VYAS, D. L.
Studies of Tillage-Fertility on Pearl Millet in Sandy Arid Plains of Rajasthan,
W75-04129 3F

WACHSMUTH, W. A.
Apparatus for Separating Solids from Liquids,
W75-03866 5D

WAITE, T. D.
Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

WALDRIP, D. B.
Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

WALLACE, R. G.
The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

WANG, W-C,
Effect of Turbidity on Algal Growth,
W75-04306 5C

WARD, J. R.
Geohydrology of Nemaha County, Northeastern Kansas,
W75-03986 2F

WARNER, G. G.
Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

WARRACK, A. W.
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

WEIDNER, C. W.
Degradation in Groundwater and Mobility of Herbicides,
W75-04045 5B

WEISS, C. M.
Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

WELTY, C. G. JR.
Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

WENDELL, M.
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

WHITHED, M. H.
Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

WILDING, L. P.
Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

WILEY, A. J.
Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

WILKIE, W. H.
The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

WILLIS, R.
The Development of Supplemental Water Resource Flexibility and Farm Management Options,
W75-04031 3F

WINDHAM, S. T.
An Examination of Design Parameters in Field Study for Exposure Evaluation,
W75-04192 5A

Low Level Population Exposure Measurement Using Thermoluminescent Dosimeters,
W75-04178 5A

WITHERSPOON, J. P.
Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluent from a Model Fuel Reprocessing Facility,
W75-04170 5A

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Dose from Operating Facilities,
W75-04166 5A

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Popu

lation Doses Following Cessation of Plant Operations,
W75-04167 5B

WOLF, D.
Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

WOLF, D. A.
The Triangle as a Tentative Unit Hydrograph,
W75-04239 4A

WOLKOFF, A. A.
A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

WOODIWISS, F. S.
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area.
W75-04110 5C

WRIGHT, B. A.
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

WRIGHT, J.
Filtration - Media Selection is the Key to Success,
W75-03943 5F

WU, D. S.
Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

WU, I-P.
Design of a Conduit System with Diverging Branches,
W75-03930 8A

WU, Y. C.
Improved Clarification of Book Mill Effluent,
W75-03902 5D

WANG, K-P.
Design of a Conduit System with Diverging Branches,
W75-03930 8A

WASYULENIS, R. Y.
Argon Spallation Yields of Cosmogonic Radioisotopes,
W75-04082 5B

Concentration of Sodium Radioisotopes in the Ground Layer of the Atmosphere and in Precipitation,
W75-04085 5A

Cosmogonic Sodium-22 and Beryllium-7 Isotopes in Investigations of Atmospheric Dynamics,
W75-04081 5B

WEE, M. S.
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

WEH, W. W-G.
Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

YERMANOS, D. M.
Agronomic Survey of Jojoba in California,
W75-03960 3F

YOMTOVIAN, I.
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

YOUNG, C. E.
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

YOUNG, R. A.
Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

YUSHKAN, E. I.
Radioactive Isotopes of Europium Produced by Nuclear Blasts,
W75-04058 5A

ZHILKINA, M. I.
Fallout and Accumulation of Radioactive Decay Products in 1966-1968 in the Vicinity of Leningrad,
W75-04103 5B

ZIMINA, L. A.
Study of the Resistance of Fibrous Filtering Materials in Rarefied Air,
W75-04105 5A

ZIMMERER, A. L.
Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

ZIMMERER, B. J.
Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

ZIMMERER, P. B.
Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

ZIRZOW, C. F.
A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5G

ZITKO, V.
Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

ZYKOVA, A. S.
Rate of Atmospheric Fallout of Cesium-137 and Strontium-90 Aerosols,
W75-04061 5A

ORGANIZATIONAL INDEX

AEROJET ELECTROSYSTEMS CO., AZUSA, CALIF.
Development of a Prototype Airborne Oil Surveillance System - Volume I - System Definitions Studies.
W75-04259 5A

AGRICULTURAL RESEARCH SERVICE, BIG SPRING, TEX.
Effect of Tractor Traffic, Surface Mulch and Seedbed Configuration on Soil Properties,
W75-04316 3F

AGRICULTURAL RESEARCH SERVICE, BRAWLEY, CALIF. IMPERIAL VALLEY CONSERVATION RESEARCH CENTER.
Deterioration of Concrete Ditch Liners in Saline-Alkali Soil,
W75-03966 8F

AGRICULTURAL RESEARCH SERVICE, FLORENCE, S.C. COASTAL PLAINS SOIL AND WATER CONSERVATION RESEARCH CENTER.
Flue-Cured Tobacco Yield and Oxygen Content of Soil in Lysimeters Flooded for Various Periods,
W75-04111 3F

AGRICULTURAL RESEARCH SERVICE, LOGAN, UTAH.
Isolated Soil Columns for Plant Research: Procedure and Uniformity Trial,
W75-04321 3F

AGRICULTURAL RESEARCH SERVICE, PENDLETON, OREG. COLUMBIA PLATEAU CONSERVATION RESEARCH CENTER.
Corn Root-Configuration Response to Soil Temperature and Matric Suction,
W75-04288 3F

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ., WATER CONSERVATION LAB.
The Three Stages of Drying A Field Soil,
W75-03965 2D

AGRICULTURAL RESEARCH SERVICE, RIVERSIDE, CALIF. SALINITY LAB.
Steady Flows of Water and Salt in Uniform Soil Profiles with Plant Roots,
W75-03956 2I

ALFA-LAVAL PTY. LTD. (AUSTRALIA). INDUSTRIAL DIV.
Solving Effluent Problems by the Use of Centrifuges,
W75-03942 5D

ALTAMAHA GEORGIA SOUTHERN AREA PLANNING AND DEVELOPMENT COMMISSION, BAXLEY, GA.
Water and Sewer Management Study, Altamaha Georgia Southern Area.
W75-04196 5G

AMERICAN INSURANCE ASSOCIATION, WASHINGTON, D.C.
Exposures During The Transportation of Radioactive Materials,
W75-04189 5C

AMOCO PRODUCTION CO., TULSA, OKLA. (ASSIGNEE)
Use of Sulfur for Combatting Oil Spills,
W75-03869 5G

AQUA-CHEM, INC., MILWAUKEE, WIS. (ASSIGNEE)
Milti-Stage Flash Evaporator,
W75-03860 3A

ARGONNE NATIONAL LAB., ILL.
Thermal Pollution of the Great Lakes -- A Non-Problem,
W75-04231 5B

ARIZONA STATE FUEL AND ENERGY OFFICE, PHOENIX. CONSERVATION SECTION.
Putting the Sun to Work: A History and Directory of Currently Available Solar Energy Applications,
W75-04128 3A

ARIZONA UNIV., TUCSON. DEPT. OF ANTHROPOLOGY.
Irrigation's Impact on Society.
W75-04138 3F

ARIZONA UNIV., TUCSON. DEPT. OF GEOSCIENCES.
The Hydraulic Geometry of a Discontinuous Ephemeral Stream in a Bajada Near Tucson, Arizona,
W75-04125 2E

Hydrogeology of the Carefree Ranch Area, Maricopa County, Arizona,
W75-04145 2F

ARIZONA UNIV., TUCSON. DEPT. OF NUCLEAR ENGINEERING.
A Combined System Concept for Power Generation and Wastewater Renovation,
W75-04227 5D

ARIZONA UNIV., TUCSON, DEPT. OF SOILS, WATER, AND ENGINEERING.
Two-Dimensional Displacement Into or from Water-Filled Ditches,
W75-03957 4A

ARIZONA UNIV., TUCSON. DEPT. OF WATERSHED MANAGEMENT.
Vegetation Management for Increased Water Yield in Arizona,
W75-03961 3B

ARIZONA UNIV., TUCSON. INST. OF GOVERNMENT.
Institutional Fragmentation and Policy Innovation: The Case of Federal Water Pollution Control,
W75-03851 5G

ARIZONA UNIV., TUCSON. LAB. OF TREE-RING RESEARCH.
Relationships of Ring Widths in Arid-Site Conifers to Variations in Monthly Temperature and Precipitation,
W75-03964 2I

ARKHANGELSKII LESOTEKHNICHESKII INSTITUT (USSR).
On the Sorption Capacity of Lignin for the Easy- and Difficult-To-Oxidize Components or Residual Liquor from Yeast Production (O sorptsionnoi emkosti lignina po legko- i trudnookislyaemym komponentam posledrozhzhevoi brazhki),
W75-03896 5D

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
Industrial Wastewaters, Red River Army Depot, Texarkana, Texas,
W75-04263 5D

ARMY ENGINEER DISTRICT, MOBILE, ALA.
Special Flood Hazard Information Report: Yockanookany River, Dye Ditch and Munson Creek, Kosciusko, Attala County, Mississippi.
W75-04204 4A

Flood Plain Information: Choctawhatchee River, Pea River, Double Bridges Creek, City of Geneva, Alabama.
W75-04212 4A

ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.
Water Quality Aspects of the 1973 Opening of the Mississippi River Diversion Spillway at Bonnet Carre, Louisiana, U.S.A.,
W75-04256 5B

ARMY ENGINEER DISTRICT, NORFOLK, VA.
Flood Plain Information: North Run, Henrico County, Virginia,
W75-04208 2E

Flood Plain Information: Gillies Creek, Henrico County, Virginia,
W75-04209 2E

ARMY ENGINEER DISTRICT, SACRAMENTO, CALIF.
Flood Plain Information: Jordan River Complex II, Midvale-Draper, Utah.
W75-04205 4A

ARMY ENGINEER TOPOGRAPHIC LAB., FORT BELVOIR, VA.
Worldwide Distributions of Mean Monthly Dewpoint,
W75-04130 2A

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS. OFFICE OF DREDGED MATERIAL RESEARCH.
Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,
W75-04347 5B

ARMY MEDICAL ENVIRONMENTAL ENGINEERING RESEARCH UNIT, EDGEWOOD ARSENAL, MD.
Problem Definition Study: Evaluation of Health and Hygiene Aspects of Land Disposal of Wastewater at Military Installations,
W75-04015 5D

ATOMIC ENERGY COMMISSION, NEW YORK, NEW YORK, HEALTH AND SAFETY LABORATORY.
Determination of Gamma-Ray Exposure in the Vicinity of a Boiling Water Power Reactor,
W75-04168 5A

BANGLADESH AGRICULTURAL UNIV., MYMENSINGH. DEPT. OF SOIL SCIENCE.
Conversion of DDT to DDD in Flooded Soil,
W75-04348 5B

BARRIER FILTERS PTY. LTD. (AUSTRALIA).
Filtration - Media Selection is the Key to Success,
W75-03943 5F

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH. WATER AND LAND RESOURCES DEPT.
Methods for Estimating Transport Model Parameters for Regional Groundwater Systems,
W75-04271 2F

Experimental Methods for Obtaining Percol Model Input and Verification Data,
W75-04276 5B

BEDFORD INST., DARTMOUTH (NOVA SCOTIA).
Run-Off Regulation of the St. Lawrence and Its Liability,
W75-04243 4A

BONNEVILLE POWER ADMINISTRATION, PORTLAND, OREG.
Open Channel Flow Evaporation Study,
W75-04273 2D

BRISTOL AVON RIVER AUTHORITY (ENGLAND).
Quality Control in River Management of the Bristol Avon,
W75-04324 5G

BROOKHAVEN NATIONAL LAB., UPTON, N.Y.
As Low as Practicable: A Critical Appraisal of Population Health Risks from Power Plant Effluents,
W75-04163 5A

Health Effects of Fossil Fuel Power Plants,
W75-04180 5C

BUREAU OF LAND MANAGEMENT, PORTLAND, OREG.
Evaluation of Criteria for Separating Soils with Xeric and Udic Moisture Regimes,
W75-04312 2G

BUREAU OF RECLAMATION, DENVER, COLO. ENGINEERING AND RESEARCH CENTER.
Nitrification in Soil-Water Systems: A Computerized Activated Complex Model,
W75-04235 5B

BUREAU OF RECLAMATION, DENVER, COLO. LOWER MISSOURI REGION.
The Elements of Carrying Capacity in the Recreation Utilization of Reservoirs,
W75-04249 6B

BURLINGTON (ONTARIO). CANADA CENTRE FOR INLAND WATERS.
A Summary and Comparison of Nutrients and Related Water Quality in Lakes Erie, Ontario, Huron, and Superior,
W75-04027 5B

CALIFORNIA STATE UNIV., SAN JOSE. DEPT. OF NATURAL SCIENCE.
A Drift Card Study in Monterey Bay, California: September 1971 to April 1973,
W75-04279 2L

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Population Exposure from High-Energy Accelerators,
W75-04183 5C

CALIFORNIA UNIV., BERKELEY. OPERATIONS RESEARCH CENTER.
Identification of a Distributed Parameter System in Hydrology,
W75-04280 2F

CALIFORNIA UNIV., BERKELEY. SCHOOL OF FORESTRY AND CONSERVATION.
Usefulness of ERTS-1 and Supporting Aircraft Data for Monitoring Plant Development and Range Conditions in California's Annual Grassland,
W75-03990 4A

CALIFORNIA UNIV., DAVIS.
Rise and Decline of the Water Table Induced by Vertical Recharge,
W75-04333 2F

Models of Dispersion in a Granular Medium,
W75-04340 2F

CALIFORNIA UNIV., DAVIS. DEPT. OF CIVIL ENGINEERING.
Applications of Systems Analysis to International Water Resources Projects,
W75-04232 6A

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF ENGINEERING SYSTEMS.
Optimization of Real Time Operation of a Multiple-Reservoir System,
W75-03935 4A

CALIFORNIA UNIV., LOS ANGELES. INST. OF GOVERNMENT AND PUBLIC AFFAIRS.
Some Political and Economic Aspects of Managing California Water Districts,
W75-03856 6B

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF PLANT SCIENCES.
Agronomic Survey of Jojoba in California,
W75-03960 3F

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA. INST. OF MARINE RESOURCES.
Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California,
W75-04283 5C

CANADA CENTRE FOR INLAND WATERS, BURLINGTON (ONTARIO).
A Highly Sensitive Technique for the Liquid Chromatographic Analysis of Phenols and Other Environmental Pollutants,
W75-03911 5A

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. DEPT. OF SYSTEMS ENGINEERING.
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water, Phase II,
W75-03853 4B

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. SEARS LIBRARY.
Setting up a Special Collection on Water Pollution in a University Library,
W75-04118 5G

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. SYSTEMS ENGINEERING DIV.
Mathematical Modelling and Identification of Thermal Pollution in Streams: A Review Paper,
W75-04230 5B

CATHOLIC UNIV. OF AMERICA, WASHINGTON, D.C. INST. OF SOCIAL AND BEHAVIORAL RESEARCH.
Evaluation of Interregional Input-Output Models for Potential Use in the McClellan-Kerr Arkansas River Multiple Purpose Project Impact Study,
W75-03923 4A

CENTRAL ARID ZONE RESEARCH INST., JODHPUR (INDIA).
Some Socio-Agricultural Changes as a Result of Introduction of Irrigation in a Desert Region,
W75-03951 3F

Distribution of Humus and Avalable Nutrient in Soil Under Sown Pastures in an Arid Environment,
W75-03958 3I

CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR (INDIA).
Some Considerations on Plant Types for Dryland Agriculture,
W75-04126 2

Studies of Tillage-Fertility on Pearl Millet i Sandy Arid Plains of Rajasthan,
W75-04129 3

CENTRAL INLAND FISHERIES RESEARCH INST., BARRACKPORE (INDIA).
Biological Processes Involved in Pollution Coastal Aquaculture Waters,
W75-04281 5

CENTRAL SOIL SALINITY RESEARCH INST., KARNAL (INDIA).
Distribution of Boron in Salt Affected and Co tiguous Normal Soils,
W75-04141 2

CENTRO DI RICERCA IBM DI VENEZIA (ITALY).
Second-Order Theory of Flow in Three-Dimesional Deforming Media,
W75-04308

CHICAGO DEPT. OF WATER AND SEWERS, ILL.
How Chicago Manages its Distribution Systen
W75-04197

CINCINNATI UNIV., OHIO. DEPT. OF ENGINEERING ANALYSIS.
The Nonlinear Rainfall Response Watersheds With Time Dependent Storage a Conveyance Properties,
W75-04240

CLEMSON UNIV., S. C. DEPT. OF CIVIL ENGINEERING.
Determining Land Use Changes in Watershe by Aerial Photographic Measurements,
W75-04051

COLORADO DIV. OF WILDLIFE, FORT COLLINS. FISHERIES RESEARCH CENTER.
Acute Toxicity of a Zinc-Polluted Stream Four Species of Salmonids,
W75-04287

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF EARTH RESOURCES.
General Disposition and Aquatic Environmental Effects of Silver Iodide in Precipitat Management,
W75-04255

COMMONWEALTH EDISON CO., CHICAGO ILL.
A Review of Effluents, General Populat Doses, and Occupational Doses Resulting fr Commonwealth Edison's Use of Nucl Power,
W75-04164

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CANBERRA (AUSTRALIA). DIV. OF PLANT INDUSTRY.
Application of Surface Moderators to Measurement of Water Content in Field Topsoils wit Neutron Moisture Depth Gauge,
W75-03940

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CLAYTON (AUSTRALIA). DIV. OF CHEMICAL PHYSICS.
Monitor for the Quality of Australia's Water Resources,
W75-03939 5A

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, DENILIQUIN (AUSTRALIA). DIV. OF PLANT INDUSTRY.
The Effect of Gypsum Treatment on the Swelling of Natural Clods of a Clay Soil,
W75-04132 2G

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, MORDIALLC (AUSTRALIA). DIV. OF ATMOSPHERIC PHYSICS.
An Energy Partition Evaporation Recorder,
W75-03937 2D

CORNELL UNIV., ITHACA, N.Y. DEPT. OF ENVIRONMENTAL ENGINEERING.
Kinetics of Microbiologically Mediated Transformations of Heavy Metals in Aquatic Environments,
W75-03945 5B

CORNELL UNIV., ITHACA, N.Y. DEPT. OF OPERATIONS RESEARCH.
Methodologies for Operating Reservoirs for Short-Term Flood Control,
W75-03855 4A

DELAWARE RIVER BASIN COMMISSION, TRENTON, N.J.
Standards, Administration, and Surveys, (Literature Review),
W75-04014 5G

DELAWARE UNIV., NEWARK; AND ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, PA.
The Delaware Estuary System, Environmental Impacts and Socio-Economic Effects. Annex to Volume I. Management Agency Problems in the Delaware Estuary,
W75-04328 6F

DELTA WORKS, THE HAGUE (NETHERLANDS). HYDRAULICS DIV.; AND WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS).
Experiences with Tidal Salinity Model Europoort,
W75-03927 8B

DEPARTMENT OF AGRICULTURE, HARROW (ONTARIO). RESEARCH STATION.
Use of Black Polyethylene Mulch to Reduce Flooding Effects on Tomato Yields,
W75-04030 3F

DEPARTMENT OF THE ENVIRONMENT, OTTAWA, (ONTARIO). MARINE SCIENCES DIRECTORATE.
Data Collection and Analysis Techniques for Global Marine Pollution Studies,
W75-04236 5A

DEPARTMENT OF THE ENVIRONMENT, READING (ENGLAND). WATER DATA UNIT.
The Ultrasonic Method of River Gauging,
W75-04026 4A

DEPARTMENT OF WATER AFFAIRS, ORANIA (SOUTH AFRICA).
Mechanics of Dispersion of Pollutants in Coastal Environment,
W75-04237 5B

DIVISION OF OPERATIONAL SAFETY (AEC), WASHINGTON, D.C.
Assessment of Public Radiation Exposure in the Vicinity of U.S. Aec Sites,
W75-04194 5A

DU PONT DE NEMOURS (E. I.) AND CO., AIKEN, S.C. SAVANNAH RIVER LAB.
Determination of Parts Per Billion Sulfide in Water with the Sulfide-Selective Electrode,
W75-04021 5A

EASTERN ENVIRONMENTAL RADIATION FACILITY, MONTGOMERY, ALA.
Low Level Population Exposure Measurements Using Thermoluminescent Dosimeters,
W75-04178 5A

An Examination of Design Parameters in a Field Study for Exposure Evaluation,
W75-04192 5A

EBASCO SERVICES, INC., NEW YORK.
Progress in Satisfying Environmental Requirements,
W75-04018 5G

ECODYNE CORP., CHICAGO, ILL. (ASSIGNEE)
Apparatus for Separating Solids from Liquids,
W75-03866 5D

ECOLE POLYTECHNIQUE, MONTREAL (QUEBEC).
Evaluating Multireservoir Operating Rules,
W75-03932 4A

EDAW, INC., SAN FRANCISCO, CALIF.
Surface Water Data of the Upper Michigan Region Project Sanguine, Site Study.
W75-04277 2E

EG AND G, INC., LAS VEGAS, NEV.
Population Exposure to Natural Terrestrial Gamma Radiation Around Selected Nuclear Power Plant Sites,
W75-04193 5A

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND). VERSUCHSANSTALT FUER WASSERBAU, HYDROLOGIE UND GLAZIOLOGIE.
The Use of Stereo, Horizontal, and Ground Level Orifice Gages to Determine a Rainfall-Elevation Relationship,
W75-04330 2B

ENTE NATIONALE PER L'ENERGIA ELETTRICA, FLORENCE (ITALY). COMPARTIMENTO DI FIRENZE.
Thermal Pollution Aspects in Europe,
W75-04226 5B

ENVIRONMENTAL DEFENSE FUND, WASHINGTON, D.C. WATER RESOURCES PROGRAM.
Is the Water Safe to Drink. Part 3: What You Can Do,
W75-04019 5F

ENVIRONMENTAL PREDICTION RESEARCH FACILITY (NAVY), MONTEREY, CALIF.
Computation of Tides, Currents, and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-Layer Hydrodynamical-Numerical Models, Part 4,
W75-04262 5B

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO.
Direct Analysis of Water Samples for Organic Pollutants With Gas Chromatography/Mass Spectrometry,
W75-03910 5A

ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
The Use and Misuse of Population Exposures in Radiation Protection,
W75-04154 5C

ENVIRONMENTAL PROTECTION AGENCY, SEATTLE, WASH. REGION X.
Guidelines for Preparation of Environmental Statements for Reviewing and Commenting on Environmental Statements by Other Federal Agencies.
W75-04010 6G

ENVIRONMENTAL PROTECTION SERVICE, OTTAWA (ONTARIO).
Study of the Seasonal Effects on the Microbiology of a Northern Pulp and Paper Mill Aeration Lagoon,
W75-03916 5D

ENVIRONMENTS FOR TOMORROW, INC., MCLEAN, VA.
Management of Water Resources for Urban Environmental Enhancement,
W75-04151 6B

ESSO RESEARCH AND ENGINEERING CO., LINDEN, N.J.
Disposal/Recycle Management System Development for Air Force Waste Petroleum Oils and Lubricants.
W75-04268 5E

FEDERAL POWER COMMISSION, WASHINGTON, D.C. BUREAU OF POWER.
Water Resources Appraisal for Hydroelectric Licensing, The Clarion River Basin, Pennsylvania.
W75-04274 6G

FINNISH PULP AND PAPER RESEARCH INST., HELSINKI.
Use of Waste Chemicals in Kraft Mill Effluent Treatment,
W75-03891 5D

FISHERIES RESEARCH BOARD OF CANADA, ST. ANDREWS (NEW BRUNSWICK). BIOLOGICAL STATION.
Uptake of Chlorinated Paraffins and PCB from Suspended Solids and Food by Juvenile Atlantic Salmon,
W75-04286 5C

FOREST SERVICE (USDA) CORVALLIS, OREG. FORESTRY SCIENCES LAB.
The Toxicity of 2, 3, 7, 8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Guppies (Poecilia Reticulatus Peters),
W75-04028 5C

FOREST SERVICE (USDA), OGDEN, UTAH. INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
More Streamflow After a Bark Beetle Epidemic,
W75-04342 4C

GEOLOGICAL SURVEY, ANCHORAGE, ALASKA.
Preconstruction Assessment of Biological Quality of the Chena and Little Chena Rivers in

GEOLOGICAL SURVEY, ANCHORAGE, ALASKA.

the Vicinity of Chena Lakes Flood Control Project Near Fairbanks, Alaska,
W75-03988 5B

GEOLOGICAL SURVEY, ATLANTA, GA.
Use of Water in Georgia, 1970, with Projections to 1990,
W75-03983 6D

Geology and Ground-Water Resources of Gordon, Whitfield, and Murray Counties, Georgia,
W75-03984 2F

GEOLOGICAL SURVEY, CARSON CITY, NEV.
The Story of Wonder, Churchill County, Nevada,
W75-03985 3E

GEOLOGICAL SURVEY, DENVER, COLO.
Possible Development of Water from Madison Group and Associated Rock in Powder River Basin, Montana-Wyoming,
W75-03972 4B

GEOLOGICAL SURVEY, EL PASO, TEX.
Quality and Availability of Water in Westernmost Texas,
W75-03979 2K

GEOLOGICAL SURVEY, HELENA, MONT.
Shallow Ground Water in Selected Areas in the Fort Union Coal Region.
W75-03974 5B

Water-Resources Investigations of the U.S. Geological Survey in the Northern Great Plains Coal Region of Eastern Montana, 1974-75.
W75-03977 7C

GEOLOGICAL SURVEY, LAS VEGAS, NEV.
Water-Resources Data Collected in the Devils Hole Area, Nevada, 1973-74,
W75-03978 7C

GEOLOGICAL SURVEY, LAWRENCE, KANS.
Geohydrology of Nemaha County, Northeastern Kansas,
W75-03986 2F

Geology and Ground-Water Resources of Montgomery County, Southeastern Kansas,
W75-03987 2F

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Hydrologic Analysis of the Mojave River, California, Using a Mathematical Model,
W75-03967 4A

Geohydrologic Map of Southern California,
W75-03973 7C

Limnological Data from Selected Lakes in the San Francisco Bay Region, California,
W75-03975 2H

Special Techniques for Determining Chemical Properties of Geothermal Water,
W75-03980 2K

Flood-Hazard Study--100-Year Flood Stage for Baldwin Lake, San Bernardino County, California,
W75-03981 2H

Limnological Study of Lake Shastina, Siskiyou County, California,
W75-03982 2H

GEOLOGICAL SURVEY, PORTLAND, OREG.
Lakes of Oregon: Volume 2. Benton, Lincoln, and Polk Counties,
W75-03968 2H

Crest-Stage Gaging Stations in Oregon--A Compilation of Peak Data Collected from October 1952 to September 1974,
W75-03969 7C

GEOLOGICAL SURVEY, RESTON, VA.
The Processing and Storage of Water-Quality Data in the National Water Data Storage and Retrieval System,
W75-03970 7C

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
The Observation-Well Network of the U.S. Geological Survey in Florida,
W75-03971 7C

Hydrologic Data for 1973, Broward County, Florida,
W75-03976 3B

GEORGIA INST. OF TECH., ATLANTA. OFFICE OF INTERDISCIPLINARY PROGRAMS.
Radiation Dose From Natural Gas vs. That From Nuclear Stimulated Natural Gas,
W75-04185 5A

GEORGIA INST. OF TECH., ATLANTA. SCHOOL OF CIVIL ENGINEERING.
Heat Dissipation from Turbulent Open Channel Flow,
W75-04350 5B

GEORGIA INST. OF TECH., ATLANTS. OFFICE OF INTERDISCIPLINARY PROGRAMS.
Consideration of Background in Development of Environmental Standards,
W75-04155 5G

GEORGIA UNIV., ATHENS. INST. OF GOVERNMENT.
Law, (Literature Review),
W75-04020 5G

GHENT RIJKSUNIVERSITEIT (BELGIUM). SOIL PHYSICS, SOIL CONDITIONING AND HORTICULTURAL SOIL SCIENCES LAB.
Dune Sand Stabilization with Synthetic Soil Conditioners: A Laboratory Experiment,
W75-03953 2G

GOVERNMENT INDUSTRIAL RESEARCH INST., TAKAMATSU (JAPAN).
The Attempts to Modify the Activated Sludge Process in Sulphate Pulp Waste Water (In Japanese),
W75-03882 5D

Studies of Renovation of Pulp Mill Waste Water; The Conditions of the Percolation Through Activated Carbon Column for Kraft Pulp Lignin (In Japanese),
W75-03883 5D

GREEN ASSOCIATES, INC., TOWSON, MD.
Regional Landfill and Construction Material Needs in Terms of Dredged Material Characteristics and Availability; Volume I: Main Text,
W75-04266 5G

GUJARAT SOIL CONSERVATION RESEARCH, DEMONSTRATION AND TRAINING CENTRE, VASAD (INDIA).
Preliminary Study on Movement of Available Water in Sandy Loam Soils Under Dry Farming Conditions,
W75-04133 3F

HAIFA UNIV. (ISRAEL).
Attitudes Toward Payment for Resource Use: The Case of Domestic Water Consumption,
W75-04201 6C

HARYANA AGRICULTURAL UNIV., HISSAR (INDIA).
Effect of Soil Moisture Regimes, Phosphorus and Nitrogen on N and P Uptake by Barley (Hordeum Vulgare L.),
W75-03991 3F

HAWAII INST. OF GEOPHYSICS, HONOLULU.
Classic Canal Theory with Graphs and Tables. Volume I,
W75-04269 8B

Classical Canal Theory with Graphs and Tables. Volume II,
W75-04270 8B

HAWAII UNIV., HONOLULU. SEA GRANT PROGRAM.
Aquatic Survey of the Kona Coast Ponds, Hawaii Island,
W75-04275 2L

HEALTH AND SAFETY LAB. (AEC), NEW YORK.
Data Needs for the Assessment of Population Dose From Background Radiation,
W75-04156 5A

HEALTH PHYSICS SOCIETY, EAST WEYMOUTH, MASS.
Symposium on Population Exposures,
W75-04152 5C

The Use of Environmental Monitoring Data in Determining Background Radiation Doses,
W75-04158 5A

HEBREW UNIV., JERUSALEM (ISRAEL). GRADUATE SCHOOL OF APPLIED SCIENCE AND TECHNOLOGY.
Interfacing Newly Developed Technology Within Present Wastewater Treatment Trains,
W75-04325 5D

HENRY (J.J.) CO., INC., MOORESTOWN, N.J.
An Analysis of Oil Outflows Due to Tanker Accidents, 1971-1972.
W75-04260 5B

HERCULES INC., WILMINGTON, DEL.
An Overloaded Sludge Plant. Try Chemical Treatment,
W75-04123 5D

HOWARD, NEEDLES, TAMMEN, AND BERGENDOFF, ALEXANDRIA, VA. DEPT. OF ENVIRONMENTAL QUALITY AND CONSERVATION.
A Positive Look at Achievements in Water Quality Enhancement,
W75-04247 5G

HURON RIVER WATERSHED COUNCIL, ANN ARBOR, MICH.
Protecting Creeksheds: Development and Evaluation of a Method to Manage Small, Urbanizing Watersheds Through Local Government Actions,
W75-03947 4D

Protecting Creeksheds, Analysis and Action,
W75-03948 4D

HYDROBIOLOGICAL RESEARCH INST., JYVASKYLA (FINLAND).
The Eutrophication and Pollution of Lake Paijanne, Central Finland,
W75-04264 5C

HYDROMETEOROLOGICAL SERVICE OF THE USSR, MOSCOW.
Nuclear Meteorology,
W75-04054 5B

IDAHO UNIV., MOSCOW.
Characteristics and Prediction of Soil Erosion on a Watershed in the Palouse,
W75-04033 2J

IDAHO UNIV., MOSCOW. DEPT OF AGRICULTURAL ENGINEERING.
Evaluation of Irrigation Systems in the Snake River Fan, Jefferson County, Idaho,
W75-04032 3F

IDROTECNECO, SAN LORENZO IN CAMPO, (ITALY).
CRE: A Method for Solving Probability Problems Related to Hydrologic Time Series,
W75-04310 2E

ILLINOIS STATE NATURAL HISTORY SURVEY, URBANA.
Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues,
W75-04034 5C

ILLINOIS STATE WATER SURVEY, URBANA.
Cost of Importing Deep Sandstone Water to Eliminate Groundwater Deficits in Northeastern Illinois,
W75-04305 6C

Effect of Turbidity on Algal Growth,
W75-04306 5C

ILLINOIS UNIV. MEDICAL CENTER, CHICAGO, ILL. SCHOOL OF PUBLIC HEALTH.
Biomedical Evaluation of Low Frequency (Long Wave) Electromagnetic Radiation Associated with Electric Power Transmission,
W75-04191 5C

ILLINOIS UNIV., URBANA.
Effect of Moisture Regimes and Green Manuring on Ferrous Iron Concentration in Soil and Growth and Yield of Paddy,
W75-04318 3F

ILLINOIS UNIV., URBANA. AGRICULTURAL EXPERIMENTAL STATION.
Effect of Nitrate and Sediment Constraints on Economically Optimal Clay Production,
W75-04349 4D

ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Model-Prototype Comparisons for Transverse Mixing in Rivers,
W75-03918 8B

Laboratory Studies on Transverse Mixing in Rivers,
W75-03928 8B

ILLINOIS UNIVERITY, CHICAGO. DEPT. OF ENGINEERING.
Toward a Science Policy for Computers in Water Resources: Trends and Issues,
W75-04257 6A

INDIAN AGRICULTURAL RESEARCH INST., NEW DELHI (INDIA).
Effect of Stored Soil Moisture Reserve Through Conservation Practices and Supplemental Irrigation on Wheat Yield Under Dryland Farming Condition,
W75-04346 3F

INDIAN DEFENCE RESEARCH AND DEVELOPMENT ESTABLISHMENT, GWALIOR.
New Spectrophotometric Method for the Estimation of Hexavalent Chromium in Water,
W75-04113 5A

INDIAN GRASSLAND AND FODDER RESEARCH INST., JHANSI.
The Effect of Interval and Intensity of Defoliation on the Dry Matter Production of Some Important Grass Species of Western Rajasthan,
W75-04131 2I

INDIAN INST. OF MANAGEMENT, AHMEDABAD.
Water Utilization and Agricultural Development in Western Uttar Pradesh,
W75-03950 3F

INDIAN INST. OF TECH., KANPUR. DEPT. OF CIVIL ENGINEERING.
A Discrete Linear Model for the Hydrologic Basin,
W75-04242 2A

INDIAN INST. OF TECH., MADRAS, SOIL ENGINEERING LAB.
Mechanistic Response of Expansive Clays,
W75-03955 2G

INDIANA UNIV., BLOOMINGTON.
Solid Waste Disposal by Land Burial in Southern Indiana,
W75-04035 5B

INSTITUTE FOR AGRICULTURAL RESEARCH, ZARIA (NIGERIA).
Comparison of Some Methods for Determining Organic Phosphorus in Some Nigerian Soils,
W75-04139 2G

INSTITUTE FOR APPLIED RESEARCH ON NATURAL RESOURCES, BAGHDAD (IRAQ).
Utilization of Mineral and Thermal Springs in Iraq: Preliminary Report.
W75-04140 4B

INSTITUTE OF GEOLOGICAL SCIENCES, LONDON (ENGLAND). DEPT. OF HYDROGEOLOGY.
Lysimeter Installations in Sandstone at Styrrup, Nottinghamshire,
W75-04332 2G

Groundwater Storage-Riverflow Relations in a Chalk Catchment,
W75-04339 2A

INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS.
Control of Reverse Osmosis Membrane Hydrolysis with Dynamically Formed Wood Chemical Membranes,
W75-03890 5D

INSTITUTUL DE STUDII SI CERCETARI HIDROTEHNICE, BUCHAREST (RUMANIA).
Prediction of Oxygen Transfer Rate in Air Bubble Aeration,
W75-04253 5D

IOWA STATE UNIV., AMES.
Effect of Level Terraces on Soil Moisture Content and Utilization by Corn,
W75-04315 3F

IOWA UNIV., IOWA CITY. INST. OF HYDRAULIC RESEARCH.
Reservoir Operation Through Objective Trade-Offs,
W75-04345 4A

JACOBS ENGINEERING CO., PASADENA, CALIF.
Dichromate Relux Chemical Oxygen Demand: A Proposed Method for Chloride Correction in Highly Saline Wastes,
W75-04124 5A

KANSAS AGRICULTURAL EXPERIMENT STATION, MANHATTAN. EVAPOTRANSPIRATION LAB.
Relation of Soybean Leaf Water Potential to Soil Water Potential,
W75-03989 3F

KARLSRUHE UNIV. (WEST GERMANY). THEODOR-REHBOCK LAB. FOR RIVER IMPROVEMENT.
Sensitivity Analysis of the Optimum Design Flood Evaluated by an Optimization Procedure,
W75-04234 4A

KENICS CORP., DANVERS, MASS.
Static Mixing Concept for Aerators Wins Acceptance,
W75-03914 5D

KENTUCKY UNIV., LEXINGTON.
Effect of a Killed Sod Mulch on Nitrate Movement and Corn Yield,
W75-04013 3F

KENTUCKY WATER RESOURCES INST., LEXINGTON.
Stochastic Simulation of Daily Rainfall,
W75-04036 2B

Hydraulic and Flow Studies Related to Sediment Transport, Kentucky River, Kentucky,
W75-04147 2J

KIMBERLY-CLARK CORP., NEENAH, WIS.
Improved Clarification of Book Mill Effluent,
W75-03902 5D

KURITA WATER INDUSTRIES LTD., OSAKA (JAPAN).
On the Application of Polyelectrolytes to White Water Treating by Dissolved-Air Flotation (In Japanese),
W75-03884 5D

L.L.R.M. MEDICAL COLL., MEERUT (INDIA). DEPT. OF HUMAN METABOLISM.
Further Observations on Endemic Fluoride-Induced Osteopathies in Children,
W75-03909 5C

LANDMARK, INC., COLUMBUS, OHIO.
Loess Distribution on a Wisconsin-Age Till Plain in Southwestern Ohio,
W75-04320 2G

LBC AND W CONSULTANTS, COLUMBIA, S.C.
Functional Plan for Water Supply and Waste Water Disposal for the Santee-Wateree Planning District,
W75-04195 5G

LEYLAND URBAN DISTRICT COUNCIL (ENGLAND).
Operational Aspects of Urban Sewage Works,
W75-04114 5D

LIMNETICS, INC., MILWAUKEE, WIS.
Development of a Complete Mathematical Model for Describing the Point Beach Nuclear Power Plant Thermal Plume,
W75-04238 5B

LINDSAY MFG. CO., NEBR. (ASSIGNEE)
Means for Rotatably Supporting an Overhead Irrigation Pipe,
W75-03867 3F

LOS ANGELES COUNTY SANITATION DISTRICTS, WHITTIER, CALIF.
Data Reduction Methods for Hydrologic Analyses,
W75-03929 7C

MAHONING-TRUMBULL COUNCIL OF GOVERNMENTS, OHIO.
A Water Sewer Plan and Program for the Youngstown-Warren Metropolitan Area,
W75-04200 5D

MALCOLM PIRNIE, INC., WHITE PLAINS, N.Y.
Knowlton (Brothers Inc., Watertown, New York) Mill Closes Loop on Waste Treatment/Water Reuse,
W75-03904 5D

MARYLAND ENVIRONMENTAL SERVICE, ANNAPOLIS.
Regional Management of Waste Systems,
W75-04000 5D

MARYLAND UNIV., PRINCE FREDERICK. CENTER FOR ENVIRONMENTAL AND ESTUARINE RESEARCH.
The Thermal Requirements and Tolerances of Key Estuarine Organisms,
W75-03944 5C

MARYLAND UNIV., SOLOMONS. NATURAL RESOURCES INST.
Enhancement of Recreational Uses of Estuarine Waters Through Study of Potential Control Methods for Stinging Sea Nettles,
W75-04037 5C

MASSACHUSETTS UNIV., AMHERST. DEPT. OF CIVIL ENGINEERING.
Wastewater Treatment, Physical and Chemical Methods, (Literature Review),
W75-04121 5D

MASSEY UNIV., PALMERSTON NORTH (NEW ZEALAND). DEPT. OF GEOGRAPHY.
The Unit Hydrograph: A Satisfactory Model of Watershed Response,
W75-04344 2A

MCGILL UNIV., STE. ANNE DE BELLEIRE (QUEBEC).
Acetylene Reduction (Nitrogen Fixation) by Pulp and Paper Mill Effluents and by Klebsiella Isolated from Effluents and Environmental Situations,
W75-03892 5B

MEKOROT WATER CO. (ISRAEL).
Regional Water Supply Development Utilizing Brackish Water Resources in the Southern Arava Region,
W75-03962 3A

MIAMI UNIV., CORAL GABLES, FLA. DEPT. OF CIVIL ENGINEERING.
Natural Phosphate Removal Mechanisms in South Florida Lakes,
W75-04250 5G

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF FISHERIES AND WILDLIFE.
Prediction of Radioisotope Concentrations in Freshwater Streams,
W75-03852 5B

MICHIGAN TECHNOLOGICAL UNIV., HOUGHTON. DEPT. OF CHEMISTRY AND CHEMICAL ENGINEERING.
Spring and Fall Thermal Bar Development in Lake Superior,
W75-04038 5B

MICHIGAN UNIV., ANN ARBOR. GREAT LAKES RESOURCE MANAGEMENT PROGRAM.
Saginaw Bay: An Evaluation of Existing and Historical Conditions,
W75-04278 5C

MINISTRY OF PUBLIC WORKS, MADRID (SPAIN). SECTION OF SEDIMENTATION AND NATURAL POLLUTION.
Relationship Between Limnological Conditions of Reservoirs and Watershed Features - A Survey,
W75-04244 2H

MINISTRY OF THE PRESIDENCY, MEXICO CITY.
Appraisal of Irrigation Projects and Related Policies and Investments,
W75-03933 3F

MINNESOTA UNIV., MINNEAPOLIS. DEPT. OF CIVIL ENGINEERING AND HYDRAULICS.
A Survey of Organic Carbon Constituents in Natural Fresh Waters,
W75-04252 5B

MINNESOTA UNIV., MINNEAPOLIS. ST. ANTHONY FALLS HYDRAULIC LAB.
Evaluation of Water Temperature Fields Resulting from Heated Water Discharges,
W75-04215 5B

MINNESOTA UNIV., ST. PAUL. DEPT. OF SOIL SCIENCE.
Nitrate and Chloride Accumulation and Distribution in Fertilized Tile-Drained Soils,
W75-04022 5B

MISSISSIPPI UNIV., UNIVERSITY. DEPT. OF GEOLOGY AND GEOLOGICAL ENGINEERING.
Interaction of Bulk Precipitation, Stream Water, and Sewage in a Small Watershed Near Oxford, Mississippi,
W75-04254 5B

MISSOURI UNIV., COLUMBIA.
Lysimetric and Chemical Investigations of Pedological Changes: I. Lysimeters and Their Drainage Waters,
W75-04311 2G

MISSOURI UNIV., COLUMBIA. DEPT. OF CIVIL ENGINEERING.
Characterization and Dewaterability of Water Treatment Plant Residues,
W75-04039 5D

Interactions Between Light and Carbon Dioxide Availabilities as a Control of Algal Species Succession,
W75-04148 5C

MISSOURI UNIV., ROLLA. DEPT. OF CHEMISTRY.
Accumulation of Mercury by Fish and Turtles of the Little Piney River,
W75-04040 5A

MISSOURI UNIV., ROLLA. DEPT. OF CIVIL ENGINEERING.
Pollution Potential of Aquatic Sediments,
W75-04150 5B

MISSOURI UNIV., ROLLA. DEPT. OF ELECTRICAL ENGINEERING.
Use of a Microwave Remote Sensor for Determination of Water in Subsoils,
W75-04149 2G

MITSUBISHI HEAVY-INDUSTRIES LTD., TOKYO (JAPAN).
Application of Micro-Controllers Melmic 100 Water Treatment Facilities, (In Japanese),
W75-04338 5

MONTREAL UNIV., (QUEBEC). DEPT. OF BIOLOGICAL SCIENCES.
Preliminary Study of Phytoplankton of La St. Louis, A Broadening of the St. Lawren River near Montreal, Quebec, (In French),
W75-04335

NATIONAL BUREAU OF ECONOMIC RESEARCH, WASHINGTON, D.C.
Changing Water Use in Selected Manufacturi Industries,
W75-03922

NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC., NEW YORK.
Spill Prevention and Control Aspects of Pap Industry Waste Water Management Programs
W75-03912

NATIONAL ENERGY AUTHORITY, BANGKO (THAILAND).
The Approximate Probability Density Functi of Range and Adjusted Range,
W75-04246

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB.
Solid Waste and Water Quality, (Literatu Review),
W75-04016

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CORVALLIS, OREG.
A Demonstration of Waste Heat Use Agriculture,
W75-04224

NATIONAL ENVIRONMENTAL RESEARCH CENTER, LAS VEGAS, NEV.
Decay Scheme Data for Radiation Dose Cal lations,
W75-04174

NATIONAL INST. OF AGRICULTURAL ENGINEERING, PENICUIK (SCOTLAND).
A Flotation Method for the Rapid Measu ment of the Wet Bulk Density of Soil Clods,
W75-04135

NATIONAL STARCH AND CHEMICAL CORP NEW YORK.
How to Reduce BOD Levels From Size-Pr Starches,
W75-03906

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Deep Snow Measurements Suggested Us Cosmic Radiation,
W75-04331

NAVAL ACADEMY, ANNAPOLIS, MD. DEPT OF CHEMISTRY.
Hydrogen Peroxide Treatment of Effl Resulting from Wet Air Oxidation of Shipbo Wastes,
W75-04261

NEBRASKA UNIV., LINCOLN. DEPT. OF AGRONOMY.
A Field Study of the Heat and Dro Tolerance of Grain Sorghum (Sorghum Bic

(L.) Moench) as an Approach to Genetic Improvement,
W75-04044 2I

Degradation in Groundwater and Mobility of Herbicides,
W75-04045 5B

NEBRASKA UNIV., LINCOLN. DEPT. OF CIVIL ENGINEERING.
Soil Adsorption of Humic Color,
W75-04043 5D

NEBRASKA UNIV., LINCOLN. WATER RESOURCES RESEARCH INST.
Elkhorn River Basin Screening Model, A Report to the Missouri River Basin Commission,
W75-03921 6A

NEVADA AGRICULTURAL EXPERIMENT STATION, RENO.
Evaluation of EDDHA as an Extraction and Analytical Reagent for Assessing the Iron Status of Soils,
W75-04144 2G

NEVADA UNIV., RENO. DESERT RESEARCH INST.
Irreversible Thermodynamic Concept on Hydrogeochemical Transport Systems,
W75-04041 5B

Application of Analog Techniques to Water Management,
W75-04202 6A

Project Skywater.
W75-04265 3B

NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ECONOMICS.
Water Resources Evaluation of the Southern High Plains of New Mexico,
W75-04042 4B

NEW SOUTH WALES INST. OF TECHNOLOGY, KENSINGTON (AUSTRALIA). DEPT. OF ECONOMICS.
The Measurement of Impacts in Small Watersheds for Flood Control,
W75-04341 4A

NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA).
Chance-Constrained Dynamic Programing and the Optimization of Water Resource Systems,
W75-03934 4A

NEW YORK STATE DEPT. OF HEALTH, ALBANY. RADIOLOGICAL SCIENCES LAB.
C-14 Gaseous Effluent From Pressurized Water Reactors,
W75-04171 5A

NEW YORK UNIV., N.Y. DEPT. OF BIOLOGY.
Toxicity of Zinc and Cygon, Applied Singly and Jointly, to Zebrafish Embryos,
W75-04282 5C

Effects of Natural Microbial Preparations on the Electrokinetic Potential of Bacterial Cells and Clay Minerals,
W75-04317 5B

NORTH CAROLINA STATE UNIV., RALEIGH.
Influence of Tobacco Plant Canopy on Percolation,
W75-03931 3F

NORTH CAROLINA STATE UNIV., RALEIGH. COLEANDER NATIONAL RICE PROGRAM PERU.
Performance of Sulfurcoated Urea Under Intermittently Flooded Rice Culture in Peru,
W75-04313 3F

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF AGRICULTURAL ENGINEERING.
Design of a Conduit System with Diverging Branches,
W75-03930 8A

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF ECONOMICS.
Economic Analysis of Land Treatment of Municipal Wastewaters,
W75-04047 5D

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF ENTOMOLOGY.
Additional Studies of the Effects of Salt Marsh Impoundments on Mosquito Populations,
W75-04048 5G

NORTH CAROLINA STATE UNIV., RALEIGH. SEA GRANT PROGRAM.
Legal Considerations of Egyptian Restriction of Free Passage in the Straits of Tiran and the Gulf of Aqaba,
W75-04002 6E

NORTH CAROLINA UNIV., CHAPEL HILL.
Planned Reuse of Polluted Waters and Wastewaters,
W75-04198 5D

NORTH CAROLINA UNIV., CHAPEL HILL. DEPT. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
Long Term Trends in Water Quality, Lower Haw and New Hope Rivers - 1966-1973,
W75-04046 5B

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF MECHANICAL ENGINEERING.
Dry-Type Cooling Systems in Electric Power Production,
W75-04221 5D

NORTHEASTERN ILLINOIS UNIVERSITY, CHICAGO, ILLINOIS.
A Model Study for the Projected Increase in Water Use in Kane County, Illinois, U.S.A.,
W75-04258 6B

NORTHWESTERN UNIV., EVANSTON, ILL. TECHNOLOGICAL INST.
Disposal of Polluted Dredgings from the Great Lakes Area,
W75-04251 5B

NOTRE DAME UNIV., IND. DEPT. OF CHEMICAL ENGINEERING.
Mixing in Anaerobic Digestion,
W75-04120 5D

NUS CORP., ROCKVILLE, MD.
Entrainment of Stratospheric Tritium: Another Radiological Anomaly of the Rocky Mountain West,
W75-04162 5A

OAK RIDGE NATIONAL LAB., TENN.
The Effect of Various Rates of Semicontinuous Drip Irrigation on Lettuce, (Lactuca Sativa L.) Grown in Greenhouse,
W75-04146 2I

Environmental Radiation Measurements Using in Situ and Core Sampling Techniques,
W75-04159 5A

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities. Part I: Population Doses from Operating Facilities,
W75-04166 5B

Population Exposure Estimates as Derived from an Environmental Assessment of LWR Fuel Cycle Facilities, Part II: Long-Term Population Doses Following Cessation of Plant Operations,
W75-04167 5B

Projections of Radioactive Wastes from the Nuclear Fuel Cycle,
W75-04169 5B

Effect of Stack Height on Individual and Population Doses Attributable to Gaseous Effluents from a Model Fuel Reprocessing Facility,
W75-04170 5A

Dosimetry of Internal Emitters for Population Exposure,
W75-04172 5C

Measurement of Absorbed Fractions For Photon Sources Distributed Uniformly in Various Organs of a Heterogeneous Phantom,
W75-04173 5A

A Metabolic Model for Whole Body and GI Tract Retention in a Human Infant Deduced from Experimental Data on Suckling Rats Administered a Single Oral Dose of Cerium-141 at Different Ages,
W75-04175 5C

Age Factors for Dose Rates From an Infinite Cloud of a Photon Emitter,
W75-04176 5C

The Effect of Deposition Velocities on Estimates of Environmental Transport and Population Doses,
W75-04177 5A

Field Testing of TSEE Dosimeters for Personnel Monitoring,
W75-04179 5A

Condos-A Model and Computer Code to Estimate Population and Individual Radiation Doses to Man From the Distribution, Use and Disposal of Consumer Products That Contain Radioactive Materials,
W75-04182 5B

Large Scale Nuclear Gas Stimulation: Population Doses Estimated in the Environmental Assessment of Carbon-14 Releases,
W75-04186 5A

Philosophy and Methodology of Assessment of Radiation Doses to Populations from Combustion Products of Plowshare Natural Gas,
W75-04187 5C

Irradiated Fuel and Control Rods Transport from a Decommissioned Power Reactor,
W75-04188 5E

OCCIDENTAL PETROLEUM CORP., LOS ANGELES, CALIF. (ASSIGNEE).
Hot Ball Desalination Process,
W75-03878 3A

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, WASHINGTON, D.C.
Exposures to Five Target Health Hazards,
W75-04190 5A

OFFICE OF RADIATION PROGRAMS, SILVER SPRING, MD. ELECTROMAGANETIC RADIATION ANALYSIS BRANCH.
The Use of an Automated Population Data Base in Population Exposure Calculations, W75-04157 5A

OFFICE OF RADIATION PROGRAMS, WASHINGTON, D.C.
The Historical Development of Concepts of Radiation Dose Commitment, W75-04153 5C

Trends in Population Radiation Exposure from Operating BWR Gaseous Effluents, W75-04165 5B

Comparative Population Radiation Dose Commitments of Nuclear and Fossil Fuel Electric Power Cycles, W75-04181 5C

OHIO RIVER BASIN COMMISSION, CINCINNATI.
A Set of Regime Equations For Indirectly Estimating Stream Flow Characteristics, W75-04245 2E

OKLAHOMA UNIV., NORMAN. DEPT. OF AEROSPACE, MECHANICAL AND NUCLEAR ENGINEERING.
Design of Thermal Cooling Systems Using the Cascade of Energy Concept, W75-04228 5D

ONTARIO MINISTRY OF NATURAL RESOURCES, THUNDER BAY. FISH AND WILDLIFE RESEARCH BRANCH.
The Morphoedaphic Index, A Fish Yield Estimator--Review and Evaluation, W75-04116 5C

ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO.
Effect of Soil Temperature on Direction of Corn Root Growth, W75-03954 3F

OREGON STATE UNIV., CORVALLIS.
The Biochemical Oxygen Demand of Finely Divided Logging Debris in Stream Water, W75-03913 5C

OREGON STATE UNIV., CORVALLIS. OCEAN ENGINEERING PROGRAMS.
Ambient Current Effects on Vertical Selective Withdrawal in a Two Layer System, W75-04049 4A

OXFORD UNIV. (ENGLAND). DEPT. OF AGRICULTURAL SCIENCE.
Effects of CCC on Drought Resistance of Triticum Aestivum L and Zea Mays L, W75-04011 3F

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, OREG.
Some Results from Experimental Data on Surface Jet Discharge of Heated Water, W75-04220 5B

PATENTS AND DEVELOPMENTS A/S, NESTTUN (NORWAY). (ASSIGNEE)
Pumping Apparatus for Skimming and Recovering an Oil Layer from a Body of Water, W75-03865 5G

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Microbiology of Waste Treatment, (Literature Review), W75-04117 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
The Triangle as a Tentative Unit Hydrograph, W75-04239 4A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF ECONOMICS.
Criteria for Regionalization of Water and Waste Management Systems, W75-03946 5D

PENNSYLVANIA UNIV. PHILADELPHIA. INST. FOR ENVIRONMENTAL STUDIES.
The Next Ten Years: Some Recommendations to the Delaware River Basin Commission, W75-04210 6B

PENNSYLVANIA UNIV., PHILADELPHIA. INST. OF ENVIRONMENTAL STUDIES.
Conservation and Flooding Easements: A Case Study, W75-04211 6E

PETTIGREW ENGINEERING CO. PTY. LTD. (AUSTRALIA).
Quality Water for Human Consumption and Industry, W75-03941 5D

PHILADELPHIA WATER DEPT., PA.
Philadelphia Pilots--Builds Oxygen Activated Sludge, W75-04115 5D

PIECZONKA CONSULTANTS, LACKAWANNA, N.Y.
Phosphorus Detergent Ban-How Effective, W75-04109 5D

PONTIFICIA UNIVERSIDADE CATOLICA DO RIO DE JANEIRO (BRAZIL); AND UNIVERSIDADE FEDERAL DO RIO DE JANEIRO (BRAZIL).
Temporary Body Burdens in Dose-Effect Studies of the Brazilian Areas of High Natural Radioactivity, W75-04161 5C

PUERTO RICO NUCLEAR CENTER, RIO PIEDRAS.
Population Exposure to Natural Radiation Background in Puerto Rico, W75-04160 5B

PURDUE UNIV., LAFAYETTE, IND.
Stochastic Models for the Interaction of Rainfall and Groundwater Levels, W75-03949 2A

QUEENSLAND UNIV., BRISBANE (AUSTRALIA). DEPT. OF BOTANY.
Effects of Low Water Potentials on Transpiration and Photosynthesis in Mitchell Grass (Astrebla Lappacea), W75-03938 2D

REACTOR CENTRUM NEDERLAND, PETTEN.
The Determination of Mercury in Water Samples from the Environment by Neutron Activation Analysis, W75-03908 5A

RESEARCH INST. OF LABOR PROTECTION AND OCCUPATIONAL DISEASES, SOFIA (BULGARIA).
An Experimental Basis for Maximal Permissible Concentrations of Patoran in Surface Waters, (In Russian), W75-03959 5C

RIVERS HOUSE, GLASGOW, (SCOTLAND).
Water Pollution and Control, W75-03915 5B

ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN (ENGLAND). DEPT. OF CHEMISTRY.
Cropping Patterns Involving Rice and Their Management, W75-04127 3F

SANITARNO-GIGIENICHESKII MEDITSINSKII INSTITUT, LENINGRAD (USSR).
Experimental Data for Hygienic Standardization of Dihydroperoxide Meta-Diisopropyl benze in Surface Waters, (In Russian), W75-04319 5C

SAPPORO MEDICAL COLL. (JAPAN). DEPT. OF PUBLIC HEALTH.
Effects of Phthalate Esters on Shrimp, W75-04285 5C

SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA, CALIF.
The Comparative Marine Geochemistries o Lead 210 and Radium 226, W75-04029 5

SECRETARIAT FOR INTERNATIONAL ECOLOGY (SWEDEN).
A Review of Desertization in Africa--Wate Vegetation, and Man, W75-04142

SENATE, WASHINGTON, D.C.
The Philosophy of S.2770, W75-04001 5

SIR GEORGE WILLIAMS UNIV., MONTREAL (QUEBEC).
Some Characteristics of Counterjet Flow, W75-04217

SOAP AND DETERGENT ASSOCIATION, NE YORK.
WPCF Adopts Resolutions Aimed at Eas Problems of Water Law. W75-04009

SOCIETE POUR L'EQUIPMENT DES INDUSTRIES CHIMIQUES, PARIS (FRANCE (ASSIGNEE)
Process and Device for Purification of fluents Containing Phenols and Ammon Salts, W75-03859

SOIL CONSERVATION SERVICE, PALMER ALASKA.
Temperature Regimes and Classification Some Well-Drained Alpine Soils in Alaska, W75-04314

SOLEM MACHINE CO., ROCKFORD, ILL. (ASSIGNEE).
Liquid Aerating Apparatus, W75-03875

SOUTH CAROLINA UNIV., COLUMBIA. DE OF GEOLOGY.
The Dilution Capacity of Small Stream South Carolina, W75-04050

SOUTHERN CALIFORNIA, UNIVERSITY O LOS ANGELES. SEA GRANT PROGRAM.
Marine Studies of San Pedro Bay, Calif Part V; Data Report, Temperature, Sal Oxygen and Hydrogen Ion Concentrati outer Los Angeles Harbor, June 197 November 1973. W75-04272

STANFORD UNIV., CALIF.
Enhancing Water Resource Planning Effectiveness: A Simulation Gaming Approach,
W75-04233 6A

STATE UNIV. COLL., BUFFALO. GREAT LAKES LAB.
Rejuvenation of the Buffalo River,
W75-04248 5C

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF BIOCHEMISTRY.
The Effect of Cadmium on Population Growth in the Green Alga Scenedesmus Quadracauda,
W75-04284 5C

STAZIONE SPERIMENTALE PER LA CELLULOSA, CARTA E FIBRE TESSILI VEGETALI ED ARTIFICIALI, MILANO (ITALY).
Control Methods for Waste Waters and Solutions of Specific Substances (Metodi di controllo di acque di scarico e soluzioni di sostanze specifiche),
W75-03885 5B

STONE AND WEBSTER ENGINEERING CORP., BOSTON, MASS. ENVIRONMENTAL ENGINEERING DIV.
Two-Dimensional Transient Hydro-Thermal Mathematical Model,
W75-04219 2H

SUDESCO SYSTEMS, INC., BUFFALO, N.Y.
Design and Model Tests of Thermal Discharge Diffusers,
W75-04216 8B

SULZER BROS. LTD., WINTERHUR (SWITZERLAND). (ASSIGNEE)
Plant for Treating Water, in Particular Sewage or Sludge,
W75-03862 5D

SWECO, INC., LOS ANGELES, CALIF. ENVIRONMENTAL SYSTEMS DIV.
New Screening Concept Boosts Water Reuse at Boxboard Mill,
W75-03900 5D

TAHAL CONSULTING ENGINEERS LTD., TEL AVIV (ISRAEL). DEPT. OF RESEARCH, DEVELOPMENT AND PLANNING.
A Method for Maintaining Cross and Serial Correlations and the Coefficient of Skewness Under Generation in a Linear Bivariate Regression Model,
W75-04309 2E

TECHNION - ISRAEL INST. OF TECH., HAIFA (ISRAEL). DEPT. OF CIVIL ENGINEERING.
The Shape of the Interface in Steady Flow in a Stratified Aquifer,
W75-04329 2F

TECHNISCHE UNIVERSITAET, MUNICH (WEST GERMANY). PHYSIKDEPARTMENT.
Detection of Water Pollutants by a CO2 Laser,
W75-04012 5A

TENNESSEE VALLEY AUTHORITY, KNOXVILLE, TENN. HYDROLOGIC RESEARCH AND ANALYSIS OFFICE.
A Double-Triangle Model for Generating Storm Hydrographs,
W75-04241 4A

TEXAS A AND M RESEARCH FOUNDATION, COLLEGE STATION.
Hydrodynamic Effects of Oil Slick Mechanical Control Devices,
W75-04327 5G

TEXAS A AND M UNIV., EL PASO. AGRICULTURAL RESEARCH STATION.
The Influence of Soil Salinity Upon Fruiting and Shedding, Boll Characteristics, Fiber Quality, and Yields of Two Cotton Species,
W75-04134 3C

TEXAS UNIV., HOUSTON. SCHOOL OF PUBLIC HEALTH.
Estimation of the Dose Equivalent to the U.S. Population from Radon in Liquified Petroleum Gas,
W75-04184 5A

TOWSON STATE COLL., BALTIMORE, MD. DEPT. OF COMPUTER SCIENCE.
Cooling Pond Temperature Prediction,
W75-04222 5B

TRENT RIVER AUTHORITY (ENGLAND). POLLUTION CONTROL AND FISHERIES DEPT.
The Toxicities of Sewage Effluents, Industrial Discharges and Some Chemical Substances to Brown Trout (Salmo Trutta) in the Trent River Authority Area,
W75-04110 5C

UARIZONA UNIV., TUCSON DEPT. OF SOILS, WATER AND ENGINEERING.
Effect of Sulfuric Acid and Sulfur Dioxide on the Aggregate Stability of Calcareous Soils,
W75-03952 2G

UDAIPUR UNIV. (INDIA). COLL. OF AGRICULTURE.
Effect of Quality of Irrigation Water on Dry Matter Production, and on Calcium, Magnesium and Phosphorus Content of Wheat, Barley and Pea,
W75-04137 2I

ULTRASCIENCE, INC., SKOKIE IH. (ASSIGNEE).
Method and Apparatus for Use in Water Purification by Reverse Osmosis,
W75-03874 5D

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
Exploitation of Deep Ocean Minerals: Regulatory Mechanisms and United States Policy,
W75-04007 6E

UTAH STATE UNIV., LOGAN. DEPT. OF ECONOMICS.
Pricing Irrigation Water in Iran,
W75-03936 3F

The Development of Supplemental Water: Resource Flexibility and Farm Management Options,
W75-04031 3F

UTAH STATE UNIV., LOGAN. DEPT. OF SOIL BIOCHEMISTRY AND MICROBIOLOGY.
Nitrogen Fixation By Blue-Green Algae-Lichen Crusts in the Great Basin Desert,
W75-03963 5B

UTAH WATER RESEARCH LAB., LOGAN.
Effects of Temperature on the Toxicity to the Aquatic Biota of Waste Discharges-A Compilation of the Literature,
W75-03854 5C

Planning for Water Quality in the Virgin River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04206 5G

Planning for Water Quality in the Sevier River System in the State of Utah: A Program for Developing a Comprehensive Water Quality Management Plan.
W75-04207 5G

UTAH WATER RESEARCH LAB., LOGAN.; AND UTAH STATE UNIV., LOGAN. DIV. OF ENVIRONMENTAL ENGINEERING.
A Continuous Flow Kinetic Model to Predict the Effects of Temperature on the Toxicity of Waste to Algae,
W75-04052 5C

UTTAR PRADESH AGRICULTURAL UNIV., PANTNAGAR (INDIA).
Influence of Irrigation Water Quality on Exchangeable Sodium Percentage in a Sodic Soil,
W75-04136 2G

UTTAR PRADESH IRRIGATION DEPT., LOCKNOW (INDIA).
A Gamma Transmission Method for the Determination of Moisture Content in Soils,
W75-04343 2G

VANDERBILT UNIV., NASHVILLE, TENN. DEPT. OF ENVIRONMENTAL AND WATER RESOURCES ENGINEERING.
Cooling Towers - Best Achievable Thermal Pollution Abatement Technology,
W75-04223 5D

Review of Heated Surface Discharge Models Applicable to Rivers,
W75-04229 5B

VSESOYUZNYI NAUCHNYI-ISSLEDOVATELSKII INSTITUT BUMAGI, ARKHANGELSK (USSR).
Ultraviolet Spectrophotometric Method for the Determination of Lignin in Effluents (UF-spektrofotometricheskii metod opredeleniya lignina v stocknykh vodakh),
W75-03897 5A

VSESOYUZNYI-NAUCHNYI PLANOVII OTDEL'BUMAZHNOI PROMYSHLENNOST, MOSCOW (USSR).
Selection of Coagulants for Treatment of Excess Activated Sludge (Vybor koagulyantov dlya obrabotki izbytochnogo aktivnogo ila),
W75-03894 5D

VYSKUMNY USTAV PAPIER A CELULOZY, BRATISLAVA (CZECHOSLOVAKIA).
Use and Disposal of Solid Wastes From Pulp and Paper Production (Vyuzitie a likvidacia pevnych odpadov z vyroby buniciny a papiera),
W75-03886 5D

WASHINGTON STATE UNIV., PULLMAN. R. L. ALBROOK HYDRAULIC LAB.
More Responsive Water Planning is Possible,
W75-04203 6A

WATER ECONOMICS RESEARCH INST., WARSAW (POLAND). DEPT. OF WATER CHEMISTRY AND BIOLOGY.
Thermal Pollution Problems in Poland,
W75-04218 5C

WATER POLLUTION RESEARCH LAB., STEVENAGE (ENGLAND).
An Automated Method for the Determination of Formaldehyde in Sewage and Sewage Effluents,
W75-04112 5A

WATER POLLUTION RESEARCH LAB., STEVENAGE (ENGLAND).

Treatment of Crude Sewage in Two High-Rate Activated-Sludge Plants Operated in Series,
W75-04334 5D

WATERLOO UNIV. (ONTARIO). DEPT. OF BIOLOGY.

Benthos and Allochthonous Organic Matter in Streams,
W75-04119 5B

WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS).

Digging in of Anchors into the Bottom of the North Sea,
W75-03919 8B

Some Hydrodynamical Aspects of Gravity-Type Platform Design,
W75-03924 8B

Stopping Distances of V.L.C.C. in IJmuiden,
W75-03925 8B

WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS). DENSITY CURRENTS BRANCH.

Pneumatic Barriers to Reduce Salt Intrusion Through Locks,
W75-03920 8A

WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS). MATHEMATICS BRANCH.

Transverse Mixing in Rivers; A Numerical Approach,
W75-03917 8B

Linear Wave Propagation Problems and the Finite Element Method,
W75-03926 8B

WATSON (J. D. AND D. M.), LONDON (ENGLAND).

Investigation for the Marine Disposal of Effluents,
W75-04289 5B

WEIZMANN INST. OF SCIENCE, REHOVOT (ISRAEL) DEPT. OF ISOTOPE RESEARCH.

Physical Properties of Oxygen-17 Water: Absolute Viscosity and Density of H2(17)0 Between 15 and 35C,
W75-03881 1A

WELSBACH OZONE SYSTEMS CORP., PHILADELPHIA, PA.

Ozone: A New Method to Remove Color in Secondary Effluents,
W75-03903 5D

WEST VIRGINIA UNIV., MORGANTOWN. WATER RESEARCH INST.

Objective Double-Mass Analysis,
W75-04307 2B

WISCONSIN UNIV., MADISON. SCHOOL OF LAW.

The Emerging Right of Physical Enforcement of Fisheries Measures Beyond Territorial Limits,
W75-03995 6E

WISCONSIN UNIV., MADISON. WATER CHEMISTRY PROGRAM; AND WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.

Biological Availability of Sediment Phosphorus to Macrophytes,
W75-04053 5B

WISCONSIN UNIV., MILWAUKEE. DEPT. OF ENERGETICS.

Analytical Model for a Heated Submerged Discharge into Break Water Wall Area,
W75-04214 2H

WYOMING UNI., LARAMIE.

The Model Water Code, the Wise Administrator and the Goddam Bureaucrat,
W75-04199 6E

WYOMING UNIV., LARAMIE. DEPT. OF BOTANY.

The Effect of Salinity on a Marine and a Freshwater Ascomycete,
W75-04267 5C

YALE UNIV., NEW HAVEN, CONN. DEPT. OF BIOLOGY.

Some Biological Aspects of Aquatic Thermal Discharges,
W75-04225 5C

ACCESSION NUMBER INDEX

W75-03851 5G
W75-03852 5B
W75-03853 4B
W75-03854 5C
W75-03855 4A
W75-03856 6B
W75-03857 5D
W75-03858 5D
W75-03859 5D
W75-03860 3A
W75-03861 5A
W75-03862 5D
W75-03863 4A
W75-03864 5D
W75-03865 5G
W75-03866 5D
W75-03867 3F
W75-03868 8B
W75-03869 5G
W75-03870 5G
W75-03871 8B
W75-03872 5G
W75-03873 8A
W75-03874 5D
W75-03875 5D
W75-03876 3A
W75-03877 3F
W75-03878 3A
W75-03879 5D
W75-03880 5D
W75-03881 1A
W75-03882 5D
W75-03883 5D
W75-03884 5D
W75-03885 5B
W75-03886 5D
W75-03887 5D
W75-03888 5D
W75-03889 5D
W75-03890 5D
W75-03891 5D
W75-03892 5B
W75-03893 5D
W75-03894 5D
W75-03895 5D
W75-03896 5D
W75-03897 5A
W75-03898 5D
W75-03899 5D
W75-03900 5D
W75-03901 5G
W75-03902 5D
W75-03903 5D
W75-03904 5D
W75-03905 5D
W75-03906 5G
W75-03907 5D
W75-03908 5A
W75-03909 5C
W75-03910 5A
W75-03911 5A
W75-03912 5G
W75-03913 5C
W75-03914 5D
W75-03915 5B
W75-03916 5D
W75-03917 8B
W75-03918 8B
W75-03919 8B
W75-03920 8A
W75-03921 6A
W75-03922 6B
W75-03923 4A
W75-03924 8B
W75-03925 8B
W75-03926 8B
W75-03927 8B
W75-03928 8B
W75-03929 7C
W75-03930 8A
W75-03931 3F
W75-03932 4A
W75-03933 3F
W75-03934 4A
W75-03935 4A
W75-03936 3F
W75-03937 2D
W75-03938 2D
W75-03939 5A
W75-03940 2G
W75-03941 5D
W75-03942 5D
W75-03943 5F
W75-03944 5C
W75-03945 5B
W75-03946 5D
W75-03947 4D
W75-03948 4D
W75-03949 2A
W75-03950 3F
W75-03951 3F
W75-03952 2G
W75-03953 2G
W75-03954 3F
W75-03955 2G
W75-03956 2I
W75-03957 4A
W75-03958 3F
W75-03959 5C
W75-03960 3F
W75-03961 3B
W75-03962 3A
W75-03963 5B
W75-03964 2I
W75-03965 2D
W75-03966 8F
W75-03967 4A
W75-03968 2H
W75-03969 7C
W75-03970 7C
W75-03971 7C
W75-03972 4B
W75-03973 7C
W75-03974 5B
W75-03975 2H
W75-03976 3B
W75-03977 7C
W75-03978 7C
W75-03979 2K
W75-03980 2K
W75-03981 2H
W75-03982 2H
W75-03983 6D
W75-03984 2F
W75-03985 3E
W75-03986 2F
W75-03987 2F
W75-03988 5B
W75-03989 3F
W75-03990 4A
W75-03991 3F
W75-03992 5G
W75-03993 6E
W75-03994 6E
W75-03995 6E
W75-03996 6E
W75-03997 6E
W75-03998 5G
W75-03999 5G
W75-04000 5D
W75-04001 5G
W75-04002 6E
W75-04003 6E
W75-04004 6E
W75-04005 6E
W75-04006 6E
W75-04007 6E
W75-04008 6E
W75-04009 5G
W75-04010 6G
W75-04011 3F
W75-04012 5A
W75-04013 3F
W75-04014 5G
W75-04015 5D
W75-04016 5B
W75-04017 5G
W75-04018 5G
W75-04019 5F
W75-04020 5G
W75-04021 5A
W75-04022 5B
W75-04023 5G
W75-04024 5G
W75-04025 6B
W75-04026 4A
W75-04027 5B
W75-04028 5C
W75-04029 5B
W75-04030 3F
W75-04031 3F
W75-04032 3F
W75-04033 2J
W75-04034 5C
W75-04035 5B
W75-04036 2B
W75-04037 5C
W75-04038 5B
W75-04039 5D
W75-04040 5A
W75-04041 5B
W75-04042 4B
W75-04043 5D
W75-04044 2I
W75-04045 5B
W75-04046 5B
W75-04047 5D
W75-04048 5G
W75-04049 4A
W75-04050 5B
W75-04051 4C
W75-04052 5C
W75-04053 5B
W75-04054 5B
W75-04055 5B
W75-04056 5B
W75-04057 5A
W75-04058 5A
W75-04059 2B
W75-04060 2B
W75-04061 5A
W75-04062 5B
W75-04063 5B
W75-04064 5B
W75-04065 5B
W75-04066 5B
W75-04067 5B
W75-04068 5B
W75-04069 5B
W75-04070 5B
W75-04071 5B
W75-04072 5B
W75-04073 2B
W75-04074 5B
W75-04075 5B
W75-04076 5B
W75-04077 5B
W75-04078 5A
W75-04079 5B
W75-04080 5A
W75-04081 5B
W75-04082 5B
W75-04083 5A
W75-04084 5A
W75-04085 5A
W75-04086 5A
W75-04087 5A
W75-04088 5A
W75-04089 5A
W75-04090 5B
W75-04091 5A
W75-04092 5A
W75-04093 5A
W75-04094 5A
W75-04095 5A
W75-04096 5A
W75-04097 5A
W75-04098 5A
W75-04099 5A
W75-04100 5A
W75-04101 5A
W75-04102 5A
W75-04103 5B
W75-04104 5B
W75-04105 5A
W75-04106 5B
W75-04107 5A
W75-04108 5A
W75-04109 5D
W75-04110 5C
W75-04111 3F
W75-04112 5A
W75-04113 5A
W75-04114 5D
W75-04115 5D
W75-04116 5C
W75-04117 5D
W75-04118 5G
W75-04119 5B
W75-04120 5D
W75-04121 5D
W75-04122 5D
W75-04123 5D
W75-04124 5A
W75-04125 2E
W75-04126 2I
W75-04127 3F
W75-04128 3A
W75-04129 3F
W75-04130 2A
W75-04131 2I
W75-04132 2G
W75-04133 3F
W75-04134 3C
W75-04135 2G
W75-04136 2G
W75-04137 2I
W75-04138 3F
W75-04139 2G
W75-04140 4B
W75-04141 2G
W75-04142 2J
W75-04143 6E
W75-04144 2G
W75-04145 2F
W75-04146 2I
W75-04147 2J
W75-04148 5C
W75-04149 2G
W75-04150 5B
W75-04151 6B
W75-04152 5C
W75-04153 5C
W75-04154 5C
W75-04155 5G
W75-04156 5A
W75-04157 5A
W75-04158 5A
W75-04159 5A
W75-04160 5B
W75-04161 5C
W75-04162 5A

W75-04163

W75-04163 5A
W75-04164 5B
W75-04165 5B
W75-04166 5B
W75-04167 5B
W75-04168 5A
W75-04169 5B
W75-04170 5A
W75-04171 5A
W75-04172 5C
W75-04173 5A
W75-04174 5A
W75-04175 5C
W75-04176 5C
W75-04177 5A
W75-04178 5A
W75-04179 5A
W75-04180 5C
W75-04181 5C
W75-04182 5B
W75-04183 5C
W75-04184 5A
W75-04185 5A
W75-04186 5A
W75-04187 5C
W75-04188 5E
W75-04189 5C
W75-04190 5A
W75-04191 5C
W75-04192 5A
W75-04193 5A
W75-04194 5A
W75-04195 5G
W75-04196 5G
W75-04197 6C
W75-04198 5D
W75-04199 6E
W75-04200 5D
W75-04201 6C
W75-04202 6A
W75-04203 6A
W75-04204 4A
W75-04205 4A
W75-04206 5G
W75-04207 5G
W75-04208 2E
W75-04209 2E
W75-04210 6B
W75-04211 6E
W75-04212 4A
W75-04213 5B
W75-04214 2H
W75-04215 5B
W75-04216 8B
W75-04217 5B
W75-04218 5C
W75-04219 2H
W75-04220 5B
W75-04221 5D
W75-04222 5B
W75-04223 5D
W75-04224 5D
W75-04225 5C
W75-04226 5B
W75-04227 5D
W75-04228 5D
W75-04229 5B
W75-04230 5B
W75-04231 5B
W75-04232 6A
W75-04233 6A
W75-04234 4A
W75-04235 5B
W75-04236 5A
W75-04237 5B
W75-04238 5B
W75-04239 4A
W75-04240 2A
W75-04241 4A
W75-04242 2A
W75-04243 4A
W75-04244 2H
W75-04245 2E
W75-04246 6A
W75-04247 5G
W75-04248 5C
W75-04249 6B
W75-04250 5G
W75-04251 5B
W75-04252 5B
W75-04253 5D
W75-04254 5B
W75-04255 3B
W75-04256 5B
W75-04257 6A
W75-04258 6B
W75-04259 5A
W75-04260 5B
W75-04261 5D
W75-04262 5B
W75-04263 5D
W75-04264 5C
W75-04265 3B
W75-04266 5G
W75-04267 5C
W75-04268 5E
W75-04269 8B
W75-04270 8B
W75-04271 2F
W75-04272 5B
W75-04273 2D
W75-04274 6G
W75-04275 2L
W75-04276 5B
W75-04277 2E
W75-04278 5C
W75-04279 2L
W75-04280 2F
W75-04281 5C
W75-04282 5C
W75-04283 5C
W75-04284 5C
W75-04285 5C
W75-04286 5C
W75-04287 5C
W75-04288 3F
W75-04289 5B
W75-04290 6E
W75-04291 6E
W75-04292 6E
W75-04293 6E
W75-04294 6E
W75-04295 6E
W75-04296 6E
W75-04297 6E
W75-04298 6E
W75-04299 6E
W75-04300 6E
W75-04301 5G
W75-04302 5G
W75-04303 5G
W75-04304 6E
W75-04305 6C
W75-04306 5C
W75-04307 2B
W75-04308 2F
W75-04309 2E
W75-04310 2E
W75-04311 2G
W75-04312 2G
W75-04313 3F
W75-04314 2G
W75-04315 3F
W75-04316 3F
W75-04317 5B
W75-04318 3F
W75-04319 5C
W75-04320 2G
W75-04321 3F
W75-04322 5G
W75-04323 5G
W75-04324 5G
W75-04325 5D
W75-04326 5G
W75-04327 5G
W75-04328 6F
W75-04329 2F
W75-04330 2B
W75-04331 2C
W75-04332 2G
W75-04333 2F
W75-04334 5D
W75-04335 5C
W75-04336 5D
W75-04337 5D
W75-04338 5D
W75-04339 2A
W75-04340 2F
W75-04341 4A
W75-04342 4C
W75-04343 2G
W75-04344 2A
W75-04345 4A
W75-04346 3F
W75-04347 5B
W75-04348 5B
W75-04349 4D
W75-04350 5B

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-04054 -- 04108 04152 -- 04194	98
Cornell University, Policy Models for Water Resources Systems	W75-03917 -- 03930 03932 -- 03936	19
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-04012 04014 -- 04029 04109 -- 04110 04112 -- 04124 04289 04322 -- 04326 04334 04336 -- 04338 04349	43
Illinois State Water Survey, Hydrology	W75-04213 -- 04263 04265 -- 04266 04268 -- 04280 04305 -- 04310 04327 04329 -- 04333 04339 -- 04345 04350	86
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-03880 -- 03908 03910 -- 03916	36
University of Arizona, Arid Land Water Resources	W75-03950 -- 03953 03955 -- 03958 03960 -- 03966 03989 -- 03990 04125 -- 04126 04128 -- 04134 04136 -- 04146	37
University of Florida, Eastern U. S. Water Law	W75-03992 -- 04010 04290 -- 04304	34
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-04195 -- 04212 04328	19
B. State Water Resources Research Institutes		
Arizona Water Resources Research Center	W75-03851	1
Idaho Water Resources Research Institute	W75-04032 -- 04033	2
Illinois Water Resources Center	W75-04034	1
Indiana Water Resources Research Center	W75-04035	1
Kentucky Water Resources Research Institute	W75-04036, 04147	2
Maryland Water Resources Research Center	W75-03944, 04037	2
Michigan Institute of Water Research	W75-03852, 04038	2
Missouri Water Resources Research Center	W75-04039 -- 04040 04148 -- 04150	5
Nebraska Water Resources Research Institute	W75-04043 -- 04045	3

Source	Accession Number	Total
B. State Water Resources Research Institute (Cont'd)		
Nevada Center for Water Resources Research	W75-04041	1
New Mexico Water Resources Research Institute	W75-04042	1
New York Water Resources and Marine Sciences Center	W75-03945	1
North Carolina Water Resources Research Institute	W75-04046 -- 04048	3
Ohio Water Resources Center	W75-03853	1
Oregon Water Resources Research Institute	W75-04049	1
Pennsylvania Institute for Research on Land and Water Resources	W75-03946	1
South Carolina Water Resources Research Institute	W75-04050 -- 04051	2
Utah Center for Water Resources Research	W75-03854, 04052	2
Wisconsin Water Resources Center	W75-04053	1
C. Other		
BioSciences Information Service	W75-03909, 03931 03954, 03959 03991, 04011 04013, 04030 04111, 04127 04135, 04264, 04267 04288 04311 -- 04321 04335 04346 -- 04348	29
Commonwealth Scientific and Industrial Research Organization, Australia	W75-03937 -- 03943	7
Effects of Pollutants on Aquatic Life (Katz)	W75-04281 -- 04287	7
Ocean Engineering Information Service (Patents)	W75-03857 -- 03879	23
Office of Water Research and Technology	W75-03855 -- 03856 03947 -- 03949 04031, 04151	7
U. S. Geological Survey	W75-03967 -- 03988	22

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
- WATER QUALITY MANAGEMENT AND PROTECTION
- WATER RESOURCES PLANNING
- RESOURCES DATA
- ENGINEERING WORKS
- MANPOWER, GRANTS, AND FACILITIES
- SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

- SUBJECT INDEX
- AUTHOR INDEX
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- ABSTRACT SOURCES

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 9
MAY 1, 1975

W75-04351 -- W75-04850

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

THE COALESCENCE OF WATER DROPS,
Tel Aviv Univ. (Israel). Dept. of Environmental Sciences.
Z. Levin.
Available from the National Technicalp 41, Information Service, Springfield, Va. 22161, as AD-784 198, $3.75 in paper copy, $2.25 in microfiche. Report No E1607, p 41, August 1974. 10 fig, 3 tab, 16 ref. DAJA37-73-C-1580.

Descriptors: *Drops(Fluids), *Coalescence, Viscosity, Viscous flow, Theoretical analysis, *Model studies, Electricity, Equations, Physical properties.
Identifiers: *Collision-coalescence process, *Water drops, Equations of motion, Oscillations, Drop deformation.

The first year results of a theoretical study to explain the phenomena of coalescence of drops were presented. Even though the model represents a gross simplification of the real situation, it shows remarkable agreement with some recent experimental results. At this stage the model investigates the effects of the viscous force between the interacting drops, but future work will include both the effects of the electrical double layer and the oscillation of the surfaces of the drops. (Jones-ISWS)
W75-04728

2. WATER CYCLE

RELATION OF OROGRAPHIC WINTER PRECIPITATION PATTERNS TO METEOROLOGICAL PARAMETERS,
National Weather Service, Silver Spring, Md. Office of Hydrology.
E. L. Peck.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 234-242, 1973. 1 fig, 3 tab, 5 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Winter, *Orography, Statistical methods, Correlation analysis, Regression analysis, Variability, Radiosondes, *Utah, Temperature, Dew point, Condensation, Advection.
Identifiers: *Wasatch Front range(Utah), Vorticity, Vertical velocity, Wet bulb potential temperature.

Patterns of orographic precipitation in the western United States are subject to considerable variation. Knowledge and predictability of these variations would provide a basis for improved short- and long-term streamflow forecasts and precipitation analyses. Previous studies have demonstrated that observed variations in precipitation distribution are related to types of synoptic situations. Multivariate (canonical) correlation analyses were used to determine whether meteorological parameters may be used to predict the distribution patterns of winter precipitation without the need for storm typing. Twelve-hour precipitation values for stations in the Wasatch Front range of northern Utah having a large range of elevation were correlated with meteorological parameters derived from concurrent radiosonde observations. The meteorological parameters were sufficient to define general precipitation patterns for winter orographic precipitation. (See also W75-01961) (Jones-ISWS)
W75-04670

2A. General

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04356

STUDY OF SUBSURFACE FLOW INTO MOUNTAIN STREAMS AS RELATED TO TOPOGRAPHY AND PARTIAL (VARIABLE) SOURCE AREAS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04357

THE VARYING SOURCE AREA OF STREAMFLOW FROM UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04358

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04448

A HYBRID COMPUTER SIMULATION MODEL FOR PREDICTING THE EFFECTS OF THE AREAL DISTRIBUTION OF PRECIPITATION ON RUNOFF CHARACTERISTICS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 2B.
W75-04692

2B. Precipitation

TORNADO OR DUST DEVEL: THE ENIGMA OF DESERT WHIRLWINDS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
S. B. Idso.
American Scientist, Vol 62, No 5, p 530-541, September-October, 1974. 11 fig, 42 ref.

Descriptors: *Tornadoes, *Dust storms, *Fronts(Atmospheric), *Wind velocity, *Turbulence, Thunderstorms, Cyclones, Meteorology, Mountains, Weather patterns, Model studies, Arizona, Air circulation, Vortices, Air-earth interfaces.

Large dust devils can be more destructive than weak tornadoes, and both have similar morphology and life cycles. Tornadoes usually occur with parent clouds, and dust devils form in clear air, but gradations between them exist. Descriptions and photographs from southern Arizona show the similarity. Worldwide observations and theories are reviewed. Both types are compared to vortices associated with several kinds of density currents, including snow avalanches, volcanic ash flows, cold fronts, and haboobs (arid land dust storms generated by cold air outflow from thunderstorms). New models proposed explain how a haboob-formed vortex can become a tornado, and how a small mountain can induce twin vortex formation. More organized observations are needed. (Duffield-Arizona)
W75-04372

SOME CHARACTERISTICS OF HAWAIIAN HIGH-INTENSITY RAINFALL,
Hawaii Univ., Honolulu. Water Resources Research Center.
C. M. Fullerton, and S. K. Wilson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 398, $4.25 paper copy, $2.25 microfiche. Technical Report No 78, UHMET 74-01, August 1974. 47 p, 29 fig, 4 tab, 33 ref. OWRT B-026-HI (1), 14-31-0001-3872.

Descriptors: *Rainfall intensity, *Rain gages, *Networks, Atmospheric pressure, Wind velocity, Winds, Computer models, Air temperature, *Hawaii, Instrumentation, Clouds.
Identifiers: *Raindrop size, Potential gradient, Microbarograph, *Showers.

A computer monitored network of rapid response Raymond-Wilson rainfall intensity gauges has been established at the Cloud Physics Observatory (CPO), on the windward coast of the island of Hawaii, to record the passage of both warm and cold showers. These showers are characterized by high intensity rainfall (50 to 300 mm/hr) and an associated increase in atmospheric pressure, a change in wind velocity, and a reversal of the electric potential gradient. The showers often occur at night, during the maximum of the diurnal pressure oscillation, and frequently in groups of two to four with an interval of 103 to 104 seconds between separate showers. A relationship between the height of the base of the trade wind inversion and the total amount of rainfall was observed, indicating that almost no rainfall occurs if the inversion base is less than 2 km. A drop-size instrument (DSI) was developed and used to measure the raindrop-size spectrum. From this measurement and the rainfall intensity, an estimation of the liquid water content (LWC) of precipitating clouds was derived. The LWC (2.0 to 8.0 g/m3) was larger than that generally assumed for trade wind showers.
W75-04442

RAINFALL PATTERNS AND GENERAL ATMOSPHERIC CIRCULATION,
D. Winstanley.
Nature, Vol 245, September 28, 1973. p 190-194, 1 tab, 7 fig, 18 ref.

Descriptors: *Rainfall, *Climatic data, *Circulation, Long-term planning, Arid climates, Climatology, Climatic zones, Isohyets, Atmosphere, Drought.
Identifiers: *Sahel zone, Mediterranean, Middle east, India, Sahara Desert.

Rainfall records of the Mediterranean, the Middle East, the Sahel Zone, and north-west India from the beginning of this century were analyzed. Rainfall fluctuations are related to changes in the general circulation of the atmosphere. From the analysis, an idea of long term rainfall prospects and future climatic patterns can be obtained. In these marginal arid areas like the Sahara, human response to low and variable rainfall is nomadism. Climatology will play an important role in long term planning in economic and political problems of the affected countries. (Mastic-Arizona)
W75-04513

IMPROVED INSTRUMENTATION FOR MEASURING MELTED PRECIPITATION ON WIND-SWEPT TOPOGRAPHY,
Forest Service (USDA), Moscow, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 7B.
W75-04655

PRECIPITATION MEASUREMENTS BY MEANS OF STORAGE GAUGES WITH

STEREO AND HORIZONTAL ORIFICES IN THE BAYE DE MONTREUX WATERSHED,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-04656

EVAPORATION LOSSES FROM STORAGE GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-04657

ANALYSIS OF SNOW COVER DISTRIBUTION FROM AEROPHOTOGRAPHY DATA OVER EXPERIMENTAL MOUNTAIN BASIN OF VARZOB RIVER,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 7B.
W75-04658

SNOW SURVEY AND METHODS FOR SNOW STORAGE ESTIMATION IN MOUNTAIN RIVER BASINS OF THE SOVIET UNION,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 2C.
W75-04659

A POSSIBILITY OF AIRFLOW - PRECIPITATION REGIME INVESTIGATIONS,
Hydrometeorological Inst. of Croatia, Zagreb (Yugoslavia).
N. Sinik.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 128-139, 1973. 6 fig, 2 tab, 6 ref.

Descriptors: *Precipitation(Atmospheric), *Forecasting, *Statistical methods, *Mountains, Isohyets, Hydrology, Correlation analysis, Probability, Orography, Forecasting, Distribution patterns.
Identifiers: *Gradient flow, Rain days, Airflow, *Yugoslavia(Lika-Gorski Kotar).

Daily precipitation patterns for Gorski Kotar and Lika (Yugoslavia) were correlated with the prevailing gradient windflow as determined from the corresponding 1000 and 850 mb pressure patterns. The cases where the wind directions were nearly the same at both pressure levels were determined and the isohyetal pattern for those unique cases drawn. It was found that only rainy days with stationary gradient flows at the 1000 mb surface could be added to the cases with parallel flows at both pressure surfaces. The project was confined to the year 1962 and additional study was recommended to insure that the results are applicable as a forecast device for precipitation expectation with wind direction. (See also W75-01961) (Jones-ISWS)
W75-04660

CHARACTERISTICS OF PRECIPITATION IN THE SCOTTISH HIGHLANDS,
Oxford Univ. (England). Dept. of Agricultural Science.
F. H. W. Green.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 140-146, 1973. 2 fig, 4 ref.

Descriptors: *Precipitation(Atmospheric), *Topography, Rainfall, Snowfall, Mountains, Rainfall disposition, Distribution patterns, Measurement.
Identifiers: *Scotland(Highlands), Rain days, Hoar frost, Potential evaporation, Potential water deficit.

Precipitation in the Scottish Highlands has highly individual characteristics resulting from the location of Scotland and from its topography. For the same reasons, difficulties in accurate measurement are increased. It was found that the largest annual totals were found on the west coast and this was attributed to the movement of precipitation systems from west to east and most of the precipitation falling on the higher mountains of the west coast. It was also found that precipitation intensity was greater in the highlands than in the lowlands. The potential water deficit was found to be lowest in the highlands of western Scotland, indicating that this area is wetter than any other part of Europe. The occurrence of hoar frost is frequent, but no means have been found to measure its contribution to the total precipitation. Measurements and computation of potential evaporation indicates that precipitation measurements are 5% too low because of the windiness of the highlands. (See also W75-01961) (Jones-ISWS)
W75-04661

RAINFALL AT THE HOHENPEISSENBERG AND THE WEATHER SITUATION,
R. Aniol.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 147-155, 1973. 5 tab, 9 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Chinook, Weather patterns, Rain, Advection, Pressure, Distribution, On-site data collections.
Identifiers: *Germany(Hohenpeissenberg Mt), Cold fronts, Warm fronts.

For the summer months during the period 1965-1970, 648 single precipitations at the Hohenpeissenberg were checked for the weather situation. Three main types could be selected. These main weather types show different aerological vertical profiles in the lower part of the troposphere. The total amount, the duration, and the intensity of rain showed significant differences for the main weather types. The main weather types were: advection of cold air, advection of warm air, and weak pressure gradients. It was shown that the presence of the mountain, Hoher Peissenberg, and warm or cold air advection determines the duration and intensity of the precipitation. (See also W75-01961) (Jones-ISWS)
W75-04662

COMPUTATION OF AIR FLOW OVER MOUNTAINS IN STATICALLY STABLE SITUATIONS,
Oslo Univ. (Norway). Inst. of Geophysics.
A. Eliassen.
In: Distribution of Precipitation in Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326, Geneva, Switzerland, 1972. p 156-160, 1 ref.

Descriptors: *Winds, *Mountains, *Mathematical models, *Computer models, Meteorology, Precipitation(Atmospheric), Orography.

Mesoscale features of flow patterns over mountains were determined by numerical integrations, with special emphasis on the distribution of the ascending motions causing orographic clouds and precipitation. (See also W75-01961) (Sims-ISWS)
W75-04663

OROGRAPHIC INFLUENCES ON DISTRIBUTION OF PRECIPITATION,
Oslo Univ. (Norway). Inst. of Geophysics.
K. Pedersen.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 161-170, 1973. 5 fig, 1 ref.

Descriptors: *Orography, *Precipitation(Atmospheric), *Computer models, Terrain analysis, Winds, Pressure, Radiosondes.
Identifiers: *Geostrophic equations, *Norway, Grid mesh, Smoothing operator, Vertical velocity.

A terrain profile of Norway representative for a grid having a mesh-size of 50 km was estimated as proper for studying the terrain-induced vertical displacements of the air. Using a quasi-geostrophic set of equations, the vertical displacements and the resulting condensation were computed for a given situation, September 4-5, 1968. (See also W75-01961) (Jones-ISWS)
W75-04664

DISTRIBUTION OF PRECIPITATION IN THE SOGNEFJORD REGION,
Bergen Univ. (Norway). Geofisisk Institutt.
E. Skaar.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 171-185, 1973. 6 fig, 4 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Wind, Fjords, Valleys, Coasts, *Distribution patterns, Agroclimatology, Weather data, On-site data collections.
Identifiers: *Norway(Sognefjord Region).

During the years 1963-1966 an agroclimatic investigation was carried out in the Sognefjord region, a mountainous area of approximately 11,000 sq km. Daily precipitation amount was measured at 145 stations in the period April to October and at 50 stations in winter. The coast districts are among the most precipitous in Norway. Thus, the average annual precipitation at Brekke is 3354 mm. The valleys at the head of the easternmost parts of the fjord (Laerdal) get only about one-ninth of this amount. The three years concerned, 1964-1966, include one 'wet' year, one 'dry' year, and one year with a near average precipitation amount. The mapping of the distribution of precipitation in this area must to some extent be based on theoretic considerations because most of the stations were sited near the fjord. The distribution pattern is dependent on the general weather type, mainly the wind conditions. This was illustrated by selected short-periods in situations of different weather types. (See also W75-01961) (Jones-ISWS)
W75-04665

MAXIMUM DAILY PRECIPITATION IN GORSKI KOTAR AND LIKA (YUGOSLAVIA) IN RELATION TO THE OVERFLYING AIRSTREAM,
Hydrometeorological Inst. of Croatia, Zagreb (Yugoslavia).
N. Plesko.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972 World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 186-197, 1973. 6 fig, 1 tab, 5 ref.

Descriptors: *Precipitation(Atmospheric), *Air circulation, *Excessive precipitation, *Local precipitation, *Probable maximum precipitation, Precipitation intensity, Climatology, Storms, Weather patterns, Winds, Isohyets, Mountains,

Distribution patterns, Climates, Geographical regions, Synoptic analysis.
Identifiers: *Yugoslavia(Gorski Kotar and Lika).

The areal distribution of precipitation daily maximums in Gorski Kotar and Lika (Yugoslavia) was studied in relation to the prevailing airstreams in the atmospheric layer from the earth surface and up to the height of about 1500 m. The isohyetal charts of daily maximums were elaborated for each of eight main wind directions. Based on the theory of Jenkinson the estimates of daily maximums were found for various return periods and for selected stations as well as their maximum expected values. (See also W75-01961) (Huff-ISWS)
W75-04666

STATISTICAL CONSIDERATIONS ABOUT SNOW CONDITIONS IN THE AUSTRIAN ALPS,
Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
For primary bibliographic entry see Field 2C.
W75-04667

ABOUT VERTICAL GRADIENTS OF LIQUID PRECIPITATION IN MOUNTAINS,
Hydrometeorological Service of the USSR, Moscow.
A. P. Zhidikov, and A. G. Levin.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 204-211, 1973. 5 fig, 1 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, *Winds, Rain gages, Isohyets, *Distribution patterns, Wind velocity, Meteorology.
Identifiers: *Liquid precipitation, USSR.

In order to get true vertical representation of precipitation in mountains, vertical profiles of measured precipitation and wind in specified mountainous areas should be taken in combination. Comparisons were made of actual vertical gradients of precipitation with gradients of measured precipitation affected by wind. Suggestions were made for the observational procedures to investigate vertical distribution of liquid precipitation as well as for the procedures to map isohyets of liquid precipitation in mountainous areas. (See also W75-01961) (Jones-ISWS)
W75-04668

METHODS FOR THE STUDY OF LAWS FOR THE DISTRIBUTION OF PRECIPITATION IN MEDIUM-HIGH MOUNTAINS (ILLUSTRATED BY THE VITIM RIVER BASIN),
Gidrometeorologicheskii Institut, Leningrad (USSR).
V. S. Vuglinski.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 212-221, 1973. 6 fig, 3 tab, 5 ref.

Descriptors: *Precipitation(Atmospheric), *Moountains, *Distribution patterns, Water balance, Evaporation, Runoff, Seasonal, Radiation, Orography, Equations.
Identifiers: Radiation balance, Turbulent heat exchange, *USSR(Vitim River Basin).

Methods for the computation of mean annual and monthly precipitation for mountain basins were illustrated by the Vitim River basin in the Trans-Baikal area. On the basis of data from the standard meteorological network with relations between precipitation and the altitude of the region, long-term mean annual and monthly precipitation patterns for individual basins were computed. The areal distribution of precipitation was accounted for by the local orography. Diagrams of the transformation of moisture fluxes over mountainous terrain were presented. A possibility for the determination of mean long-term annual precipitation for mountain basins in the absence of observational data on runoff and radiation balance was considered with the use of the equations of Schreiber, Oldekopp, and Budyko. (See also W75-01961) (Jones-ISWS)
W75-04669

THE DISTRIBUTION OF PRECIPITATION IN SOME MOUNTAINOUS CANADIAN WATERSHEDS,
Atmospheric Environment Service, Calgary (Alberta).
D. Storr, and H. L. Ferguson.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 243-263, 1973. 16 fig, 3 tab, 18 ref.

Descriptors: *Demonstration watersheds, *Watersheds(Basins), *Precipitation(Atmospheric), Rainfall, Rainfall-runoff relationships, *Distribution patterns, *Canada, Slopes, Snowmelt, Snowpacks, Water loss, Water balance, Rain gages, Evapotranspiration, Mountains, Rocky Mountain region, Data collections.
Identifiers: Alberta, British Columbia.

Several research investigations in western Canada include studies of the distribution of precipitation in mountainous regions. Five such projects were described. Three of these are International Hydrologic Decade experimental basin projects located on the eastern slopes of the Rocky Mountains in Alberta. Five to ten years of record were available for these basins and problems of gage exposure, network design, and data collection and analysis were discussed in detail. Two projects in British Columbia, one on Vancouver Island, and another in the Okanagan Basin in the interior, were established more recently and only preliminary results could be provided at this time. (See also W75-01961) (Sims-ISWS)
W75-04671

PHYSIOGRAPHICALLY ADJUSTED PRECIPITATION-FREQUENCY MAPS,
National Weather Service, Silver Spring, Md. Office of Hydrology.
J. F. Miller.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 264-277, 1973. 4 fig, 2 tab, 13 ref.

Descriptors: *Frequency analysis, *Distribution patterns, *Flood recurrence interval, *Orography, *Precipitation(Atmospheric), Rainfall disposition, Precipitation excess, Precipitation intensity, Storms, Snowfall, Weather patterns, Depth-area-duration analysis, Topography, Climatic data, Climatic zones, Moisture, *Maps, Mapping.
Identifiers: Partial duration series, *Index relations.

Recent investigations of the precipitation-frequency regime in the United States have focused on the mountainous western portion of the country. These investigations have attempted to depict the variations of the precipitation-frequency regime with the variations in physiographic factors for return periods between 2 and 100 years and durations of 6 and 24 hours. Relationships between precipitation-frequency data at stations and topographic and climatic parameters, such as elevation, exposure, and normal annual precipitation, were developed to aid in understanding these variations. These relationships were used in the preparation of generalized isopluvial charts. In some portions of the mountainous western United States, snow contributes significantly to the series of extreme precipitation amounts. In these regions, an additional set of maps were prepared to depict the precipitation-frequency regime for the May to October season, when practically all heavy precipitation is in the form of rain. (See also W75-01961) (Huff-ISWS)
W75-04672

THE CHARACTERISTIC CHANGES OF THE AMOUNT OF PRECIPITATION IN CONNECTION WITH ALTITUDE IN THE MOUNTAINOUS AREAS OF YUGOSLAVIA,
Federal Inst. of Hydrometeorology, Belgrade (Yugoslavia).
I. Delijanic.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 278-289, 1973. 5 fig, 1 tab.

Descriptors: *Precipitation(Atmospheric), *Mountains, *Orography, Valleys, Gages, Statistical methods, Regression analysis, Climates, Distribution patterns.
Identifiers: *Yugoslavia, Vertical gradients, Precipitation regions. Atmospheric circulations.

During the preparation of a climatic atlas of Yugoslavia, a series of charts of mean precipitation were prepared. The scarcity of gages in certain districts, particularly in the mountains, required that a means of estimating the precipitation be found. The estimation is complicated in that the records were not homogeneous for the entire period from 1931 through 1960 and the different source regions of moisture and wind regimes cause the different mountainous regions to respond differently to the precipitation-bearing air masses. The inhomogeneous records were resolved through the use of very detailed statistical analysis. The altitude-precipitation relationships were solved by partitioning the country into regions, generally along ridge and valley lines, with similar response characteristics and applying correlation techniques. (See also W75-01961) (Jones-ISWS)
W75-04673

DISTRIBUTION OF PRECIPITATION IN MOUNTAINOUS AREAS OF WEST PAKISTAN,
Pakistan Meteorological Dept., Karachi.
F. C. K. Alam.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switerland, p 290-306, 1973. 6 fig, 2 tab, 10 ref.

Descriptors: *Mountains, *Precipitation(Atmospheric), Isohyets, Rain gages, Topography, Snow, Probable maximum precipitation, Mass curves, Basic data collections, *Distribution patterns.
Identifiers: *Pakistan, Double mass curve technique.

With the inception of the Indian Meteorological Department in 1875, systematic recording of daily rainfall was initiated in the Indo-Pak sub-continent. Prior to 1961, the normal and other isohyetal maps drawn on the basis of available data were found unsatisfactory for the hilly areas. Following the signing of the Indus Basin Treaty 1960, special hydrometeorological studies were taken up in the Pakistan Meteorological Department for the implementation of the Water Resources Projects connected with the Indus Basin Development Plan. By 1961, though the network of raingages had fairly improved, the undeveloped and inaccessible areas, particularly the

mountainous areas of the Northern region were still inadequately or completely ungaged. Consequently, in the studies conducted since 1961, the technique of analysis ensuring homogeneity and accuracy of data were employed. However, the primary draw-back of lack of basic data was considerably eliminated by developing the elevation-barrier-precipitation relationship, depicting the effect of topography of the area on the resultant precipitation. These relationships varied with the season as well as with different project areas. The topographically adjusted normal isohyetal maps thus developed were found to provide reliable results in the computation of the probable maximum precipitation studies. These studies also provided an objective basis for improving the precipitation network in the mountainous areas. (See also W75-01961) (Jones-ISWS)
W75-04674

PRECIPITATION IN TAIWAN MOUNTAINOUS AREAS,
P. S. Pan.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 307-321, 1973. 14 fig, 2 tab, 10 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Monsoons, Raingages, Rainfall, Snow, *Orography, Islands, Air circulation, Winds, Runoff, Infiltration, Convection, Cyclones, Isohyets, Elevation, Networks, Typhoons, *Weather.
Identifiers: *Taiwan.

Located astride the Tropic of Cancer, Taiwan has a subtropical climate. Meteorologically, the island is amidst the East Asian Monsoon system, beside being a favorite target of typhoons. Because of its distance from the southern hemisphere source regions, the summer southwest winds approaching Taiwan are weaker and less regular than their winter northeast counterparts. The island receives very little snowfall, even in mountain peaks, exceeding 3000 meters in height; the annual island precipitation attributable mainly to monsoons and typhoons averaged to 2340 milimeters (92 inches). Due to rugged topography and the Central Mountain Range oriented 25 degrees to the northeast, the orographic effect has a great influence on the distribution of precipitation in mountain areas caused by monsoons, and additional precipitation results on the mountain areas caused by tertiary circulations. Analyses of the weather elements were described, while problems both in measurement and calculation of mountain precipitation in Taiwan by orographic effects were discussed. (See also W75-01961) (Jones-ISWS)
W75-04675

OROGRAPHIC INFLUENCES ON THE DISTRIBUTION OF PRECIPITATION,
British Meteorological Office, Bracknell (England).
A. Bleasdale, and Y. K. Chan.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 322-333, 1973. 6 fig, 1 tab, 13 ref.

Descriptors: *Mountains, *Precipitation(Atmospheric), Rainfall, Statistical methods, Computers, Data collections, *Distribution patterns, *Orography.
Identifiers: *United Kingdom, Rainfall-height relationships, Five-km rainfall grid.

The predominant influence of orography on the spatial distribution of average annual rainfall over the United Kingdom has been well known for a long time. Apart from a rather small number of studies for separate districts, knowledge of this influence has been largely based on subjective qualitative appreciation. By using a computer and data for several thousand stations, an attempt was made to investigate the influence in a more precise quantitative sense for the whole country and thereby obtain guidance on the nature of the secondary influences. (See also W75-01961) (Jones-ISWS)
W75-04676

EXTREME THUNDERSTORM RAINFALL IN THE INTERMOUNTAIN WESTERN UNITED STATES,
National Weather Service, Silver Spring, Md. Office of Hydrology.
J. T. Riedel, and E. M. Hansen.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 334-345, 1973. 8 fig, 1 tab, 6 ref.

Descriptors: *Probable maximum precipitation, *Rainfall, *Thunderstorms, *Precipitation(Atmospheric), Mountains, Excessive precipitation, Pacific Northwest U.S., Southwest U.S., *Rocky Mountain region, Depth-area curves, Climatology, Orography, Elevation.

Studies show the intense local thunderstorm is the most critical rain producer for small drainages in the large intermountain region, bordered by the Continental Divide on the east and the Sierra Nevada with their extension, the Cascades, into Canada on the west. Data from such storms, producing rainfalls of 100 to 290 mm in about one hour, were analyzed. Inspection of weather maps generally does not show well-organized systems that account for these occurrences. The seeming lack of simultaneous rains at the nearest surrounding stations, or on adjoining days, points to the local nature of the storms. The development of a generalized chart of probable maximum thunderstorm rainfall was described. Estimates for 1 hour over 2 sq km ranged from 170 to 300 mm within the region. The derived 1-hour rainfall depth-area relation, based on limited data, gave 20% of the 2 sq km value for a 1000 sq km area. Studies to find preferred localities (with respect to terrain features) for most extreme occurrences were described. Some data suggest a decrease in short-duration rains for elevations above 1500 m. Ultimately, for higher elevations, distant from lower valleys, thunderstorm rainfall must begin to decrease. A decrease of 5% per 300 m for elevations above 1500 m was adopted for probable maximum thunderstorm rainfall. (See also W75-01961) (Sims-ISWS)
W75-04677

WATER YIELD AS AN INDEX OF LEE AND WINDWARD TOPOGRAPHIC EFFECTS ON PRECIPITATION,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 346-358, 1973. 1 fig, 3 tab, 40 ref.

Descriptors: *Streamflow, *Precipitation(Atmospheric), *Evapotranspiration, *Orography, *Water yield, Watersheds(Basins), Snowmelt, Topography, Elevation, Slopes, Regression analysis, Snow model studies, California.
Identifiers: *Principal component analysis, Barrier height, Sierra Nevada Barrier.

In mountainous areas, the best precipitation maps are derived by distributing streamflow back on the watershed and correcting for evapotranspiration. Special problems arise in the lee of major mountain barriers, such as the Sierra Nevada of California. There, the relation of mean annual streamflow to topography was determined from data for 14 watersheds. Variables indexing effects of rise, air flow separation, spillover, and barrier height explained 99% of the variance; standard error was 11%. Rise and flow separation were important. Streamflow increased for the area 8 km to the lee of the Sierra Nevada ridge, and decreased progressively with elevation above and below about 2700 m. Evapotranspiration estimates were obtained from snow course accumulations during periods with snow only and from the streamflow relations to topography. (See also W75-01961) (Huff-ISWS)
W75-04678

INFLUENCE OF OROGRAPHY ON THE SHARE OF PRECIPITATION IN THE EAST ALPINE HIGH MOUNTAINS,
H. Tollner.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 359-361, 1973.

Descriptors: *Precipitation(Atmospheric), *Mountains, *Orography, Convection, Rainfall disposition, Distribution patterns.
Identifiers: *Eastern Alps, Rain shadows, Totalizers.

During an observational period from 1932 through 1938, it was found by using totalizers that the maximum precipitation occurrence was not realized at higher elevations at the same time that it occurred in the valleys. Similar patterns were revealed in the records from ombroscopes over a longer period of time. The temporal variation of the precipitation maxima were found to be related to: (1) intensification of instability by high-level heat sources with particular solar aspect, (2) rain shadowing of certain areas by mountains upwind during the normal summertime westerly and northwesterly flow, and (3) an unequal increase in springtime of the upslope precipitation. (See also W75-01961) (Jones-ISWS)
W75-04679

ON THE PROBLEM OF VERTICAL DISTRIBUTION OF PRECIPITATION, ESPECIALLY IN AREAS WITH GREAT HEIGHT DIFFERENCES,
Uppsala University, Uppsala (Sweden), Dept. of Physical Geography.
B. E. Ryden.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 362-372, 1973. 3 fig, 2 tab, 9 ref.

Descriptors: *Precipitation(Atmospheric), *Elevation, Mountains, Rainfall, Variability, Regression analysis, Rain gages, Instrumentation, Climates, On-site data collections, Measurement.
Identifiers: *Sweden.

Precipitation was measured by totalizers during the summers of 1967 to 1971 in the high mountains of northern Sweden. The totalizers were of a simple and robust construction, fitting the hard weather conditions at high levels above the tree line. The sites of the instruments covered a vertical distribution of more than 1500 meters in the drainage basin. Results showed a near linear increase of precipitation with altitude. During the season with the higher amount of precipitation, the increase with altitude was greater. (See also W75-01961) (Sims-ISWS)
W75-04680

STUDY OF OROGRAPHIC EFFECT ON OPTIMUM NUMBER OF RAINGAUGES,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 7A.
W75-04681

SPECTRA OF PRECIPITATION SERIES IN MOUNTAINOUS REGIONS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 7A.
W75-04682

THE USE OF THE MODIFIED TIME SERIES ANALYSIS TECHNIQUE FOR THE DETERMINATION OF AREAL PRECIPITATION ACCURACIES,
Aston Univ., Birmingham (England).
P. Hutchinson.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 448-465, 1973. 6 fig, 3 tab, 8 ref.

Descriptors: *Network design, *Time series analysis, *Precipitation(Atmospheric), Rainfall, Elevation, Rain gages, Mathematical studies, Areal.
Identifiers: *New Zealand.

Further work on the development and use of a modified time series analysis technique for determining areal precipitation accuracies, with daily rainfall data from an area of accentuated relief was reported. The effect of changes in the lag intervals was in the determination of the 'standard error' of the areal precipitation was studied and simple rules for the selection of the optimum lag interval were presented. For the given areas, the raingage network density was varied, and the effect of this variation on the calculated accuracy of the areal precipitation was shown. Daily precipitations were grouped according to six prevailing synoptic situations, and it was shown that different accuracies of areal precipitation determinations can be expected, depending upon the synoptic situation. The implications of this work for the design of precipitation gage networks were discussed. It was shown that an increase in the number of gages increases the accuracy of the estimate of areal precipitation, but that this increase is much less than may be expected from considerations of random data. It seems likely that the type of synoptic situation has relatively little effect on the standard error. (See also W75-01961) (Sims-ISWS)
W75-04683

DEFICIENCIES IN MEASURED SNOW PRECIPITATION IN A MOUNTAINOUS AREA IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo (Norway).
For primary bibliographic entry see Field 2C.
W75-04684

PRECIPITATION ESTIMATES FROM METEOROLOGICAL SATELLITE DATA,
Stanford Research Inst., Menlo Park, Calif.
P. A. Davis, and S. M. Serebreny.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 474-483, 1973. 3 fig, 2 tab.

Descriptors: *Satellites(Artificial), *Precipitation(Atmospheric), Hydrology, Meteorological data, *Remote sensing, Climatic data, Data collections, Watersheds(Basins), *Mountains, Montana, Clouds.

Existing series of cloud photographs from polar-orbiting satellites were utilized in a technique designed to estimate total precipitation (rain and snow) over a mountainous drainage basin in northwestern Montana. Daily precipitation for the entire basin was defined from analyses of surface observations and climatological data within the basin. Satellite-viewed cloud cover was distinguished in terms of eight exclusive categories representative of differing probable contributions to basin precipitation. After a dominant categorization was assigned to each successive 12-hour period, estimates of the cumulative basin precipitation were obtained by summation of probable amounts assigned to each cloud category. Initial applications of the technique with dependent data indicated that good estimates of the cumulative precipitation could be obtained from satellite data over summation periods of about two weeks during the early winter and about five days during the early summer. Subsequently, the technique was tested with independent data; estimates and observations also were compared with independent estimates of precipitation based on radar data analysis. The feasibility and importance of recognizing visible cloud organization and movements was apparent, but the desirability of including satellite infrared data was suggested. (See also W75-01961) (Sims-ISWS)
W75-04685

FACTORS AFFECTING THE ESTIMATE OF AREAL AVERAGE SUMMER AND WINTER PRECIPITATION IN A SMALL CATCHMENT OF THE SWISS PREALPS,
Swiss Forest Research Inst., Birmensdorf.
H. M. Keller.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 484-496, 1973. 2 fig, 6 tab, 11 ref.

Descriptors: *Precipitation(Atmospheric), *Watersheds(Basins), Water balance, Rainfall, Snow, Topography, Mountains, Distribution patterns, Alpine, On-site investigations, Winds, Precipitation gages, Areal, *Seasonal.
Identifiers: *Swiss Prealps.

Four years of record from 12 storage and 4 recording precipitation gages as well as from 17 snow courses in a 300 ha catchment ranging from 1120 to 1640 m ASL were analyzed. The local variation in monthly catch of liquid precipitation is best explained by the topographic position of the gages considering prevailing wind conditions in the catchment. In winter storage gages are of restricted use to estimate the distribution of winter precipitation. Snow course data indicate that snow distribution in winter may be estimated using wind speed and potential radiation as topographic parameters. For the estimate of winter precipitation, however, only data from selected gages can be used. Procedures for data adjustment were given to estimate areal average summer and winter precipitation in the catchment. Annual precipitation becomes about 10% higher when using these procedures. (See also W75-01961) (Sims-ISWS)
W75-04686

AREAL RAINFALL ANALYSIS BY COMPUTER,
British Meteorological Office, Bracknell (England).
For primary bibliographic entry see Field 7C.
W75-04687

COMPUTERIZED CALCULATION OF AREAL PRECIPITATION AND ITS ACCURACY,
Techische Universitaet, Brunswick (West Germany). Leichtweiss Inst. for Water Research.
For primary bibliographic entry see Field 7C.
W75-04688

SOME INTRA-STORM CHARACTERISTICS OF HIGH-INTENSITY RAINFALL BURSTS,
Forest Service (USDA), Utah. Forest Sciences Lab.
E. E. Farmer, and J. E. Fletcher.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 525-531, 1973. 2 fig, 3 tab, 2 ref.

Descriptors: *Cloudbursts, *Rainfall intensity, *Design storm, *Duration curves, *Probable maximum precipitation, Thunderstorms, Precipitation(Atmospheric), Orography, Basic data collections, Convection, Storms, Frequency analysis, Data processing, Networks, Hydrology.

Basic data for analyses of high-intensity rainfall bursts were obtained from two rainfall intensity gage networks located in central and north central Utah. Twenty-five intensity gage stations are located at altitudes between 1325 and 3095 meters, of these, eighteen gages are at altitudes greater than 2440 meters. Analyses included: (1) intra-storm timing and number of bursts, (2) distribution of storm rainfall by 10% of storm duration, and (3) relationship between depth of total storm rainfall and depth of burst rainfall. More than 50% of the total storm rainfall depth occurs in 25% of the storm period; usually more than half of the total depth of rain is delivered as burst rainfall. Rainfall bursts occur most frequently in the first quarter of the storm period. Design data were presented for storms which contain a burst of 10 minutes or longer with return periods of 2 and 10 years. (See also W75-01961) (Sims-ISWS)
W75-04689

A HYDROLOGICAL ASSESSMENT OF PRECIPITATION IN THE WESTERN HIGHLANDS OF NEW GUINEA,
Imperial Coll. of Science and Technology, London (England). Dept. of Civil Engineering.
E. M. Shaw.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 532-543, 1973. 3 fig, 4 tab, 8 ref.

Descriptors: *Rainfall intensity, *Frequency analysis, *Duration curves, Data processing, Rainfall, Areal, Design storm, *Precipitation(Atmospheric), Hydrology, Tropical regions.
Identifiers: *New Guinea.

Estimates of the frequency of high intensity falls and their areal distribution were required during a feasibility study for a land drainage scheme in an intermontane plateau in New Guinea at an altitude of about 1500 m above sea level and with an average annual precipitation of 2600 mm. With the available short-period autographic data and an eighteen-year daily record, depth-duration-frequency curves were established for rainfall at a point. The maximum daily fall recorded in the area is 102 mm, very low in comparison with other regions in the territory. Some tentative explanations were given. The determination of areal rainfall from point measurements was approached in several ways and an average reduction factor of 75% was found for an area of about 420 sq km, assuming a maximum point storm of 102 mm. (See also W75-01961) (Sims-ISWS)
W75-04690

AREA PRECIPITATION MEASUREMENT WITH X-BAND RADAR FROM A MOUNTAIN NORTH OF THE ALPS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
For primary bibliographic entry see Field 7B.
W75-04691

A HYBRID COMPUTER SIMULATION MODEL FOR PREDICTING THE EFFECTS OF THE AREAL DISTRIBUTION OF PRECIPITATION ON RUNOFF CHARACTERISTICS,
Utah Water Research Lab., Logan.
E. K. Israelsen, and J. P. Riley.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 552-564, 1973. 5 fig, 5 tab, 3 ref.

Descriptors: *Model studies, *Computer models, Rainfall-runoff relationships, *Precipitation(Atmospheric), Watersheds(Basins), Distribution patterns, Mountains, *Utah, Hydrology, *Simulation analysis, *Forecasting.

A distributed parameter hydrologic model based on fundamental relationships, several of which are non-linear, was described. Spatial resolution was achieved by subdividing the modeled area and by applying average values of model parameters within each subzone. Input data for each subzone consisted of precipitation, temperature, and physical characteristics (slope, soil type, rooting depth, and vegetative cover). The snow accumulation and ablation processes were also considered. Presumably, through weather modification procedures it is possible to alter and control the distribution of precipitation on a watershed. To demonstrate its ability to predict the effects of aerial distribution of precipitation on runoff characteristics, the model was applied to a watershed within the Wasatch Mountains of northern Utah. Telemetered precipitation stations are distributed throughout the area. The computer model predicted actual runoff patterns and simulated runoff patterns under assumed patterns of precipitation distribution. (See also W75-01961) (Sims-ISWS)
W75-04692

ESTIMATING AREAL RAINFALL BY FITTING SURFACES TO IRREGULARLY SPACED DATA,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 7C.
W75-04693

INADVERTENT RAIN MODIFICATION AS INDICATED BY SURFACE RAINCELLS,
Illinois State Water Survey, Urbana.
P. T. Schickedanz.
Journal of Applied Meteorology, Vol 13, No 8, p 891-900, December 1974. 1 fig, 6 tab, 26 ref.

Descriptors: *Local precipitation, *Weather modification, *Weather patterns, Rainfall disposition, Rainfall intensity, Rain gages, Artificial precipitation, Topography, Statistical methods, Illinois, *Missouri.
Identifiers: *Raincells, *Urban rainfall, *St. Louis(Mo), Wood River(Ill), Urban effects.

Rainfall data from a large dense network are being used to study inadvertent rainfall modification in the St. Louis area. Surface raincells are delineated and then analyzed to determine the character of any urban-induced changes in precipitation. Results for comparisons of 605 potential effect cells and 870 non-effect cells from the summer of 1971-72 provide strong evidence that cell characteristics have been sizeably altered by the local urban-industrial environment. For cells occurring in the urban-industrial zone of St. Louis, the average rainfall volume was 176% greater than for cells in the control sample. For cells occurring in the separate industrial region of Wood River, the average volume was 262% greater than the cells in the control sample. The results show that the primary change in St. Louis cells is total rain area, and this and other results suggest that the change relates to dynamic effects induced by the urban heat island. The primary change in Wood River cells is in rain intensity, and this and other results suggest that this relates to microphysical effects from the industrial aerosols and additions of moisture into the atmosphere, particularly in dry summers. (Huff-ISWS)
W75-04703

FREQUENT OCCURRENCE OF HEAVY RAINFALL ALONG THE NORTH SIDE TO THE LOW-LEVEL JET STREAM IN THE BAIU SEASON,
Meteorological Research Inst., Tokyo (Japan).
T. Akiyama.
Papers in Meteorology and Geophysics, Vol 24, No 4, p 379-388, December 1973. 8 fig, 10 ref.

Descriptors: *Rainfall, *Excessive precipitation, Convection, Winds, Distribution patterns, Jets, Clouds.
Identifiers: *Japan, Baiu front.

The relationship between the heavy rainfall and the low-level jet stream was examined over southwest Japan throughout the Baiu season of 1968. As for the spatial relation, it was concluded that the occurrence of heavy rainfall is mostly confined within the zone about 200 km wide along the north side of the low-level jet axis. The wind speed in the heavy rainfall zone is almost vertically uniform in the thick convective layer while the geostrophic wind speed increases with height. This characteristic wind profile suggests that the intensification of the super geostrophic low-level jet is to be attributed to convective momentum mixing. These observational facts about the relation between the heavy rainfall and the low-level jet were explained by the dynamic model of the low-level jet circulation proposed by Matsumoto and Ninomiya (1971). (Jones-ISWS)
W75-04704

DIURNAL VARIATIONS IN CLOUD CONDENSATION NUCLEI,
State Univ. of New York, Albany. Atmospheric Sciences Research Center.
T-F. D. Lee, and J. E. Jiusto.
Journal of Geophysical Research, Vol 79, No 36, p 5651-5656, December 20, 1974. 4 fig, 1 tab, 11 ref. NSF Grant GA-12735.

Descriptors: *Nucleation, *Condensation, *Cloud physics, Clouds, *Diurnal distribution, Coagulation, *New York, Aerosols, On-site investigations.
Identifiers: *Aitken nuclei, Thermal gradient diffusion chamber.

An increase in the concentration of cloud condensation nuclei at night has been reported frequently in recent years in Australia. An experiment was conducted in New York to determine if and why an evening increase in cloud condensation nuclei might occur. Such a cloud condensation nuclei nocturnal peak was observed over one third of the time and preliminary results suggested that coagulation of smaller Aitken nuclei might be a responsible mechanism. (Jones-ISWS)
W75-04711

RAINDROP CHARACTERISTICS IN SOUTH CENTRAL UNITED STATES,
Agricultural Research Service, Baton Rouge, La.
C. E. Carter, J. D. Greer, H. J. Braud, and J. M. Floyd.
Transaction of the American Society of Agricultural Engineers, Vol 17, No 6, p 1033-1037, November-December 1974. 6 fig, 1 tab, 18 ref.

Descriptors: *Raindrops, *Impact(Rainfall), Erosion, Rates, Rainfall intensity, Energy, Particle size, *Louisiana, *Mississippi, Central U.S., *Gulf Coastal Plain.
Identifiers: *Soil loss, Drop-size distribution, Kinetic energy, Universal soil loss equation, Flour pellet method.

Raindrops were measured by the flour-pellet method to determine why the universal soil loss equation overpredicted erosion along the Gulf Coast. Raindrops measured in Baton Rouge, Louisiana, were not significantly different in size from those measured in Holly Springs, Mississippi. Differences were indicated, however, between raindrop sizes in these two south central states and those measured in Washington, D.C. Median raindrop sizes increased with increasing rainfall intensities up to approximately 2.5 inches per hour then decreased as rainfall intensities increased further. The decrease in median drop sizes at intensities above 2.5 inches per hour was attributed to raindrops breaking into smaller drops as they approached the unstable size of approximately 6.2 mm in diameter. A cyclic relationship between median raindrop size and rainfall intensity was indicated by median drops increasing again in size with increasing rainfall intensities above 8 inches per hour. Such a relationship is reasonable due to : (1) raindrops increasing in size by coalescence, and (2) raindrops decreasing in size by breaking into smaller drops when they reach an unstable size. Kinetic energy values calculated from the south central states data were in close agreement with those presently used in the soil loss equation at low rainfall intensities (3 inches per hour and less). However, for higher intensities (7 to 8 inches per hour), kinetic energies used in the soil loss equation were as much as 50% greater than values obtained for the south central states. (Jones-ISWS)
W75-04713

MICROMETEOROLOGICAL MEASUREMENTS FOR PESTICIDE DRIFT STUDIES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-04714

AN ASSESSMENT OF WARM FOG - NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
M. L. Corrin, J. R. Connell, and A. J. Gero.
Report No NASA CR-2477, p 143, November 1974. 11 fig, 15 tab, 229 ref, append. NASA NAS8-29583.

Descriptors: *Fog, *Nucleation, Coalescence, Instrumentation, Turbulence, Surface tension, Optical properties, Condensation, Aerosols, Air circulation, Weather modification.
Identifiers: *Fog microphysics, Visibility, Surface films, Drop-size distribution, Liquid water content, Warm fog modification.

A state-of-the-art survey of warm fog research which has been performed up to, and including, 1974 was presented. Topics covered were nucleation, growth, coalescence, fog structure and visibility, effects of surface films, drop size spectrum, optical properties, instrumentation, liquid water content, and condensation nuclei. Included was a summary of all reported fog modification experiments. Additional data were provided on air flow, turbulence, a summary of recommendations on instruments to be developed for determining turbulence, air flow, etc., as well as recommendations of various fog research tasks which should be performed for a better understanding of fog microphysics. (Jones-ISWS)
W75-04717

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM - BRIDGER RANGE CLOUD SEEDING EXPERIMENT,
Montana State University, Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W75-04721

ATMOSPHERIC MOISTURE PARAMETERIZATION,
Environmental Technical Applications Center, Washington, D.C.
R. D. Smith.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-784 814, $3.75 in paper copy, $2.25 in microfiche. USAFETAC TN 74-1, p 21, January 1974. 15 fig, 6 tab, 25 ref.

Descriptors: *Cloud physics, Weather modification, Thermodynamics, Convection, Condensation, Fog, Clouds, Atmosphere, *Moisture content, Model studies, Temperature, Measurement, Reviews.
Identifiers: *Atmospheric moisture, Liquid state, Solid state, Cloud droplet size distribution, Droplet terminal velocity, Vertical motion, Stratus clouds, Cumulus clouds, Atmospher.

The development of theoretical and empirical means of measuring atmospheric moisture in both the liquid and solid state was reviewed. The relationships developed for moisture parameterization result in the best estimate of liquid and solid water at a point in time and space. These parameterizations are to be used in modeling the distribution of atmospheric moisture by applying nephanalysis and the more conventional parameters from actual and historic three-dimensional data bases. (Jones-ISWS)
W75-04724

AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN,
Linguistic Systems, Inc., Cambridge, Mass.
NASA TT F-801, p 185, November 1974, Translated from Avtomatizatsiya sbora i analiz nauchnoy informatsii v probleme vzaimodeystviya atmosfery i okeana, Vol 301, Hydrometeorological Press, Leningrad, 1972, 140 p Borisenkov, Ye P, and Dyubkin, I A, editors.

Descriptors: *Oceanography, *Meteorology, *Model studies, *Data processing, Research equipment, Ships, Instrumentation, Air circulation, Ocean circulation, Theoretical analysis.
Identifiers: Scientific research vessels.

This collection contains material from research into the interaction of the atmosphere and the ocean, including both experimental research conducted aboard scientific research vessels, and work of a theoretical nature. A number of articles are devoted to the principles basic for a ship automated system that collects and analyzes oceanological data. The theoretical articles deal with the basic concepts of hydrodynamic models of atmospheric and oceanic circulation. (See W75-04730 thru W75-04741) (Sims-ISWS)
W75-04729

AUTOMATED SYSTEM FOR MEASUREMENT, COLLECTION AND PROCESSING OF HYDROMETEOROLOGICAL DATA ABOARD SCIENTIFIC RESEARCH VESSELS OF THE GUGMS (SIGMA-S),
For primary bibliographic entry see Field 7C.
W75-04730

SOFTWARE FOR THE SIGMA-S,
For primary bibliographic entry see Field 7C.
W75-04731

SMALL PARAMETRIC MODEL OF THE PRECOMPUTATION OF METEOROLOGICAL FIELDS ON THE BASIS OF COMPLETE EQUATIONS AND ITS ENERGETIC ANALOGS,
For primary bibliographic entry see Field 7C.
W75-04736

ESTIMATE OF HEAT FLUXES ON THE SUBJACENT SURFACE (ACCORDING TO DATA FROM SYNOPTIC ANALYSIS),
For primary bibliographic entry see Field 7C.
W75-04737

THE PROBLEM OF CALCULATING CLOUD COVER IN CALCULATIONS OF LONG WAVE RADIATIONAL CHARACTERISTICS OF THE ATMOSPHERE,
Z. P. Galakhov.
In: NASA TT F-801, p 159-168, November 1974. 3 fig, 11 ref.

Descriptors: *Cloud cover, *Radiation, *Thermal radiation, *Atmosphere, Mathematical models, Model studies, Data processing, Meteorology.

The results of calculating the fluxes of outgoing long wave radiation, taking cloud cover into account, on the basis of mean monthly data were discussed. A three-level and a nine-level model of the atmosphere were used, the nine-level with a one-hundred millibar level as upper limit. Data used in the calculations were collected over many years. (See also W75-04729) (Sims-ISWS)
W75-04740

RECONSTRUCTING THE VERTICAL PROFILE OF HUMIDITY ON THE BASIS OF THE VERTICAL PROFILE OF TEMPERATURE,
T. I. Bazlova.
In: NASA TT F-801, p 169-181, November 1974. 2 fig, 3 tab, 9 ref.

Descriptors: *Humidity, *Temperature, *Model studies, Altitude, Meteorology, Absorption, Radiation, Atmosphere.
Identifiers: *Vertical distribution.

The vertical profile of humidity in the atmosphere was developed on the basis of the vertical profile of temperature by using an empirical formula linking changes in humidity with changes in temperature and altitude. The atmosphere was divided into three layers by altitude because the conditions for the formation of humidity varies with altitude. (See also W75-04729) (Sims-ISWS)
W75-04741

THE OBJECTIVE ANALYSIS OF RELATIVE HUMIDITY,
British Meteorological Office, Bracknell (England).
M. J. Atkins.
Tellus, Vol 26, No 6, p 663-671, 1974. 8 fig, 4 ref.

Descriptors: *Forecasting, *Rainfall, *Humidity, Rainfall intensity, Precipitation(Atmospheric), Meteorology, Model studies, Mixing, Methodology.
Identifiers: Mixing ratio, Primitive equation model, United Kingdom, *Weighting functions(Analysis).

A method of objective analysis of relative humidity was described which makes use of non-isotropic weighting functions. These depend on the gradient of the background field in such a way that observations in a direction along closely packed isopleths have higher weight than those in a direction perpendicular to them. Rainfall predictions with the United Kingdom fine mesh 10-level model were found to be better when based on this humidity analysis than on one using isotropic weighting functions and the results for a particular case were described. The use of surface observations in the lowest layer of the model was discussed and it was shown that it is better to use the surface humidity mixing ratio rather than the surface relative humidity. Resulting forecasts of rainfall are better and do not exhibit the diurnal variations found when using surface relative humidity observations. (Jones-ISWS)
W75-04791

FRONTAL MOTION IN THE ATMOSPHERE,
Tel-Aviv Univ. (Israel), Dept. of Mathematical Sciences.
E. Turkel.
Tellus, Vol 26, No 6, p 630-637, 1974. 8 fig, 14 ref.

Descriptors: *Fronts(Atmospheric), Numerical analysis, Meteorology, Model studies, Equations, Flow, Storms, Boundaries(Surfaces), Air circulation, Equations, *Atmosphere.
Identifiers: *Equations of motion(Atmospheric), Velocity vector.

The motion of frontal disturbances in the atmosphere was studied with a one layer non-linear model proposed by Stoker. The equations of motion were integrated in the interior of the domain by a two step method. Flows resulting from various initial and boundary conditions were considered for considerably longer times than those previously computed. The boundary was followed by a numerical procedure that allows for arbitrary shapes of the front. Hence, flows can be followed until occlusion occurs and the effects of the various initial and boundary conditions on the occlusion process can be accurately compared. In all cases, the cold front propagates faster than the warm front and a relatively strong mass convergence region exists behind the cold front. A cyclonic circulation pattern is clearly visible near the cold front. These facts suggest the occurrence of severe storms associated with cold fronts but not with warm fronts. (Jones-ISWS)
W75-04792

A CRITICAL EXAMINATION OF THE TURBULENCE INSTRUMENT USED IN THE MARSTA MICRO-METEOROLOGICAL FIELD PROJECT,
Uppsala Univ. (Sweden). Dept. of Meteorology.
For primary bibliographic entry see Field 7B.
W75-04795

SENSITIVITY DISTRIBUTION ALONG THE STRIPS OF COMPENSATION PYRHELIOMETERS,
Institute for Atmospheric Physics, Budapest (Hungary).
For primary bibliographic entry see Field 7B.
W75-04796

2C. Snow, Ice, and Frost

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
P. Tscheschke, J. F. Alfaro, J. Keller, and R. J. Hanks.
Soil Science, Vol 117, No 4, p 226-231, April, 1974. 1 tab, 5 fig, 5 ref.

Descriptors: *Soil water, *Saline water, *Irrigation, *Irrigation practices, Soil profile, Leaching, Hydraulic gradient, Evapotranspiration, Irrigation water, Salts, Root zone, Irrigation efficiency.
Identifiers: *Trickle irrigation.

Soil water patterns in soil profiles, subjected to four different trickle irrigation management treatments with highly saline water were investigated. The irrigation treatments on cherry tomato plants were (a) daily with a volume of water equal to that used by the plant the previous day, (b) every other day with equal volumes of water (c) below, and (d) above the volume of water evapotranspired. Generally, the soil water potential decreased in the soil profile, as a result of salt accumulation, with increased distance from the trickle source. The highest salt concentration occurred in the profiles irrigated with volumes of water below that evapotranspired by the tomato plants, indicating the importance of avoiding under-irrigation when-

ever highly saline water is used with trickle irrigation. Higher soil water potentials and higher yields resulted from irrigating with volumes above the evapotranspiration rate. (Mastic-Arizona)
W75-04391

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 5: ICE SHEET DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04405

HAIL AND ITS DISTRIBUTION,
Army Engineer Topographic Labs., Fort Belvoir, Va. Earth Sciences Div.
L. Williams.
Army Engineer Topographic Laboratories, Fort Belvoir, Virginia, Special Report ETL-SR-73-3. 16 p, January, 1973. 4 fig, 1 tab, 26 ref.

Descriptors: *Hail, *Precipitation(Atmospheric), *Ice, *Ice stones, Frequency, Probability, Convection, Distribution patterns, Seasonal.
Identifiers: Hailstorms, Hailstorm distribution.

Hail may occur in regions from the tropics to the polar zones, but the principal world occurrence belt is 30 degrees N to 50 degrees N latitude. The number and severity of hailstorms and their duration can vary widely from year to year. Hailstorms move fairly rapidly; durations average from 3 to 5 minutes. Hail falls in streaks and may combine with several other streaks to cover a continuous and broad swath of ground. Over continental areas, hail activity generally peaks in the late spring and early summer with some areas experiencing a secondary peak in the fall. Being a convective system, hailstorm activity tends to peak in midafternoon to early evening. Probability of occurrence of hailstones ranging from a record 5.6 inches in diameter to 0.25 inches are included for guidance of design engineers. (Mastic-Arizona)
W75-04604

ANALYSIS OF SNOW COVER DISTRIBUTION FROM AEROPHOTOGRAPHY DATA OVER EXPERIMENTAL MOUNTAIN BASIN OF VARZOB RIVER,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 7B.
W75-04658

SNOW SURVEY AND METHODS FOR SNOW STORAGE ESTIMATION IN MOUNTAIN RIVER BASINS OF THE SOVIET UNION,
Hydrometeorological Service of the USSR, Moscow.
V. D. Komarov, A. A. Kharshan, and V. M. Muchin.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 111-116, 1973. 1 fig, 3 ref.

Descriptors: *Precipitation(Atmospheric), *Snowfall, *Mountains, Hydrology, Photography, Snowmelt, Snowpacks, Mountain forests, Slopes, Snow cover, Snow surveys, Satellites(Artificial), Water equivalent, Melt water, Water resources, River basins.
Identifiers: *Snow courses, Snow stakes, *USSR.

The procedures for making estimates of the amount of melt water to be expected from mountain watersheds were described. The methods include prescribed snow courses with fixed points of measurement where means of snow depth and density are determined. The average distance between measuring sites varies from 2-10 km with a maximum difference of 15-200 m in height between sites along the same course. The frequency of measurement is on the order of 3-4 times during the winter. Approximately 200 mountain basins are now surveyed in the Soviet Union. Where necessary, helicopters are used to reach inaccessible watersheds. The helicopters are used to read or photograph snow stakes previously set along a snow course. The use of meteorological satellites shows promise for studying the dynamics of snow coverage of the mountains and the snow line altitude. The water equivalent of snow increases with altitude up to the upper boundary of the forest, but decreases above the tree line. The snow pack also decreases with altitude in barren zones. The water equivalent is found by summing the products of the site water equivalent and the areas that they represent. Other formulas are used when snowpack values are unreliable. (See also W75-01961) (Jones-ISWS)
W75-04659

STATISTICAL CONSIDERATIONS ABOUT SNOW CONDITIONS IN THE AUSTRIAN ALPS,
Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
K. Cehak.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 198-203, 1973.

Descriptors: *Snow, *Climatology, *Statistical methods, Variability, Precipitation(Atmospheric), Snow cover, Mountains, Distribution patterns.
Identifiers: *Austria(Alps).

Characteristics of the statistical distributions of some precipitation parameters were calculated. The dependency of these characteristics on the place of the observing station with regard to the Alps and to altitude was investigated. The results were represented in a set of composite maps. (See also W75-01961) (Jones-ISWS)
W75-04667

DEFICIENCIES IN MEASURED SNOW PRECIPITATION IN A MOUNTAINOUS AREA IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo (Norway).
O. G. Gjorsvik.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 466-473, 1973. 3 fig, 2 tab, 1 ref.

Descriptors: *Snow, *Water balance, *Precipitation(Atmospheric), Watersheds(Basins), Mountains, *Measurement, Runoff, Snowpacks, Instrumentation, Melt water, Winter, Winds.
Identifiers: *Norway.

Observations of runoff and precipitation in the Groset area, Norway, showed considerable deficiencies in measured precipitation. The basin has an area of 5.91 sq km and a mean altitude of 990 m ASL. A water balance for the period 1949-1968 was established, based on observations of precipitation (3 stations), runoff, groundwater stage, and snow surveys. A 'true precipitation' was calculated for the winter season from measurements of the snow storage and runoff, and the calculated groundwater runoff. The ratio between this true precipitation and the observed precipitation in Norwegian standard gages was estimated at 1.51. This means that the precipitation gages in the Groset area are able to catch, on the average, 66% of the snow precipitation. (See also W75-01961) (Sims-ISWS)
W75-04684

SIMPLE ALBEDO FEEDBACK MODELS OF THE ICECAPS,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
I. M. Held, and M. J. Suarez.
Tellus, Vol 26, No 6, p 613-629, 1974. 10 fig, 21 ref, 3 append. NOAA Grant 04-3-00233 and NSF Grant GA-40341.

Descriptors: *Ice, *Albedo, *Mathematical models, *Glaciology, Model studies, Theoretical analysis, Analytical techniques, Mathematics, Equations, Circulation, Air circulation, Ocean circulation, Solar radiation, Climates, Ice cover, *Variability.
Identifiers: *Diffusive models, Linear diffusive models, Non-linear diffusive models, Global climates, Perturbation theory, Obliquity variations.

A series of simple models of the albedo feedback mechanism and its effect on the global climate were solved analytically. All of the models are similar to one considered by Budyko. The seasonal variation in incident solar radiation was ignored. Emphasis was placed on the parameter dependence of the models' sensitivity to changes in the solar constant. It was found in all cases that increasing the efficiency of the poleward transport of energy increases this sensitivity. It was suggested that knowledge of the partitioning of the transport between the atmosphere and the oceans is of considerable importance for estimating sensitivity. The stability of equilibrium states was determined from the properties of small perturbations away from equilibrium. It was observed that relaxation times of perturbations can be increased considerably by the albedo feedback mechanism. The effect of variations in the obliquity of the planet's orbit on sensitivity and stability was also analyzed. The results indicate that albedo feedback may increase the significance of obliquity variations on Mars, as well as on Earth. (Humphreys-ISWS)
W75-04794

2D. Evaporation and Transpiration

CHANGES IN TRANSPIRATION, NET CARBON DIOXIDE ASSIMILATION AND LEAF WATER POTENTIAL RESULTING FROM APPLICATION OF HYDROSTATIC PRESSURE TO ROOTS OF INTACT PEPPER PLANTS,
Connecticut Univ., Storrs. Dept. of Plant Science.
For primary bibliographic entry see Field 3F.
W75-04399

SILICON CONTENT OF WHEAT HUSKS IN RELATION TO WATER TRANSPIRED,
Commonwealth Scientific and Industrial Research Organization, Glen Osmand (Australia). Div. of Soils.
J. T. Hutton, and K. Norrish.
Aust J Agric Res Vol 25, No 2, p 203-212, 1974. Illus.
Identifiers: Equations, Fertilizers, Growth rates, Nitrogen, Silicon hydroxide, *Wheat, *Transpiration.

Si concentrated in the husks, is about 1/3 of the total Si in the plant, and so the husks were used for transpirational measurements. Samples, from field trials extending over several seasons and from a number of localities, showed that the percent Si in the husks is closely related to water transpired. The equation, water used (cm) = 7.4 + 4.6 (% Si) ($r = 0.99$, $n = 8$), should be applicable to most of the wheat-growing areas of southern Australia, but the addition of fertilizers, particularly N, modifies the equation. The relationship between weight of Si in the tops and water transpired is consistent with the known solubility of $Si(OH)_4$ in soils, but the correlation is poorer than that using percentage Si.—Copyright 1974, Biological Abstracts, Inc.
W75-04484

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
For primary bibliographic entry see Field 2G.
W75-04507

EVAPORATION LOSSES FROM STORAGE GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-04657

WATER YIELD AS AN INDEX OF LEE AND WINDWARD TOPOGRAPHIC EFFECTS ON PRECIPITATION,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2B.
W75-04678

A METHOD FOR MEASURING FIRST-STAGE SOIL WATER EVAPORATION IN THE FIELD,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
G. F. Arkin, J. T. Ritchie, and J. E. Adams.
Soil Science Society of America Proceedings, Vol 38, No 6, p 951-954, November-December, 1974. 5 fig, 8 ref.

Descriptors: *Evaporimeters, *Soil moisture, *Evaporation, Transpiration, Drying, Flow rates, Pressure measuring instruments, Measurement, *Evapotranspiration, *Soil water.
Identifiers: Transducers, Evaporation plate.

An economical, automated method was developed for measuring soil water evaporation during first-stage drying simultaneously at several locations in a field to evaluate the effectiveness of mulches and crop canopies in reducing soil water evaporation. The method also provided a reasonable procedure for separating soil water evaporation during first-stage drying from transpiration, when the total evapotranspiration rate was accurately measured. Water flow through a thin evaporation plate with a known surface area was measured and used as a direct indicator of the evaporation rate. Flow rates could be recorded manually or automatically. Field tests of evaporation indicated that the resolution of the system was equal to that of a precision weighting lysimeter and that the system gave reasonable accuracy on an hourly basis. Mulch rates of 1000, 4000, and 10,000 kg/ha reduced daily soil water evaporation measured with this method by 26, 59, and 78% of the bare soil evaporation. Cumulative daily soil water evaporation was reduced by 57 and 71% under plant canopies with 100- and 50-cm row spacings and similar leaf area indices (3.0 and 2.7, respectively). (Roberts-ISWS)
W75-04698

FEEDLOT WASTE EFFECTS ON SOIL CONDITIONS AND WATER EVAPORATION,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5B.
W75-04699

SYNTHESIS OF HYDROGRAPH RECESSIONS ADJUSTED FOR EVAPOTRANSPIRATION LOSSES,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-04712

LYSIMETER EXPERIMENT DESCRIPTION AND PROGRESS REPORT ON NEUTRON MEASUREMENTS,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. J. C. Hsieh, L. E. Brownell, and A. E. Reisenauer.
Report No BNWL-1711, p 56, 1973. 8 fig, 2 tab, 1 ref, 4 append.

Descriptors: *Lysimeters, *Neutron absorption, Moisture content, *Meteoric water, Soil water, Vadose water, Measurement, *Path of pollutants, Water pollution sources.
Identifiers: Neutron meters, Psychrometers, Thermocouples.

Two large lysimeters were installed in the soil of the Hanford Reservation to gather data on the accumulation and penetration of meteoric water. The construction details of the experiment were described. The soil hydraulic characteristics and data collected for the first 6 months were included. One of the lysimeters was constructed with a closed bottom to prevent interchange of moisture with the vadose zone. If annual precipitation exceeded annual evapotranspiration, the moisture content near the bottom of this lysimeter would have increased. An open bottom lysimeter was constructed to provide data to support the results obtained from the closed lysimeter. Each was 3 meters diameter and 18.3 deep and filled with well-mixed local soil. Each had three tubes to accomodate neutron probes, psychrometers and thermocouples for water potential and soil temperature measurements, and tubes for measuring atmospheric pressure at various depths. (Roberts-ISWS)
W75-04725

2E. Streamflow and Runoff

FLOOD HAZARD REPORTS: TOOLS FOR RESOURCE PLANNING AND MANAGEMENT,
Soil Conservation Service, Grand Rapids, Mich.
For primary bibliographic entry see Field 4A.
W75-04432

RELATIVE RATES OF FLOW OF THE NEGRO AND SOLIMOES RIVERS (DETERMINED) THROUGH O18 CONCENTRATIONS, (IN PORTEGUESE),
Centro de Energia Nuclear na Agricultura, Sao Paulo (Brazil).
E. Matsui, E. Salati, W. L. F. Brinkmann, and I. Friedman.
Acta Amazonica, Vol 2, No 3, p 31-46, 1972, Illus.
Identifiers: *Brazil, *Flow rates, Mixing, Negro River, *Oxygen-18, Rivers, Solimoes River, Isotopic concentration.

Isotopic concentration was measured in different spots of the Rio Negro, Rio Solimoes and Rio Amazonas (Brazil) at regular intervals f 12 consecutive months. Values as found in Rio Negro waters were significantly different from the others. Difference between isotopic concentration found in Rio Negro and Rio Solimoes is useful information for identifying the spot where the Rio Amazonas, formed by the confluence of the Negro and Solimoes, presents a homogenous vertical and horizontal structure after complete mixing of both rivers. A perfect mixture was not found up to 120 km below the confluence. Systematic sampling is a method for the determination of relative outflow of both rivers. The data are close to the results of direct measurements performed by Oltman et al.--Copyright 1974, Biological Abstracts, Inc.
W75-04495

OPTIMAL WEIGHTING FUNCTION IN WATER QUALITY MODELING,
University of Southern California, Los Angeles. Dept. of Electrical Engineering, and Materials Science.
For primary bibliographic entry see Field 5B.
W75-04614

A METHOD FOR DETERMINING PEAK FLOWS AND DETENTION STORAGE REQUIREMENTS IN URBANIZING AREAS.
Soil Conservation Service, Indianapolis, Ind.
For primary bibliographic entry see Field 4A.
W75-04694

RIVER REGIME WITH SPECIAL REFERENCE TO RIVER NILE,
Assiut Univ. (Egypt).
M. B. Khalil.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings Paper 11072, p 135-153, January 1975. 15 fig, 1 tab, 34 ref, 2 append.

Descriptors: *Regime, *Sedimentation, *Stability, *Channel morphology, *Canals, *River flow, Hydraulic similitude, Dimensional analysis, Hydraulic design, Streams, Particle size.
Identifiers: *Nile River Valley, Silt factor, Laceys regime theory.

A review of canal systems in India and the United States showed that when the variables of flow area, surface slope, and flow velocity are considered proportional to some power of discharge, the value of the exponent of a variable for various canal systems is essentially the same. However, the coefficient of proportionality varies and this variation is attributed to variation in sediment parameters. Natural rivers are irregular and less predictable in their behavior. The exponents of the rate of flow of water for the three variables for natural rivers vary more about the mean value than for the canals. The average slope computed at gaging stations on the Nile and its tributaries varied from 1.53 to 100.0 times 100,000. The relationship between discharge and water depth was analyzed. The water depth was proportional to discharge raised to the 2/5 power. The scatter of observations about the mean line was explained by seasonal filling of the bed with sediments, variation in water slop and sediment concentration, and changes in bed configuration and roughness. For the Nile River, the silt and flow equations seem sufficient to describe the channel geometry. (Singh-ISWS)
W75-04706

EVALUATION PROBLEM OF STORM WATER ROUTING MATHEMATICAL MODELS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
For primary bibliographic entry see Field 5D.
W75-04708

SYNTHESIS OF HYDROGRAPH RECESSIONS ADJUSTED FOR EVAPOTRANSPIRATION LOSSES,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
J. O. Duru, H. N. Holtan, and R. L. Green.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 5, p 922-926, September-October 1974. 9 fig, 1 tab, 16 ref.

Descriptors: *Hydrograph analysis, *Evapotranspiration, Recession curves, Runoff, Precipitation(Atmospheric), Streams, Hydrographs, Theoretical analysis.
Identifiers: *Recession limb, Recession flows.

The structure of discharge-recession curves was investigated starting with a 1939 reference that states that the recession limb of a hydrograph is comprised of surface runoff, interflow, and groundwater components in variable proportions with the surface runoff component close to the hydrograph peak. The exponential equation developed in the 1939 paper would produce a

unique recession curve for every watershed. observations differ from this theory because evapotranspiration losses from a watershed are seasonal and have a variable effect on the slopes of recession curves. The premise was that the streamflow recession reflects watershed physical characteristics so that each watershed has its unique recession curve. The recession equation of 1939 was modified to permit the synthesis of the watershed standard curve given an observed recession curve for the watershed and evapotranspiration loss rates during the recession period. An equation was developed that permitted the routing of subsurface flow while simultaneously adjusting the routed recession for evapotranspiration losses. (Roberts-ISWS)
W75-04712

ROTATING HYDRAULICS OF STRAIT AND SILL FLOWS,
Woods Hole Oceanographic Institution, Massachusetts.
For primary bibliographic entry see Field 2L.
W75-04716

THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES,
For primary bibliographic entry see Field 2L.
W75-04739

FLOOD PLAIN INFORMATION: SHUNGANUNGA CREEK, TOPEKA, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04751

CHANNEL FLOW DRIVEN BY A STATIONARY THERMAL SOURCE,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 8B.
W75-04793

AN ALTERNATIVE FORMULATION OF THE PROBLEM OF DENSITY JUMP,
Sargent and Lundy, Chicago, Ill.
For primary bibliographic entry see Field 8B.
W75-04797

SURFACE WATER DATA OF THE LLANO TEXAS REGION, PROJECT SANGUINE.
EDAW, Inc., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD-780 254. Paper copy $3.75, microfiche $2.25. November 1973. 38 p, 1 tab, 23 ref, 3 append. Contract N62472-73-C-1056.

Descriptors: Hydrology, *Rainfall, *Runoff, Topography, Surface waters, Streams, Drainage, Discharge measurement, Streamflow, Cross-sections, *Texas, Water quality, Colorado River, On-site data collections.
Identifiers: San Saba River(Tex), Llano River(Tex), Pedernales River(Tex).

The only large streams that cross the Llano, Texas study area are the southward-flowing Colorado River and its three eastward-flowing tributaries - the San Saba, Llano, and Pedernales Rivers. The study area is located on a relatively old geologic/topographic surface with a highly developed stream net. This type of drainage, along with climatic conditions that include sporadic periods of heavy rainfall, results in 'flashy' stream performance. The quality of the water in streams in the area is generally good, but it is quite hard. The Llano River at low flow has a TDS of only about 250 ppm, while perennial tributaries have a TDS of 350 ppm. Bedrock is shallow and the streams do not scour to great depths. Surface water is diverted and pumped for irrigation and used as a municipal water supply in a few cities. Water quality does not appear to have deteriorated within the period of measurement and it will not change unless large quantities of waste water are discharged into the streams. (Dawes-ISWS)
W75-04847

2F. Groundwater

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
T. H. Hufen, R. W. Buddemeier, and L. S. Lau.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 410, $3.25 paper copy, $2.25 microfiche. Paper IAEA/SM-182/33, presented at International Atomic Energy Agency Symposium, Vienna, Australia. February 1974. 18 p, 5 fig, 2 tab, 15 ref. OWRT B-030-HI(1), 14-31-0001-3875.

Descriptors: *Hawaii, *Water sampling, *Carbon radioisotopes, Groundwater, Age, *Groundwater movement, Isotopes, *Tritium, Confined water, Aquifers, Carbonates, Pumping, Recharge, Basalts, Piezometry.
Identifiers: *Carbon-13, Basal groundwater, *Basaltic aquifers, Liquid scintillation counting, *Oahu(H.I.), *Carbonate aquifers.

Principal fresh water aquifers on the subtropical island of Oahu consist of basaltic rocks that are devoid of fossil carbonate minerals. In southern Oahu fresh water occurs as semi-independent basal lenses which float on salt water and are bounded by sedimentary formations along the coast and in valley bottoms. The latter formations contain carbonate aquifers. Fresh water also occurs in dike compartments located in the central parts of the mountains. The radiocarbon content of groundwater recharge on Oahu is between 96 and 100% modern. The carbon-13 concentration associated with fresh groundwater is between -17 and -19 deviations per mil from the PDB standard, and remains constant while such waters reside in, or travel through, basaltic rock aquifers. Radiocarbon and tritium data on basal waters withdrawn by major pumping stations show these waters to have ages between a few decades and several hundred years. Differences in these ages relate systematically to individual pumping rates of the stations, well depths and local lens thickness.
W75-04441

CONTROLS ON THE QUALITY VARIATIONS OF SOME CARBONATE SPRING WATERS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
R. L. Jacobson, and D. Langmuir.
Journal of Hydrology, Vol 23, No 3/4, p 247-265, December 1974. 10 fig, 5 tab, 29 ref.

Descriptors: *Geochemistry, *Carbonate rocks, *Springs, *Hydrogeology, Discharge(Water), Spring waters, Water chemistry, Geologic control, Solutes, Subsurface runoff, Dissolved solids, Infiltration, Groundwater movement, Hydrographs, Storms, Recharge, Specific conductivity, Equilibrium, Statistics, *Pennsylvania, *Water quality control.
Identifiers: *Nittany Valley(Pa), Diffuse flow, Conduit flow.

In carbonate-rock terranes i central Pennsylvania, a spring's discharge characteristics and water chemistry can be predicted from its geographic and hydrogeologic setting. Springs located near non-carbonate ridges (conduit-type) receive much of their recharge as mountain runoff entering sinkholes, have waters low in solutes, and have a large variability in water quality and discharge. Springs in mid-valley areas (diffuse-type) receive water chiefly by infiltration through soils, or from a deeper circulating groundwater flow system, and discharge water with higher total dissolved solids (TDS) and less variation in solute amounts and discharge. A spring's flow is a much more important control on its water chemistry than is season, particularly for diffuse-type springs. In conduit spring waters, TDS increase in the early part of the storm hydrograph, decrease during the middle of the storm peak because of recharge via sinkholes, and finally increase as the storm pulse dissipates. In diffuse spring waters TDS increase and decrease nearly simultaneously with discharge following a storm as infiltration through soils near the spring leaches salts to the groundwater table. Based on precipitation and discharge records, it took 6 and 60 days, respectively, for 50% of the groundwater introduced following a storm to leave a conduit and a diffuse type spring system. (Visocky-ISWS)
W75-04710

GROUNDWATER PUMPAGE IN NORTHERN ILLINOIS, 1960-1970,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W75-04727

2G. Water In Soils

DISTRIBUTION OF DIFFERENT FORMS OF NITROGEN IN SOME DESERT SOILS,
California Univ., Los Angeles.
H. Nishita, and R. M. Haug.
Soil Science, Vol 116, No 1, p 51-58, July, 1973. 6 tab, 35 ref.

Descriptors: *Nitrogen, *Nitrification, *Deserts, *Vegetation effects, Nitrogen fixation, Nitrogen compounds, Soil chemical properties, Alkalinity, Organic compounds, Inorganic compounds.

Several desert soils were studied to determine the contents and distributions of different forms of nitrogen. Soil profiles were sampled in 7.6 cm increments to various depths with a maximum depth of 91.4 cm. All of the soils examined were of alkaline reaction since nitrification is favored by a pH above neutral. Total nitrogen was greatest in the surface layer (0.0-7.6 cm.) and usually decreased sharply in the second layer. The order of the different nitrogen forms in the surface layers of soils was (organic N)>(fixed NH4+-N)>(NO3--N)>(extractable NH4+-N)>(NO2--N). The fixation of NH4+-N was lower in the soil under plants than in the bare soil. The nitrogen content in the soil was influenced by plant species. (Mastic-Arizona)
W75-04373

CALCULATION OF THE DRAINAGE COMPONENT OF SOIL WATER DEPLETION,
Agricultural Research Service, Prosser, Wash.
D. W. Miller, and J. S. Aarstad.
Soil Science, Vol 118, No 1, p 11-15, July, 1974. 1 tab, 2 fig, 9 ref.

Descriptors: *Evapotranspiration, *Soil water, *Drainage, *Irrigation, Soil texture, Field capacity, Soil water movement, Wetting.
Identifiers: Soil water depletion.

The relationship between soil water content and drainage was studied under conditions of no evapotranspiration. Drainage was calculated for a range of evapotranspiration rates under the assumption that for a given cropped soil, the drainage rate was a function of water content and independent of water uptake by plants. A close correlation between measured and calculated soil water depletion was obtained with three soils ranging in texture from sand to silt loam and at transpiration rates of 0.4 to 1.3 centimeters per day. The proportion of total depletion due to evapotranspiration increases as evapotranspiration increases. (Mastic-Arizona)

W75-04374

INFILTRATION FOR THREE RANGELAND SOIL-VEGETATION COMPLEXES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center; and Soil Conservation Service, Phoenix, Ariz.
J. R. Tromble, K. G. Renard, and A. P. Thatcher.
Journal of Range Management, Vol 27, No 4, p 318-321, July, 1974. 3 tab, 2 fig, 8 ref.

Descriptors: *Infiltration, *Grasses, *Rainfall simulators, *Soil-water-plant relationships, *Watershed management, Infiltrometers, Runoff, Brush, Grazing, Arizona, Hydrologic properties, Soil types, Soil surfaces.
Identifiers: Walnut Gulch Experimental Watershed.

A rainfall simulator was used to examine infiltration-runoff relations as influenced by three typical soil-vegetation complexes on rangeland sites in southeastern Arizona. These sites were selected in order to quantify differences in infiltration and runoff encountered on three major rangeland soil with brush, grass, or no vegetation and to examine infiltration variability encountered on different hydrological soil groups. Soil moisture content was low at all sites as a result of below normal precipitation during the preceeding 4 months. Infiltration was higher on brush than on ungrazed grass plots, and higher on ungrazed grass plots than on grazed grass plots. Infiltration decreased significantly with base soil. On brush-dominated plots more litter was present providing soil conditions more amenable to infiltration. Approximately twice as much crown cover was measured on brush plots as on grass plots providing more soil protection and improving infiltration. (Mastic-Arizona)
W75-04377

THE TEMPERATURE PROFILES OF SOIL COLUMNS DURING INFILTRATION,
Sydney Univ. (Australia). Dept. of Soil Science.
N. Collis-George, and R. Lal.
Australian Journal of Soil Research, Vol 11, No 1, p 93-105, March 1973. 3 tab, 2 fig, 11 ref.

Descriptors: *Infiltration, *Soil moisture, *Heat balance, *Thermal conductivity, *Soil profiles, Temperature, Soil aggregates, *Heat transfer, Isotherms, Thermodynamics, Radiation, Vapor pressure, Condensation, Convection, Diffusion, Water vapor, Wetting.

An attempt was made to gather more quantitative evidence to ascertain the role played by heat of wetting on infiltration behavior in columns of two soil aggregates at two initial moisture regimes. A temperature front produced during infiltration can be divided into zones: (a) a zone of vapor condensation and temperature rise, (b) a zone between (a) and (c) where temperature falls and heat is lost by conduction to the liquid wetting front, and (c) a zone starting at the liquid wetting front and with temperature decreasing to ambient. Mechanisms of vapor diffusion, liquid flow, heat conduction, and heat transport that occur qualitatively explain all observed results. Heat balance procedures are used to show that the thermodynamic heat of wetting obtained from the absorption isotherms is the dominant quantity in each experiment. Results are discussed in terms of infiltration into unstable soils. (Mastic-Arizona)
W75-04389

THE CLASSIFICATION OF SOME NIGERIAN SOILS,
Wisconsin Univ.-Stevens Point.
M. I. Harpstead.
Soil Science, Vol 116, No 6, p 437-443, December, 1973. 1 fig, 3 tab, 15 ref.

Descriptors: *Soil classification, *Soil formation, *Soil structure, *Land use, Soil type, Soil texture, Vegetation, Aeolian soils, Soil physical properties, Soil chemical properties, Soil profiles.
Identifiers: *Nigeria.

Soil profile samples from eleven sites in Nigeria were studied for soil classification. Samples were widely distributed from the high rainfall coastal area of sedimentary parent material to the dry northern area where aeolian deposits from the Sahara Desert have been the major soil forming factor. Soils were classified according to the USDA system of soil classification. Soils with weatherable minerals formed from crystalline rocks were mainly classified as alfisols. Those soils formed from sedimentary rocks and ultrabasic crystalline rocks are oxisols. Soils derived from aeolian parent material and the Pleistocene sediments are classified as inceptosols. Location, soil classification, vegetation, type present, parent material, probable age, and some morphological characteristics are given. This study was undertaken as a basic soil survey to aid in land use planning necessary for meeting the great demand being placed on the soil to meet the food and fiber needs of a rapidly expanding population. (Mastic-Arizona)
W75-04390

OVERSATURATION METHOD FOR PREPARING SATURATION EXTRACTS FOR SALINITY APPRAISAL,
Agricultural Research Service, Chickasha, Okla.
L. E. Allison.
Soil Science, Vol 116, No 2, p 65-69, August, 1973. 3 fig, 1 tab, 5 ref.

Descriptors: *Saturated soils, *Saturation, *Soil water, *Puddling, Salinity, Field capacity, Soil texture, Soil horizons.

A new method for preparing saturated extracts of salt-affected soils is described. Soil saturation is achieved by means of oversaturation rather than from a dry soil. The method offers saving in time and labor of preparing saturated pastes for extraction and analysis. The oversaturation technique offers two main advantages over the standard procedure; it avoids the necessity of repeated adding and mixing of increments of water into a sticky soil mass that develops long before saturation is attained, and it prevents the puddling effect that occurs when fine-textured soils are mixed at a water content near field capacity. An effective test for the end point of saturation and some modern extraction equipment are described. (Mastic-Arizona)
W75-04392

THE UNRELIABILITY OF TILE EFFLUENT FOR MONITORING SUBSURFACE NITRATE-NITROGEN LOSSES FROM SOILS,
For primary bibliographic entry see Field 5B.
W75-04438

EFFECT OF QUALITIES OF IRRIGATION WATER AND FERTILIZERS ON SOIL PROPERTIES, YIELD AND NUTRIENT UPTAKE BY WHEAT,
S.K.N. Coll. of Agriculture, Jobner (India). Dept. of Agricultural Chemistry and Soil Science.
For primary bibliographic entry see Field 3F.
W75-04482

SUSCEPTIBILITY OF GRAIN SORGHUM TO WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-04483

EVALUATION OF THE FILTER PAPER METHOD FOR ESTIMATING SOIL WATER POTENTIAL,
Utah State Univ., Logan.
S. Al-Khafaf, and R. J. Hanks.
Soil Sci, Vol 117, No 4, p 194-199, 1974, Illus.
Identifiers: *Filter paper method, Flow, Liquids, Psychrometers, Soil temperature, Thermocouples, *Soil water potential, Water vapor, Estimating.

The method was calibrated using salt solutions, thermocouple psychrometer, pressure plates and soil columns at equilibrium. The predicted water potential was influenced by the type of contact of the soil with the filter paper. It is suggested that 1 filter paper be placed beneath the soil (good contact for liquid flow and vapor flow) and another above the soil not in physical contact (allowing vapor flow only). The absolute temperature was not too important but temperature variations had a large effect on the producted soil water potential.--Copyright 1974, Biological Abstracts, Inc.
W75-04506

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
P. Tscheschke, J. F. Alfaro, J. Keller, and R. J. Hanks.
Soil Sci, Vol 117, No 4, p 226-231, 1974, Illus.
Identifiers: Evapotranspiration, Irrigation, Management, *Saline water, *Soil water potential, Tomato, Transpiration, *Trickle irrigation, Crop production.

Although trickle irrigation offers the possibility of obtaining comparatively good yields when nontoxic highly saline water is used for irrigation, the subsequent accumulation of salts in the root zone is a potential hazard that should not be disregarded. The soil water potential and salt patterns in uniform soil profiles as a result of 4 different water management treatments were determined. Under these treatments cherry tomato plants were irrigated daily with a volume of water equal to that used by the plant on the previous day, every other day with volumes of water equal, below, and above the water evapotranspired. In general, the soil water potential decreased in the soil profile, as a result of salt accumulation, with increased distance from the trickle source. In the profiles where the wetting fronts reached the mid-region between the emitters much lower soil water potentials were measured near the soil surface. The highest salt concentration occurred in the profiles irrigated with volumes of water below that evapotranspired by the tomato plants, indicating the importance of avoiding under irrigation whenever highly saline water is used with trickle irrigation. Higher soil water potentials and higher yields resulted from irrigating with volumes above the evapotranspiration.--Copyright 1974, Biological Abstracts, Inc.
W75-04507

MECHANISM OF FIRE-INDUCED WATER REPELLENCY IN SOIL,
S. M. Savage.
Soil Science Society of America, Proceedings, Vol 38, July-August 1974. p 652-657, 4 tab, 3 fig, 8 ref.

Descriptors: *Litter, *Soil temperature, *Heat, *Burning, Organic compounds, Forest fires, Sands, Volatility.
Identifiers: *Water-repellency, Hydrophobic substances, Thermocouple.

The distribution, chemistry, and reaction of substances released from the organic litter layer as a result of wildfire which creates water-repellent soils were studied. The formation of water-repellent soil can cause serious erosion and delay revegetation of the burned areas. Organic soil litter collected under Manzanita (Arctoslaphylos sp.) was burned over a sand column. In one case the

burned litter was allowed to remain until cool, in the other, the litter was removed at once. Results showed that maximum temperatures were reached when the litter remained. The movement of organic substances occurs during the fire, and after burning heat moves into the sand 'fixing' some of the more polar hydrophobic substances and revolitilizing the less polar substances, thus broadening the water-repellent layer. Temperatures required for these processes appeared to be greater than 250C. (Mastic-Arizona)
W75-04515

SALT AND WATER MOVEMENT IN RELATIVELY DRY SOIL,
Papua and New Guinea Univ., Port Moresby (New Guinea). Dept. of Physics.
D. R. Scotter.
Australian Journal of Soil Research, Vol 12, No 1, March 1974. p 27-35, 6 fig, 11 ref.

Descriptors: *Salts, *Soil water movement, *Diffusivity, Soil moisture, Fertilizers, Gravitational water, Model studies.
Identifiers: *Water potential, Parlange theory.

The Parlange theory of relatively dry soil salt and water movements was studied. Data on water potentials and water and salt diffusivities as functions of water content for the particular soil used are neccessary. When dry crystalline salt is placed on a relatively dry soil, water accumulates in the soil directly adjacent to the salt, and dissolved salt moves into the wetter area. Results show the theory to have some limited success in predicting salt movement into the soil, but to inadequately explain the water distribution in the wetter area adjacent to the crystalline salt. To account for the discrepancy between the measured and calculated water diffusivity, it is suggested that there is significant water movement in the vapor phase which is not accounted for in the theory. (Mastic-Arizona)
W75-04516

THE EFFECT OF INITIAL MOISTURE CONTENT AND INFILTRATION QUANTITY OF REDISTRIBUTION OF SOIL WATER,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
T. Talsma.
Australian Journal of Soil Research, Vol 12, No 1, March 1974. p 15-26, 8 fig, 2 tab, 11 ref.

Descriptors: *Infiltration, *Soil moisture, *Moisture content, *Drainage, *Water distribution, Irrigation, Sands, Loam, Capillary water, Capillary conductivity, Gravitational water, Soils, Transition flow.
Identifiers: Moisture profiles.

Experimental data were obtained to verify several studies that describe the redistribution of water in uniformly moist, inert, porous material, after irrigation has ceased. Initial moisture content and infiltration quantity were studies in loam, fine sand, and coarse sand. Moisture profiles were obtained during redistribution by gamma ray attenuation. Measured values of the hydraulic properties of the soils were used to calculate fluxes at the transition from drainage to wetting. Gravity effects dominated in both sands, while capillary effects at smaller initial moisture contents and infiltration quantities dominated in the loam. In all soils, increased initial moisture quantities or infiltration quantity was directly related to the increased contribution of gravity to the flux, and decreased contribution of capillarity. In any particular material, it depends on the magnitude of these fluxes whether mean moisture contents in the drainage zone will be higher or lower at increasing values of initial moisture content or infiltration quantity. (Mastic-Arizona)
W75-04517

THE EFFECT OF SOIL TEXTURE AND DENSITY ON THE NEUTRON AND DENSITY PROBE CALIBRATION FOR SOME TROPICAL SOILS,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
R. Lal.
Soil Sci 117(4): 183-190, Illus. 1974.
Identifiers: Calibration, *Density probes, Moisture, *Neutron probes, *Soil texture, Soils, *Tropical soils, Ferrallitic soils, Instrumentation, *Soil density.

The effect of soil texture and bulk density on calibration of neutron moisture and density probes was investigated for 5 tropical ferrallitic soils. Soil texture and bulk density had a significant effect on the neutron probe calibration. Fine-textured soil with high content of extractable Fe had an intercept of 0.465 as compared to 0.044 for coarse-textured soil. For 20% volumetric moisture content the count ratio changed from 0.568 for dry density of 1.0 g cm-3 to 0.943 with twice the value of soil density. Similarly, texture and initial moisture content significantly influenced the density probe calibration. Therefore, widespread heterogeneity of tropical soils limits the usefulness of the neutron-scattering technique as routine method of monitoring soil moisture regimes.--Copyright 1974, Biological Abstracts, Inc.
W75-04549

COMPARATIVE CHANGES IN SOIL-PHYSICAL PROPERTIES INDUCED BY ADMIXTURES OF MANURES FROM VARIOUS DOMESTIC ANIMALS,
California Univ., Davis.
A. A. R. Hafez.
Soil Science, Vol 118, No 1, p 53-59, July, 1974. 7 tab, 2 fig, 9 ref.

Descriptors: *Soil physical properties, *Organic wastes, *Hydraulic conductivity, *Fertilizers, *Farm wastes, Permeability, Bulk density, Soil aggregates, Soil types, Soil texture, Soil strength, Soil water movement, Moisture content, Compaction, Shrinkage, Cattle.
Identifiers: Horses.

Changes in some properties of soils were observed following the addition of manures from domestic animals. Bulk densities were decreased in a fine sandy loam soil. Water holding capacities of both sandy and clay soils were increased in proportion to quantities of manure added. Water flow through saturated soils was dramatically enhanced by the fibrous components of beef cattle and horse manures, whereas poultry manures gave little or no response. Addition of animal manure induced water-stable soil particle aggregation and higher shrinkage limits in a clay soil. Soil strength was reduced progressively with increased rates of admixed manure. There was strong evidence to support the proposition that the fibrosity of manures might have important bearing on the degree of hydraulic conductivity that may be induced in improvements in physical properties in soils, whereas the organic component is mainly responsible for increases in the water holding capacities. (Mastic-Arizona)
W75-04602

A NONDESTRUCTIVE METHOD OF FOLLOWING MOISTURE CONTENT AND TEMPERATURE CHANGES IN SOILS USING THERMISTORS,
Sydney Univ. (Australia). Dept. of Soil Science.
P. M. Cornish, K. B. Laryea, and B. J. Bridge.
Soil Science, Vol 115, No 4, p 309-314, April, 1973. 2 tab, 4 fig, 11 ref.

Descriptors: *Soil moisture, *Soil moisture meters, *Soil temperature, *Thermal conductivity, *Moisture content, Soil structure, Potentiometers, Calibrations, Infiltration, Evaporation, Bulk density, Soil physical properties, Wetting, Instrumentation.
Identifiers: Thermistors, Wheatstone bridge circuit.

Thermistors are embedded directly in the soil, and functioning as both heating elements and sensors, respond to changes in thermal conductivity of the soil as water content changes. The thermistors are used in a Wheatstone Bridge circuit as part of a nondestructive method for following moisture content changes in soil materials. Following calibration for the particular soil material, the method allows moisture contents to be monitored in experiments involving both evaporation and infiltration where changes in bulk density and particle geometry are not extreme. The bridge circuits and thermistors can also be sued to measure soil temperature when the thermistors have been calibrated. (Mastic-Arizona)
W75-04605

THE COMBINED EFFECTS OF INFILTRATION AND REDISTRIBUTION ON LEACHING,
California Univ., Davis.
C. Kirda, D. R. Nielsen, and J. W. Biggar.
Soil Science, Vol 117, No 6, p 323-330, June, 1974. 1 tab, 6 fig, 82 ref.

Descriptors: *Leaching, *Soil water movement, *Infiltration, *Sprinkler irrigation, *Hydraulic conductivity, Chlorides, Soil water, Salts, Hysteresis, Soil surfaces, Rainfall, Irrigation, Soil types, Soil profiles.

Nondestructive measurements were used to examine simultaneous transport of chloride and water for infiltration and redistribution within soil columns. The objective was to evaluate whether water content at the surface and the initial soil water content cause appreciable differences in the leaching process. Water application methods yielding small average soil water contents during infiltration leached the chloride efficiently to relatively great depths. Initial soil water content did not have any appreciable effect on leaching during infiltration, but the smaller the initial soil water content present, the displacement of chloride during redistribution was deeper and more complete. (Mastic-Arizona)
W75-04606

POLYVINYL ALCOHOL AS A STABILIZER OF SURFACE SOIL,
Waite Agricultural Research Inst., Glen Osmond (Australia).
R. C. Stefanson.
Soil Science, Vol 115, No 6, p 420-427, June, 1973. 6 tab, 5 fig, 15 ref.

Descriptors: *Soil surfaces, *Rainfall, *Simultated rainfall, *Soil water, *Biodegradation, Soil stabilization, Plant growth, Organic matter, Soil types, Soil structures, Infiltration, Moisture content, Hydrolysis, Chemical properties, Chemicals.
Identifiers: *Polyvinyl alcohol, PVA.

Polyvinyl alcohol (PVA) is shown to be an effective stabilizer of surface soils when soil organic matter maintains the structural organization of the soil. In three out of four soils studied, rainfall acceptance could be doubled by adding 0.005% w/w of PVA to the 0-2 cm. layer of soil in an undisturbed core. The use of an optimal-sized polymer and application to wet soil improved the efficiency of stabilization. Additional factors that were studied included the effect of the method and rate of application, the molecular weight and degree of hydrolysis of PVA, the importance of soil type, and the effect of plant growth. When the PVA was applied to cores which had recently supported plant growth, the acceptance of rainfall was reduced. PVA appears to be resistant to biodegradation in undisturbed soils, but confirmation with c14 labeled PVA will be necessary. (Mastic-Arizona)
W75-04607

MICROMORPHOLOGY. A DISCIPLINE AT THE CHEMISTRY-MINEROLOGY INTERFACE,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
R. Brewer.
Soil Science, Vol 115, No 3, p 261-266, March, 1973. 29 ref.

Descriptors: *Soil chemical properties, *Soil chemistry, *Percolation, *Soil water, *Weathering, Microscopy, Mineralogy, Soil profiles, Soil formation, Soil physical properties, X-ray diffraction.
Identifiers: Micromorphology, Microhydrology.

In terms of pedology, micromorphology deals specifically with the study of thin sections of soil materials using a polarized light microscope. Micromorphology can be useful as an intermediate step in chemical-mineralogical studies where the distribution of mineral constituents can be observed and used for interpreting chemical processes. These processes that may be analyzed include, mineral weathering for use in determining chemical histories of soils, concentration of mineral species to interpret specific pedological features in therms of specific chemical processes, and, the effects on profile chemistry to determine the effects of pedological features on soil solutions percolating through, including wetting and drying patters and rates of movement of solutions. This discussion infers that the full potential of micromorphology has not been realized; and that a reason might be the general lack of attempts to correlate microscopic data with chemical and mineralogical data. (Mastic-Arizona)
W75-04608

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTES, VOL. I, CH.1 THRU 3,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04623

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTE, VOL II, CH. 4, THRU 7,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04624

SIMULATION OF MOISTURE TRANSFER IN SOILS: ONE-DIMENSIONAL INFILTRATION,
Goettingen Univ. (West Germany). Inst. of Soil Science and Forest Nutrition.
R. R. Van der Ploeg.
Soil Science, Vol 118, No 6, p 349-357, December 1974. 3 fig, 2 tab, 8 ref.

Descriptors: *Soil moisture, *Soil water movement, *Infiltration rates, *Unsaturated flow, Computer models, Computer programs, Profiles, Soils, Darcys law, Infiltration, Permeability, Model studies, Evaporation, Moisture content, Water transfer, Simulation analysis.
Identifiers: *Yolo light clay, One-dimensional infiltration.

A simulation program for a digital computer was developed to calculate the soil moisture profile, the infiltration rate, and the cumulative infiltration under conditions of one-dimensional, vertical unsteady infiltration into soil. The simulation program does not require an advanced mathematical knowledge, nor does it require much computer programming skill. The results of the simulation technique were compared with existing solutions for one-dimensional infiltration for Yolo light clay, and good agreement was found. The simulation program does not require a uniform soil or an initially uniformly distributed moisture content in the soil. It can be easily changed to include evaporation from soil. Due to its simplicity the simulation program that was developed may be more appealing than existing techniques to calculate moisture profiles, infiltration rates, and cumulative infiltration. (Sanderson-ISWS)
W75-04695

STRESS-STRAIN RESPONSE FOR SAND,
Punjab Agricultural Univ., Ludhiana (India).
For primary bibliographic entry see Field 8D.
W75-04696

A LEAK-PROOF SAMPLING PORT IN GAS ANALYSES STUDIES,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 7B.
W75-04697

A METHOD FOR MEASURING FIRST-STAGE SOIL WATER EVAPORATION IN THE FIELD,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
For primary bibliographic entry see Field 2D.
W75-04698

FEEDLOT WASTE EFFECTS ON SOIL CONDITIONS AND WATER EVAPORATION,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5B.
W75-04699

TWO-DIMENSIONAL WATER INFILTRATION FROM A TRENCH IN UNSATURATED SOILS,
Connecticut Agricultural Experiment Station, New Haven.
B. L. Sawhney, and J-Y. Parlange.
Soil Science Society of America Proceedings, Vol 38, No 6, p 867-871, November-December, 1974. 8 fig, 2 tab, 10 ref.

Descriptors: *Soil moisture, *Soil water movement, *Unsaturated flow, *Infiltration rates, Diffusion, Sorption, Conductivity, Model studies, Water transfer, Soils, Soil disposal fields, Flow rates.
Identifiers: Moisture profiles, Wetting fronts.

Two-dimensional infiltration of water from finite trenches was observed in three soil samples with different textures. The vertical infiltration was slowed by the lateral infiltration and the slowing was inversely proportional to the width of the trench. Furthermore, the vertical infiltration was about twice as fast as the lateral infiltration for all soils tested. At the same relative distance from the trench, the soil was drier beside than below the trench. These observations and interpretations agreed with the numerical simulations of Selim and Kirkham. (Gibb-ISWS)
W75-04700

UNSTEADY, UNSATURATED, N-DIMENSIONAL MOISTURE FLOW IN SOIL: A COMPUTER SIMULATION PROGRAM,
Goettingen Univ. (West Germany).
R. R. Van der Ploeg, and P. Benecke.
Soil Science Society of America Proceedings, Vol 38, No 6, p 881-885, November-December 1974. 7 fig, 1 tab, 15 ref.

Descriptors: *Soil moisture, *Soil water movement, *Infiltration rates, *Unsatured flow, *Computer models, Water transfer, Soils, Darcys law, Infiltration, Permeability, Model studies, Evaporation, Diffusivity, Moisture content, *Simulation analysis.
Identifiers: Yolo light clay, Nahal Sinai sand, Gilat loam.

A computer simulation program for predicting n-dimensional moisture flow in soils was tested and presented. The programming was done with the computer program System/360 Continuous System Modeling Program (CSMP). The program is simple and does not require an extensive mathematical background. Sample problems dealing with one-dimensional absorption, spherical absorption, two-dimensional infiltration from a line source, and three-dimensional infiltration from a trickle source compared well with existing solutions. The accuracy of the simulation results is sufficiently high for most purposes, where quantitative answers about soil moisture dynamics are needed. (Gibb-ISWS)
W75-04701

LYSIMETER EXPERIMENT DESCRIPTION AND PROGRESS REPORT ON NEUTRON MEASUREMENTS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 2D.
W75-04725

RATIONAL BASIS FOR SEPTIC TANK SYSTEM DESIGN,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04801

UNIFORM DISTRIBUTION IN SOIL ABSORPTION FIELDS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04807

2H. Lakes

AN ECOLOGICAL STUDY OF A BALD-CYPRESS SWAMP IN ST. CHARLES PARISH, LOUISIANA,
Army Engineer District, New Orleans, La.
G. N. Montz, and A. Cherubini.
Castanea, Vol 38, No 4, p 378-386, 1973.
Identifiers: Alternanthera-philoxeroides, *Baldcypress, *Ecological studies, *Louisiana(St. Charles Parish), *Swamps, Taxodium-distichum, *Alligator weeds, Marshes.

A baldcypress (Taxodium distichum (L.) Richard) swamp bordering a marsh in St. Charles Parish was studied by the quadrat method. A dense undergrowth of alligator weed (Alternathera philoxeroides (Mart) Griseb.) covered most of the study area. Plant succession with extension of baldcypress into the marsh was studied by comparing townships maps of 1860 and quadrangle maps of 1955 and 1957 to quadrangle maps of 1969. Only baldcypress was recorded, with tree diameters increasing from the marsh-swamp zone into the swamp. Of the 639 trees recorded in the study area, 357 were dead.--Copyright 1974, Biological Abstracts, Inc.
W75-04364

TEMPERATURE MEASUREMENTS AND INTERNAL WAVES IN SENACA LAKE, NEW YORK,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
M. H. Fliegel.
Available from NTIS, Springfield, Va 22161 as AD-769 227, $5.75 in paper copy, $2.25 in microfiche. Tech. Rept. No. 9, Oct. 1973. 146 p, 66 fig, 6 tab, 26 ref.

Descriptors: *Measurement, *Temperature, *Lakes, *New York, *Waves(Water), Internal waves, Frequency, Wind times, Heat budget,

Heat balance, Heat transfer, Thermal capacity, Seasonal, Dynamics.
Identifiers: *Seneca Lake(NY), Wave direction.

Temperatures were measured near the center of Seneca Lake with thermistors and bathythermographs during four different years. Seneca Lake is a long, narrow, deep lake in the Finger Lakes region of western central New York state, with a temperature structure similar to that of many oceans. The bathythermograph records, which were used to reconstruct the annual temperature cycle of the lake, indicate that it is freely circulating throughout much of the winter although its temperature is below 4C. The annual heat budget was estimated to range between 40,000 and 47,000 cal./cm sq for most years. Amplitude and directional data are given for internal waves. (Houser-ORNL)
W75-04400

DIURNAL TEMPERATURE DISTRIBUTION IN SMALL RESERVOIR,
Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
F. Armaly.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 402, $4.25 paper copy, $2.25 microfiche. Completion Report, January 17, 1975. 31 p, 11 fig, 1 tab, 33 ref. OWRT A-080-MO (1), 14-31-0001-4025.

Descriptors: *Reservoirs, *Diurnal distribution, *Thermocline, Model studies, *Stratification, *Water temperature, Impoundments, Absorption, Solar radiation, Evaporation, Convection, Attenuation, Heating, Cooling.
Identifiers: *Solar energy.

The diurnal temperature distribution in a deep water impoundment which is exposed to heating and cooling loads by convection, evaporation and radiation is examined. The diurnal behavior of the solar load, directional and spectral, is used with the selective attenuation and reflection characteristics of the water to account for the internal solar energy absorption rate. Simple atmospheric and water attenuation models were used to examine and simulate the diurnal behavior. The results demonstrate the stratification developments of the reservoir and indicate that in some cases deep layer responds continuously to the diurnal fluctuations of surface energy loads.
W75-04443

BIOLOGIC DETECTION AND CONTROL OF WATER POLLUTION,
Clemson Univ., S. C. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W75-04447

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. I. FIELD OBSERVATIONS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04469

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. II. INHIBITION EXPERIMENTS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04470

INFLUENCE OF FRESHWATER DULUTION ON DYNAMICS OF POPULATIONS OF BUILDER CRUSTACEANS FROM LAGOON OF BIGUGLIA, CORSICA (COROPHIUM INSIDIOSUM C., TANAIS CAVOLINII M.E., ERICHTHONIUS BRASILIENSIS D.), (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
M-L. De Casabianca.
Identifiers: Corophium-insidiosum, *Corsica(Lagoon of Biguglia), *Crustaceans, Density, Dilution, Erichthonius-brasiliensis, Lagoons, Microdeutopus-gryllotalpa, Rain, *Salinity, Tanais-cavolinii, Winter, Lakes, *Brachish water.

The fluctuations of constructing crustacean populations (C. insidiosum, T. cavolinii, E. brusiliensis and Microdentopus gryllotalpa) were studied in the north of the brackish lake Biguglia with monthly calculations of density. This density was estimated during the year 1968/69, which was characterized by exceptional winter rains bringing large quantities of fresh water and lowering the salimity from 34-1.7%. Ninety-five to nearly 100% of the indicated populations disappeared with the current. Experiments on the tolerance of salinity of T. cavolinii and C. insidiosum show that the 2 spp. are fairly euryhaline.--Copyright 1974, Biological Abstracts, Inc.
W75-04490

NITROGEN FIXATION (ACETYLENE REDUCTION) BY PHYTOPLANKTON IN GREEN BAY, LAKE MICHIGAN, IN RELATION TO NUTRIENT CONCENTRATIONS,
Illinois Univ., Urbana. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-04498

A NEW TECHNIQUE FOR THE STUDY OF EPIPHYTIC ALGAE,
Clayton Junior Coll., Morrow, Ga.
For primary bibliographic entry see Field 5C.
W75-04499

SALSVATN, A LAKE WITH OLD SEA WATER,
Oslo Univ. (Norway). Dept. of Limnology.
A. Boyum.
Schweiz Z Hydrol, Vol 35, No 2, p 262-277, 1973, Illus.
Identifiers: Lakes, *Norway(Salsvatn Lake), Salinity, *Sea water, Lake sediments.

Salsvatn is a 464 m deep lake laying 16 m above sea level in North Tronfelag, Norway. The lake was isolated from the sea some 3000 yr ago. It is assumed that salt-water in the deepest 50 m of the lake is the remainder of sea water trapped in the lake at this time. The concentration of chloride in the salt-water layer corresponds to a salinity of 29% as in ordinary sea water. The hydrography of the lake and changes in some components of the salt water compared with ordinary seawater are discussed. A comparison is made with changes in the stagnant layers of the Black Sea and Lake Rorholtfjorden. The latter is another lake with old sea water at its bottom. Surface sediment samples were collected from the freshwater and salt-water layers in Lake Rorholtfjorden and from the salt-water layer of Lake Salsvatn. Some chemical components of the sediments and interstitial water were analyzed.--Copyright 1974, Biological Abstracts, Inc.
W75-04500

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX E--COMMERCIAL NAVIGATION,
International Joint Commission-United States and Canada. Great Lakes Levels Board.
December, 1973. 162 p, 20 fig, 69 tab.

Descriptors: *Great Lakes, *Water level fluctuations, *Economic impact, Evaluation, *International Joint Commission, Great Lakes Region, Lakes, Water levels, *Regulation, Water management(Applied), Comprehensive planning, Planning, Water policy, Transportation, Water resources development, Cost-benefit analysis, Governmental interrelations, United States, Canada, Economics, Foreign trade, Economic prediction, Navigation.
Identifiers: Environmental policy, International agreements, Coastal zone management.

Analyzed are the effects of lake level fluctuations upon commercial navigation interests within the Great Lakes-St. Lawrence River System. The appendix details the methodology applied in the assessment of the potential benefit or loss to shipping and the evaluation of economic effects upon navigation of regime changes that would occur under selected regulation plans. A computer program was prepared to integrate such factors as vessel characteristics, fleet size and composition, prospective commerce, and operating costs. All costs and benefits are based on 1971 price levels and an interest rate of seven percent. Transportation costs were determined for the four bulk commodities of iron ore, coal, limestone and grain which comprise nearly eighty-five percent of all Great Lakes traffic. Evaluations were made for the year 1970, using actual data, and for the years 1995 and 2020, using estimates of future traffic and vessel fleet composition and characteristics. Evaluation of commodities comprising the remaining fifteen percent was deemed to have no significant effect upon the results obtained using the four major bulk commodities. (See also W75-03682) (Deckert-Florida)
W75-04601

SEDIMENT TRAP EFFICIENCY OF SMALL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W75-04702

TEMPERATURE DYNAMICS IN DIMICTIC LAKES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
H. Stefan, and D. E. Ford.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings paper 11058, p 97-114, January 1975. 11 fig, 25 ref, 2 append.

Descriptors: *Limnology, *Lakes, *Reservoirs, Hydrodynamics, Temperate, *Energy budget, Heat budget, Thermal properties, Turnovers, Heating, Heat transfer, Conduction, Convection, Radiation, Thermocline, Stratification, Environmental engineering, Hydraulics, Winds, Weather, *Water temperature, *Forecasting.
Identifiers: *Dimictic lakes.

Daily water temperature profiles in temperate or dimictic lakes (defined as those lakes whose surface temperature is above 4C in summer and below 4C in winter) were predicted from time-variable meteorological conditions and lake morphology. A total energy concept was used. The method of analysis was derived and illustrated through case studies. Agreement of predicted and measured water temperatures in two lakes throughout the summer season was good. Although energy inputs and losses were computed separately, the method of analysis recognized and incorporated the mutual interdependence between different forms of energy input. (Jess-ISWS)
W75-04705

2I. Water In Plants

THE INFLUENCE OF SOIL WATER POTENTIAL ON THE PERENNIAL VEGETATION OF A DESERT ARROYO,
New Mexico State Univ., University Park. Dept. of Biology.
F. R. Balding, and G. L. Cunningham.
The Southwestern Naturalist, Vol 19, No 3, p 241-248, September 23, 1974. 1 fig, 2 tab, 4 refs.

Descriptors: *Arroyos, *Soil water, Soil moisture, Regression analysis, Arid climates, Semiarid climates, Soil chemical properties, Soil physical properties, Shrubs, Plant groupings, Vegetation, Ephemeral streams, Drainage, Precipitation(Atmospheric), Soil-water-plant relationships, *Desert plants.
Identifiers: Soil water potential gradient.

Soil water potential is an important environmental factor limiting the numbers and sizes of perennial plant species in arid and semi-arid regions. The density, mean plant height, and mean plant width of the perennial shrubs in a small desert arroyo were compared with the soil water potential gradient along the arroyo during one growing season. The density of shrubs was negatively correlated with the soil water poteneital gradient, while shrub mean size was positively correlated with the gradient. The soil water potential alone can not account for the variation in vegetation parameters; additional factors such as soil chemical and physical properties, and interactions between the species present also contribute to the variations. (Mastic-Arizona)
W75-04365

SPY MESA YIELDS BETTER UNDERSTANDING OF PINYON-JUNIPER IN RANGE ECOSYSTEM,
Soil Conservation Service, Phoenix, Ariz.; and Bureau of Land Management, Phoenix, Ariz.
A. P. Thatcher, and V. L. Hart.
Journal of Range Management, Vol 27, No 5, p 354-357, September 1974. 1 tab, 7 fig, 11 ref.

Descriptors: Ecosystems, Soils, Soil types, Pinyon pine trees, Juniper trees, Shrubs, Grasses, Infiltration, Runoff, Soil-water-plant relationships, Soil surfaces.
Identifiers: Spy Mesa, Arizona, Plant succession.

The natural occurrence of pinyon-juniper in range ecosystems was studied in Spy Mesa relict area of the Arizona Strip in northern Arizona. The area has a wide variety of soils, and natural fires have occurred over the past 50 years. Following natural fires, grasses became significant only on soils with sandy surface textures. Pinyon-juniper was the dominant species in the absence of fire regardless of the soil type. No significant amounts of grass were produced at any platy surface layer. Soils with this characteristic have poor water infiltration rates and high runoff rates eliminating those plants that are unable to compete for limited moisture. Pinyon, juniper, and shrubs are the principal plants produced on these soils. Soils having granular sandy loam surface layers, even when very shallow, produced large quantities of grass under natural conditions. (Mastic-Arizona)
W75-04375

RESPONSE OF HERBACEOUS VEGETATION TO FELLING OF ALLIGATOR JUNIPER,
Forest Service (USDA), Flagstaff, Ariz. Rocky Mountain Forest and Range Experiment Station.
W. P. Clary.
Journal of Range Management, Vol 27, No 5, p 387-389, September 1974. 1 tab, 2 fig, 12 ref.

Descriptors: *Juniper trees, *Forage grasses, *Range management, *Plant growth regulators, *Arizona, Runoff, Soil-water-plant relationships, Sediments, Ranges, Small watersheds, Vegetation, Forage production.
Identifiers: Tree felling.

A 13 percent crown cover of alligator juniper was removed from a 100 acre experimental watershed in north-central Arizona resulting in a 38 percent increase in total herbage production and a 45 percent increase in forage plant production. Felling with power saws was used to eliminate soil pits areated by uprooting through cabling or pushing. These pits are considered undesirable because they reduce runoff by retaining surface water, are a potential source of sediment, and much of the cool season grasses are destroyed which normally grow beneath the tree crowns. Herbage increases were highly variable with little or no response in 3 of the 7 post-treatment years. Indications are that average herbage production may reach a near steady state within several years after tree removal. Little effect of the treatment on ground cover and range condition was detected suggesting that major changes will either take long periods of time or require major changes on grazing management. (Mastic-Arizona)
W75-04376

INFILTRATION FOR THREE RANGELAND SOIL-VEGETATION COMPLEXES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center; and Soil Conservation Service, Phoenix, Ariz.
For primary bibliographic entry see Field 2G.
W75-04377

RANGE PLANT YIELD AND SPECIES RELATIONSHIPS IN NATURAL AND PARTIALLY CONTROLLED ENVIRONMENTS,
Agricultural Research Service, Logan, Utah.
A. T. Bleak, W. Keller, and A. C. Hull, Jr.
Journal of Range Management, Vol 27, No 5, p 396-399, September, 1974. 4 tab, 3 fig, 4 ref.

Descriptors: *Soil moisture, *Crop production, *Arid lands, *Soil-water-plant relationships, *Forage grasses, Precipitation(Atmospheric), Root systems, Harvesting, Alfalfa, Utah, Soil moisture meters.
Identifiers: Crested wheatgrass, Russian wildrye, Cheatgrass, Kochia.

The effect of stand improvement or depletion with age, the production by single species and species mixtures, and soil moisture depletion within isolated plants were studied using alfalfa, cheatgrass, Kochia, crested wheatgrass, and Russian wildrye. Plots were isolated from the surrounding soil by heavy plastic sheeting to a depth of 1.4 m. Some plots received only natural precipitation some 1 - 1/2 times the growing season precipitation, some 2/3 of the normal precipitation. These different moisture levels had no significant effect on herbage yields over a 3 year period. Alfalfa plots were the most productive. Alfalfa and Kochia were found to have put roots beneath the plastic barrier into the adjacent soil. Alfalfa was least affected and Kochia most affected by a close (5 cm.) harvest height. (Mastic-Arizona)
W75-04378

WATER UPTAKE BY SEEDS AS AFFECTED BY WATER STRESS, CAPILLARY CONDUCTIVITY, AND SEED-SOIL WATER CONTACT. I. EXPERIMENTAL STUDY AND, II. ANALYSIS OF EXPERIMENTAL DATA,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil Physics.
A. Hadas, and D. Russo.
Agronomy Journal, Vol 66, No 5, p 643-652, September-October 1974. 11 fig, 2 tab, 21 ref, 2 parts.

Descriptors: *Hydraulic conductivity, *Soils, *Germination, *Arid lands, Seeds, Seed treatment, Soil water, Soil texture, Stress, Soil aggregates.
Identifiers: Seed-soil water contact area, Chickenpea, Pea, Vetch.

Inhibition and seed germination as affected by water potentials, hydraulic conductivity, and seed-water area contact were studied. Chickenpea, pea, and vetch seeds were germinated in pure, aerated water and in sand or aggregate fractions of various grain-sized classes. Results show that low values of external water potential affect the rate of water uptake, but not percent of germination as long as waterpotential is higher than a critical value that is a species-specific. For a given seed-water contact area, any decrease in hydraulic conductivity reduced rates of water uptake and germination; total germination was not affected as long as the critical water potential was not reached. The data also shows that for optimal seed-soil water contact in aggregated soils, the mean aggregate size should be one-fifth to one-tenth of the seed's diameter. Possible applications to field practices, such as seed-bed preparation, are discussed. (Mastic-Arizona)
W75-04381

ENERGY BUDGET MEASUREMENTS OVER THREE COVER TYPES IN EASTERN ARIZONA,
Forest Service (USDA), Tempe, Ariz. Forest Hydrology Lab.
J. R. Thompson.
Water Resources Research, Vol 10, No 5, p 1045-1048, October 1974. 4 fig, 2 tab, 12 ref.

Descriptors: *Energy budget, *Evapotranspiration, *Small watersheds, *Vegetation effects, *On-site data collections, Radiation, Seasonal, Plant growth, Pine trees, Clear-cutting, Precipitation(Atmospheric), Slopes, Soil temperature, Runoff, Rain gages, Streamflow, Arizona, Climatic data, Solar radiation, Dew point, Vapor pressure.

Measurements of net radiation and evapotranspiration were made over a 3-year period for a pine forest, a cienega, and a clear-cut opening in the Apache National Forest of eastern Arizona. Seasonal patterns for net radiation and evapotranspiration were determined using the energy budget measurements in the Bowen ratio equation. Evapotranspiration for the growing season was 19.4 inches for the forest, 15.3 inches for the clear-cut, and 13.2 inches for the cienega. Weighting these amounts by the extent of the cover type resulted in an average evapotranspiration amount of 18.4 inches for the growing season. Some inconsistent results were obtained when data were used from days when reverse vapor pressure gradients existed. The ratios appeared reasonable when only data from days with continuous vapor movement away from the surface were used. With all data combined, the ratios lost some of the seasonal pattern. (Mastic-Arizona)
W75-04383

PHENOLOGICAL EVENTS AND THEIR ENVIRONMENTAL TRIGGERS IN MOJAVE DESERT ECOSYSTEMS,
California Univ., Los Angeles. Lab of Nuclear Medicine and Radiation Biology.
J. C. Beatley.
Ecology, Vol 55, No 4, p 856-863, Autumn 1974. 1 fig, 20 ref.

Descriptors: *Phenology, *Ecosystems, *Rainfall, *Desert plants, *Arid climates, Plant populations, Rodents, Soil Moisture, Temperature, Animal populations.
Identifiers: *Mojave Desert.

The occurrence of phenological events in the Mojave Desert ecosystem are dependent on heavy rains (> 25 mm (1 in)). The most predictable of these are the regional rains between late September and early December. Rains during this period are necessary for successful vegetative and reproductive growth of most shrubs, perennials, and annuals in the following winter and spring. Summer rains appeared to have little immediate

significance for most native plant and animal populations except under certain conditions when rainfall may trigger growth and reproduction of primary producers permitting at least moderate or local success every season. Whether seasonal success is to be regional or local is not predictable except as the season progresses and the pattern of expression of the controls unfolds during the autumn and winter months. (Mastic-Arizona)
W75-04385

ECONOMICS OF FERTILIZER APPLICATION ON RANGE AND MEADOW SITES IN UTAH,
Utah State Univ., Logan. Dept. of Range Science.
J. P. Workman, and T. M. Quigley.
Journal of Range Management, Vol 27, No 5, p 390-393, September 1974. 1 fig, 4 tab, 12 ref.

Descriptors: *Forage grasses, *Range management, *Fertilizers, *Economics, *Utah, Ranges, Marginal return, Nitrogen, Phosphorus, Nitrates, Harvesting, Hay, Profit, Grazing, Precipitation(Atmospheric), Grasslands.

Forage production responses to applications of nitrogen and phosphorous on five Utah range and meadow sites and one Idaho range were subjected to economic analysis. None of the sites studied responded to phosphorus application, but forage production on three sites increased significantly with nitrogen applications in the form of ammonium nitrate. Standard marginal economic analysis indicated that when the forage was harvested for hay, nitrogen application was profitable on the semi-wet meadow and mountain loam sites. Fall application offered a definite advantage over spring application on both sites. Nitrogen application proved unprofitable when increased production was valued in terms of range forage. (Mastic-Arizona)
W75-04388

FASCICLE DENSITY AND NEEDLE GROWTH RESPONSES OF RED PINE TO WATER SUPPLY OVER TWO SEASONS,
Forest Service (USDA), Durham, N.H. Northeastern Forest Experiment Station.
P. Garrett, and R. Zahner.
Ecology. Vol 54, No 6, p 1328-1334. 1973, Illus.
Identifiers: *Fascicle density(Pines), Growth rates, Mitosis, *Needle growth(Pines), *Pine trees(Red), Pinus-Resinosa, Seasonal, Water supply.

The ontogeny of terminal growth in red pine (Pinus resinosa Ait.) suggests that the growing season in Michigan be divided into three 2-mo. periods: April-May, June-July, and Aug.-Sept. It is during the middle period that mitotic activity at the shoot apex initiates dwarf shoot primordia in the bud for the subsequent season's foliage; thus, preconditioning 1 yr has a strong effect on next year's growth. Water was applied to or withheld from the soil under 23-yr-old trees in various combinations of the 2-mo. periods over 2 growing seasons. All effects of drought were greatest on the terminal shoot of the main stem, diminishing on terminals of branches with distance from the apex, and disappearing at the base of the crown. Shoot extension was governed equally by conditions of the middle period of the previous year and of the early period of the current year. Each year fascicle density was regulated only by water conditions of the early period of the current year, regardless of preconditioning. Spacing of needles on shoots depended on elongation of the stem internodes between dwarf shoots, and was independent of the number of fascicles. Number of fascicles per shoot was governed only by conditions of June-July of the previous year, with drought during this period reducing the number of 30%. Length of needles was related to two factors: the number of fascicles produced per shoot and the water treatment of the period during which needles elongated. Thus when the water supply of the middle of the previous year was deficient, fewer but longer needles were produced currently; when water during the middle of the current year was deficient, needles were reduced in length by about 30%. It is concluded that the interaction of 2 seasons' water supply are usually compansative, rarely additive. The average net effect on foliage production is a long-term, year-to-year stabiility in photosynthetic potential for red pine.--Copyright 1974, Biological Abstracts, Inc.
W75-04424

DOMINANCE OF CALIFORNIA ANNUAL GRASSLANDS BY BRASSICA NIGRA,
Illinois Univ., Urbana. Dept. of Forestry.
D. T. Bell, and C. H. Muller.
Am Midl Nat. Vol 90, No 2, p 277-299. 1973 Illus.
Identifiers: Allelopathic mechanism, Animal boraging, Annual, Avena-Fatua, *Brassica-Nigra, Bromus-Mollis, Bromus-Rigidus, Browsing, *California, *Grasslands, Leachate, Pasture.

B. nigra (L.) Koch is a dicotyledonous member of the annual grassland vegetation of southern California. Pasture grassland areas often show pure stands of this species surrounded by areas inhabited by various mixtures of the grassland associates. Yearly regeneration of these pure stands occurs at the 1st rainfall of late autumn and initiates the growing season of all annual species of this vegetative type. At this time the weedy grass species which characterize these annual grasslands are notably absent in the areas of Brassica dominance. The exclusion of the grasses, such as Avena fatua, Bromus rigidus and Bromus mollis occurs primarily as a result of an allelopathic mechanism, involving the leaching of water soluble toxins from standing dead stalks and dead leaf material remaining in the soil. The pattern of geographic isolation of the species was shown not to be a result of spatial differences in soil texture, pH or temperature. Competitive mechanisms involving light or soil factors failed to be effective in this case of interference. Animal foraging was shown to be of minimal consequence. A potentially highly allelopathic, volatile toxin from living vegetative parts of Brassica was shown to lack an ecologically effective mechanism. Exudates from germinating seeds exhibited no effect upon grass seed in the laboratory and the possibility that this mechanism could be operative under field conditions is negligible. Water soluble phytotoxins, however, provide an ecologically effective mechanism which is operative in this field-inhibition phenomenon. Water soluble toxins inhibit the annual grassland species and permit the invasion and control of extensive grassland areas by B. nigra.--Copyright 1974, Biological Abstracts, Inc.
W75-04435

SOME EFFECTS OF SPRING SNOWMELT RUNOFF ON AQUATIC INVERTEBRATE POPULATIONS IN A HIGH MOUTAIN STREAM,
Wyoming Univ., Laramie. Water Resources Research Inst.
W. R. Good.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 405, $5.25 paper copy, $2.25 microfiche. Completion Report, Water Resources Series No 50, April 1974. 103 p, 20 fig, 8 tab, 25 ref, 7 append. OWRT A-006-WYO (1).

Descriptors: *Snowmelt, *Wyoming, *Invertebrates, *Benthos, Runoff, Water temperature, Streams , *Diptera, Reproduction, *Breeding, *Hatching.
Identifiers: Nash Fork Creek(Wyo).

This study investigates the abiotic and biotic factors acting on a community of benthic invertebrates in a high mountain stream during the spring snowmelt runoff period. Data used were collected in 1970. The study area was a 1 km section of Nash Fork Creek near 3,000 m in the Snowy Range, Wyoming. Runoff began in mid-May when the discharge was 6 c.f.s., rose erratically to a peak on June 25, at 125 c.f.s., then dropped through the rest of the summer. Water temperatures increased through the runoff from 0C. in mid-May to 4.5-11.5C. on June 25 and 7-16C. by July 21. The general snow cover over the stream present in mid-May was gone by June 4. For each invertebrate species in the study area which could be separated, population estimates were made, size ranges were recorded, and when possible, hatching and breeding periods were noted. Adjustment of the life cycle was a common means of adaptation to the runoff and was manifested in several ways: (1) The Diptera avoided exposing pupae to the peak of the runoff; (2) Many insect species were found to breed during the runoff; (3) Prolonged hatching of eggs or avoidance of hatching, were recongized as runoff-survival strategies.
W75-04450

VERTICAL DISTRIBUTION OF FRESHWATER MUSSELS (PELECYPODA, UNIONIDAE) IN SOUTHWESTERN FINLAND,
Turku Univ. (Finland). Dept. of Zoology.
E. Haukioja, and T. Hakala.
Ann Zool Fenn Vol 11, No 2, p 127-130, 1974. Illus.
Identifiers: Anodonta-piscinalis, Clays, *Distribution patterns, *Finland, Lakes, *Mussels(Freshwater), Pelecypoda, Pseudanodonta-complanata, Rivers, Silt, Unio-pictorum, Unio-tumidus, Unionidae, Vertical distribution.

Species composition, numbers and biomass in relation to depth are presented for a lake and a river in southwestern Finland. Species found were Unio tumidus, U. pictorum, Anodonta piscinalis and Pseudanodonta complanata. U. pictorum was most strictly limited to shallow waters and P. complanata to deeper waters. A piscinalis evidently had the widest tolerance of depth. Highest densities and biomass (up to 11.8 kg/m2) were found in 0-1 m depth. From this depth downwards densities decreased sharply and few individuals were found at 5 m. In all species the smaller individuals tended to live in shallower waters. The nature of the bottom was also important; all mussels avoided hard clay and very soft silt.--Copyright 1974, Biological Abstracts, Inc.
W75-04486

DISTRIBUTION AND ECOLOGY OF AMPHIPODES (ESPECIALLY GAMMARIDES) IN THE BASIN AND ESTUARY OF THE DOURDUFF RIVER (BRITTANY, FRANCE), (IN FRENCH),
Amsterdam Univ. (Netherlands). Inst. of Taxonomic Zoology.
Marion J. Van Maren.
Bull Zool Mus Univ Amst Vol 3, No 22, p 189-209, 1974. Illus.
Identifiers: *Amphipods, Competition, *Distribution patterns, Echinogammarus-berilloni, *Ecology, Estuary, *France(Dourduff River), Gammarids, Gammarus-chevreuxi, Gammarus-zaddachi, Reproduction, River basins, Salinity, Seasonal.

Stations (1-5) situated at the head of the Dourduff-estuary (Brittany, France), were sampled monthly at springtide during the period of May-Oct. 1971. The data obtained this way show a shifting in the populations of Echinogammarus berilloni, Gammarus chevreuxi and G. zaddachi from the upstream part of the estuary downstream and vice versa. E. berilloni can exist in the head of the estuary as long as G. chevreuxi and G. zaddachi are few in number or absent (i.e., May-Sept.). When in Sept. the latter 2 spp. repopulate the upstream part of the estuary, E. berilloni disappears from this river section and is found only farther upstream. Because it has been domonstrated that E. berilloni can sustain salinities up to 80% seawater (Vincent, 1966), the increased salinity in the head of the estuary, during the springtides in au-

tumn, can not explain the disappearance of this species in that part of the river. The reproduction period of E. berilloni falls during May and June. Several places in the estuary, samples were taken in the main stream and in the brooklets discharging into it. This sampling resulted in a survey of the distribution of gammarids in the estuary in correlation with some environmental factors. A microgeographical analysis was executed in the non-estuarine part of the Dourduff and its ramifications. The distribution of species in this part of the river system is shown.--Copyright 1974, Biological Abstracts, Inc.
W75-04488

INFLUENCE OF FRESHWATER DULUTION ON DYNAMICS OF POPULATIONS OF BUILDER CRUSTACEANS FROM LAGOON OF BIGUGLIA, CORSICA (COROPHIUM INSIDIOSUM C., TANAIS CAVOLINII M.E., ERICHTHONIUS BRASILIENSIS D.), (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 2H.
W75-04490

THE OCCURRENCE OF YOUNG SARDINELLA AURITA IN THE BRACKISH WATER OF THE LAGOONS OF CANANEIA (BRAZIL), (IN GERMAN),
Sao Paulo Univ. (Brazil). Instituto Oceanografico.
For primary bibliographic entry see Field 2L.
W75-04492

NOTE ON GROWTH OF THE BREAM, ABRAMIS BRAMA (LINNAEUS, 1758) IN THE ORLIK VALLEY WATER RESERVOIR,
Karlova Universita, Prague (Czechoslovakia). Lab. of Ichthylogy.
A. S. Naiksatam.
Vestn Cesk Spol Zool, Vol 38, No 2, p 113-116, 1974, Illus.
Identifiers: Abramis-brama, *Bream, *Czechoslovakia(Orlik Valley reservoir), *Growth rates, Reservoirs, Scales, Age.

Age and growth was studied by using scales of 121 specimens of A. brama from the Orlik valley water reservoir of Czechoslovakia. Computation of growth history was made by using Lee's method. The growth of bream from the Orlik valley water reservoir compared with some selected data published from various localities of Czechoslovakia, show a relatively slow rate of growth compared with the growth in other valley water reservoirs. In comparison with the data summarized by Oliva and by Poupe the rate of growth is average.--Copyright 1974, Biological Abstracts, Inc.
W75-04493

REMARKS ON BIONOMY OF FAMILY CYPRINODONTIDAE (PISCES) WITH RESPECT TO DEPENDENCY OF DEVELOPMENT OF EMBRYOS OF ROLOFFIA FOLOFFI (AHL., 1938) ON THE HARDNESS OF THE WATER, (IN GERMAN),
S. Frank.
Vestn Cesk Spol Zool, Vol 38, No 1, p 13-18, 1974, Illus.
Identifiers: *Bionomy, *Cyprinodontidae, *Embryo development, Extracts, Peat, Pisces, *Roloffia-roloffi, *Water hardness.

The jungle waters of southern Sierra Leone in western Africa are the habitat of R. roloffi, which is easily kept in aquariums. The optimal water hardness range for the development of eggs and larvae is approximately 14-16 degrees dNKH (a measurement of noncarbonate or sulfate content), in which case mortality reaches a maximum of 5%. When water hardness is reduced to 10 degrees or increased to 20 degrees, mortality increases significantly. When carbonate content exceeds 1 degree, the net negative effect is even more drastic. Peat extracts almost double the embryonic development time at a constant water temperature of 26C, increasing it from 10-12 days to 18-22 days; mortality also increases.--Copyright 1974, Biological Abstracts, Inc.
W75-04494

EFFECT OF LEAF AREA REDUCTION ON THE WATER REQUIREMENT OF BARLEY (HORDEUM VULGARE L.),
Arizona Univ., Tucson.
A. L. Foutz, A. K. Dobrenz, and M. A. Massengale.
Journal of the Arizona Academy of Science, Vol 9, No 2, June 1974. p 51-54, 3 fig, 1 tab, 17 ref.

Descriptors: *Transpiration, *Transpiration control, *Water requirements, *Barley, *Crop yield, *Defoliation, Plant growth, Leaves, Crop production, Photosynthesis.
Identifiers: *Defoliation, Leaf area reduction.

Since transpiration accounts for a large percentage of water used by a crop, efficiency could be increased by decreasing transpiration. In this experiment, leaf blades were clipped when the flag leaf emerged from the sheath. Leaf area reduction treatments consisted of (a) removal of all the leaves except the flag leaf (b) removal of all leaves except the flag and two adjacent leaves, and (c) the removal of all leaves except the flag and one adjacent leaf, and (d) no leaf removal. Transpiration rates were decreased with increased leaf area reduction. Yields of the defoliated plants were also significantly reduced with increased leaf area reduction. Leaf removal may be an effective water use reduction technique in producing a barley crop. Timing of defoliation treatments is critical to prevent severe reductions in yields, and should be made when the flag leaf is fully emerged. (Mastic-Arizona)
W75-04511

MODEL FOR PREDICTING PLANT YIELD AS INFLUENCED BY WATER USE,
Utah State Univ., Logan.
R. J. Hanks.
Agronomy Journal, Vol 66, No 5, p 660-665, September-October, 1974. 4 tab, 6 fig, 22 ref.

Descriptors: *Plant growth, *Water utilization, *Model studies, *Crop production, *Soil-water-plant relationships, Soil water, Transpiration, Evaporation, Irrigation, Drainage, Field capacity, Wilting, Moisture uptake, Evapotranspiration, Rainfall, Agriculture.

A model is presented for predicting plant yield in both total dry matter and grain, as a function of water use. It was assumed that transpiration is the only water-use factor directly influencing plant growth. Evaporation and drainage have an indirect influence on the amount of water available for transpiration. The yield-water use curve was found to be sensitive to transpiration and evaporation assumptions. The model is simple and inexpensive to run on a computer, and can be used to predict seasonal yields based on factors such as irrigation frequency and amount of rainfall and soil water storage. (Mastic-Arizona)
W75-04609

SOME EFFECTS OF SUBIRRIGATION ON BENTGRASS DURING HEAT STRESS IN THE FIELD,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
J. V. Krans, and G. V. Johnson.
Agronomy Journal, Vol 66, No 4, p 526-530. July-August, 1974. 3 tab, 5 fig, 10 ref.

Descriptors: *Irrigation effects, *Turf grasses, *Root development, *Root distribution, *Crop production, Sprinkler irrigation, Heat, Temperature, Stress, Aeration, Wilting, Chlorphyll, Fertilization, Water table, Soil gases.
Identifiers: *Subirrigation, Bentgrass, N chlorosis.

The alleviation of the adverse effects of heat stress by subirrigation of bentgrass was studied. Results of prolonged temperature stress include dissication, disease, or insect damage. Effects were evaluated in a field study from clipping yields, chlorphyll content, and root distribution. Root development was significantly improved by subirrigation. Wilting was not experienced by plants under this treatment, while surface irrigated treatments required periodic syringing to alleviate this problem. A major problem of the subirrigated treatment was N chlorosis related to a high temperature and poorly aerated environment. Proper adjustment of water table levels and surface fertilization should improve aeration and eliminate N chlorosis increasing turf quality. (Mastic-Arizona)
W75-04612

EFFECT OF ROOT PRUNING ON WATER RELATIONS AND GROWTH OF COTTON,
Southern Regional Research Lab., New Orleans, La.; and Alabama Agricultural Experiment Station, Auburn.
J. R. Stansell, B. Klepper, and V. D. Browning.
Agronomy Journal, Vol 66, No 4, p 591-592. July-August, 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Root development, *Root distribution, *Plant growth, *Root systems, *Soil-water-plant-relationships, Moisture uptake, Soilwater, Growth rates, Moisture content, Cotton, Moisture stress.
Identifiers: Root pruning.

An experiment was conducted to determine the effects of root-system loss on plant water use and growth rates. Approximately one-fourth of the root length was severed by forcing a sharp-edged plate horizontally through the soil in a study compartment. Growth parameters such as stem diameters and plant height were measured daily along with water uptake by the cotton plants. Growth reductions were greater after root pruning when the root systems were small and concentrated in the upper 25 cm. of soil. Growth was less affected in plants with deeper and more extensive root systems. Although the proportion of roots removed was approximately the same, greater growth reduction occured in the more concentrated root systems indicated that the effect of root pruning, especially after soil water content had decreased, depends on distribution of the remaining root system rather than the percentage of roots removed. (Mastic-Arizona)
W75-04613

RELATIVE INFLUENCE OF MOISTURE-AERATION AND NUTRIENTS ON VEGETATION AND BLACK SPRUCE GROWTH IN NORTHERN ONTARIO,
Great Lakes Forestry Research Center, Sault Sainte Marie (Ontario).
J. K. Jeglum.
Can J For Res, Vol 14, No 1, p 114-126, 1974.
Identifiers: *Aeration, *Black spruce, *Canada(Ontario), *Growth rates, *Moisture, *Nutrients, Peatlands, Picea-Mariana, Sites, Spruce, Vegetation.

Results from a principal component analysis suggest that nutrient regime is more important to vegetational variation than the moisture-aeration regime. Correlations between site index and habitat measures suggest that the moisture-aeration regime influences tree growth more than the nutrient regime. For particular components of vegetational variation and for segments of the total data the proportional influence of the 2 gradients varies. Moisture-aeration and nutrient regimes explain a large proportion of the variation in minor vegetation and tree growth on black spruce (Picea

mariana) peatlands (Canada).--Copyright 1974, Biological Abstracts, Inc.
W75-04837

2J. Erosion and Sedimentation

PARTICULATE MATTER AT THE SEDIMENT-WATER INTERFACE IN COASTAL ENVIRONMENTS,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
For primary bibliographic entry see Field 2L.
W75-04497

SUSPENDED SOLIDS CARRIED BY THE GALLATIN RIVER OF SOUTHWESTERN MONTANA: AMOUNTS CARRIED DURING SPRING RUNOFF,
Montana State Univ., Bozeman. Dept. of Plant and Soil Science.
M. G. Klages, L. D. Logan, and Y. P. Hsieh.
Northwest Sci, Vol 47, No 4, p 203-212, 1973, Illus.
Identifiers: Clays, Erosion, Measurement, *Montana(Gallatin River), Rivers, *Runoff, Sediments, Silt, Snow, Spring, *Suspended solids, *Turbidity, Snowmelt.

Erosion resulting from spring snowmelt and resultant runoff is the major contributor to suspended solids in the Gallatin River. The suspended load varies with time, but one season can be compared to another if several samplings are averaged. Yearly variations in suspended load were not closely related to either total runoff or peak flow. Runoff from urban and agricultural lands contributes to sediment early in the season before snowmelt begins in the mountains. Streambank erosion is an important source of sediment in the broad lower valley during the high spring flow accompanying melting of the mountain snowpack. Geology is one of the important factors controlling suspended load in the steep, mountainous terrain of the upper part of the drainage. Soft, easily eroded, and unstable sedimentary rocks produce most of the suspended solids. Taylor Fork is one of the major contributors to sediment in the Gallatin River. Hard volcanic and metamorphic igneous rocks give rise to clearer streams in this watershed even though the harder rocks are accompanied by stronger relief. Turbidity measurements can be used to estimate suspended solids. They are more accurate on suspended silt and clay than on total suspended solids.--Copyright 1974, Biological Abstracts, Inc.
W75-04501

A GEOPHYSICAL AND GEOLOGICAL INVESTIGATION OF POTENTIALLY FAVORABLE AREAS FOR PETROLEUM EXPLORATION IN SOUTHEASTERN ARIZONA,
Arizona Univ., Tucson. Geophysics Lab.
C. L. V. Aiken, and J. S. Sumner.
Arizona Oil and Gas Conservation Commission, Phoenix, Report of Investigations 3. 1974, 40 p, 17 fig, 4 tab, 58 ref.

Descriptors: *Sedimentation, Geology, Exploration, Arizona, Fuels, Oil, Deposition(Sediments), Geophysics, Gravity studies, Cenozoic Era, Sedimentary petrology, Magnetic studies, Drill holes.

Surface geological investigations in the mountain ranges indicate that a thick sequence of marine sedimentary Paleozoic and Mesozoic (Cretaceous) rocks was deposited in the Pedregosa basin in southeastern Cochise County and adjacent shelf areas. The marine strata deposited in this basin are similar in many aspects to those in petroleum-productive areas in southeast New Mexico and west Texas. They contain organic-rich basin facies of rocks that were probable sources for oil and gas. Adverse factors such as the wide thickness variance of Cenozoic valley fill (100 feet or less to almost 12,000 feet) impede geologic investigations for petroleum. Data have been collected from gravity and magnetic and drill hole investigations. (Bahre-Arizona)
W75-04509

SEDIMENT TRAP EFFICIENCY OF SMALL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
F. E. Dendy.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 5, p 898-901, September-October 1974. 4 fig, 1 tab, 16 ref.

Descriptors: *Reservoirs, *Sediments, *Trap efficiency, Volume, Inflow, Watersheds(Basins), Suspended load, Efficiencies, Indexing, United States, *Lake sediments.

Despite widely varying reservoir sizes, shapes, sediment inflow rates, and volumes, trap efficiencies varied little among 17 small flood-water retarding reservoirs throughout the United States. Trap efficiencies ranged from 81 to 98% for periods of from 4 to 16 years. Trap efficiencies for dry reservoirs were essentially the same and varied over about the same range as ponded reservoirs. Relationships between trap efficiency and various parameters including capacity/watershed, capacity/inflow, calcium-sodium ratios, reservoir shapes, and sediment particle sizes were poorly defined and only explained a small portion of the total variation. Structures with a capacity/inflow ratio greater than 0.1 will trap 80 to 95% of inflowing sediments. Trap efficiencies of sediment particles larger than 0.062 mm range from 96 to 100%. The correlation coefficient between computed and observed trap efficiency values was 0.96. Thus, the prediction equation should provide reasonably good estimates, within 10 to 15%, of trap efficiency for most small reservoirs. (Dawes-ISWS)
W75-04702

RIVER REGIME WITH SPECIAL REFERENCE TO RIVER NILE,
Assiut Univ. (Egypt).
For primary bibliographic entry see Field 2E.
W75-04706

SOIL EROSION AND SEDIMENT TRANSPORT FROM GULLIES,
Agricultural Research Service, Columbia, Watershed Research Unit.
R. F. Piest, J. M. Bradford, and G. M. Wyatt.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings paper 11069, p 65-80, January 1975. 7 fig, 4 tab, 19 ref, 1 append.

Descriptors: *Erosion, *Gullies, *Mass wasting, *Sedimentation, *Tractive forces, Soil mechanics, Sediment transport, Watersheds(Basins), Soil conservation, Watershed management, Storm runoff, Hydraulics, *Iowa.
Identifiers: *Treynor(Iowa), Loess soil mantle.

Field observations of four gullied watersheds, 74 acres to 150 acres in size, showed that gully erosion was one-fifth of the total sediment yield during a 9-yr period. Erosion rates were dependent upon mass wasting of loessial gully banks and headcuts. For the nonconservation watersheds, tractive forces exerted by runoff on the channel boundary did not detach appreciable amounts of undisturbed soil but were more than adequate to entrain the soil debris yielded by mass-wasting processes. Gully erosion was minimal on conservation watersheds; the runoff was generally below the levels required for gully debris removal, and the degree of slope was reduced to a stable value. Soil mechanics principles, applied to strength/stability aspects of gully banks in western Iowa, indicated that the height of the water table, soil cohesive strength, and rate of water infiltration are controlling factors. Initial field and laboratory model experiments provided insight into variables that affect the mass-wasting process. A large part of the gully soil debris accumulates during winter and early spring and is flushed from the channel with the first spring rainstorms. The relative quantities are greatly reduced for each subsequent runoff event during the year. (Singh-ISWS)
W75-04707

RAINDROP CHARACTERISTICS IN SOUTH CENTRAL UNITED STATES,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 2B.
W75-04713

2K. Chemical Processes

OVERSATURATION METHOD FOR PREPARING SATURATION EXTRACTS FOR SALINITY APPRAISAL,
Agricultural Research Service, Chickasha, Okla.
For primary bibliographic entry see Field 2G.
W75-04392

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 2F.
W75-04441

ELECTROCHEMICAL PROCESS FOR NUTRIENT REMOVAL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04446

DEPOSITION OF WATER AND CATIONS ON ARTIFICIAL FOLIAR COLLECTORS IN FIR KRUMMHOLZ OF NEW ENGLAND MOUNTAINS,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
W. H. Schlesinger, and W. A. Reiners.
Ecology, 55(2): 378-386, Illus, 1974.
Identifiers: Abies-balsamea, *Calcium, *Cations, *Fir krummholz, Foliar collectors, *Lead, *Magnesium, Mountains, New England, *Potassium, *Sodium, *New Hampshire.

Atmospheric depositions of water Ca, Mg, Na, K and Pb were measured in an Abies balsamea krummholz ecosystem in New Hampshire. Two types of collectors were used. Open buckets captured rainout, washout and sedimentation (bulk precipitation), while buckets with attached artificial conifer foliage collected intercepted aerosols and cloud droplets as well as bulk precipitation. Water catchment averaged 4.5 times greater in the foliar collectors than in open buckets, and Ca, Mg, Na, K and Pb deposition averaged 8.3, 6.0, 4.9, 5.7 and 5.5 times greater, respectively, in the foliar collectors. Most of the increase in foliar collectors was due to higher volume catchment, but some concentration enrichment through interception was also contributory. These data cannot be extrapolated to elemental deposition per unit area without correcting capture efficiency of collectors to that of natural vegetation. These data do strongly suggest, however, that in areas of high wind and frequent exposure to clouds or fog, such as in mountain areas of New England, measurements of total elemental deposition require an evaluation of interception as well as bulk precipitation.--Copyright 1974, Biological Abstracts, Inc.
W75-04471

CONTROLS ON THE QUALITY VARIATIONS OF SOME CARBONATE SPRING WATERS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
For primary bibliographic entry see Field 2F.
W75-04710

THE COALESCENCE OF WATER DROPS,
Tel Aviv Univ. (Israel). Dept. of Environmental Sciences.
For primary bibliographic entry see Field 1A.
W75-04728

2L. Estuaries

THE EFFECT OF TEMPERATURE AND CHEMICAL POLLUTANTS ON THE BEHAVIOR OF SEVERAL ESTURINE ORGANISMS,
Ichthyological Associates, Inc., Middletown, Del.
For primary bibliographic entry see Field 5C.
W75-04353

ROOKERY BAY: ECOLOGICAL CONSTRAINTS ON COASTAL DEVELOPMENT,
Conservation Foundation, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-04354

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. THIRD SEMI ANNUAL REPORT TO THE NATIONAL SCIENCE FOUNDATION.
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W75-04421

THE EFFECTS OF MERCURIC CHLORIDE UPON RESPIRATION IN CONGERIA LEUCOPHAETA,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-04472

FLUORIDE CONCENTRATIONS IN TWO PACIFIC COAST INLETS-AN INDICATION OF INDUSTRIAL CONTAMINATION,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5B.
W75-04473

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: I. SURVEY OF HYDROCARBONS IN SEDIMENTS AND CLAMS (MERCENARIA MERCENARIA),
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-04477

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: II. CHEMICAL AND ISOTOPIC ANALYSIS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-04478

PRODUCTION ECOLOGY OF TWO CARIBBEAN MARINE ECOSYSTEMS: I. PHYSICAL ENVIRONMENT AND FAUNA,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
For primary bibliographic entry see Field 5C.
W75-04479

PRODUCTION ECOLOGY OF TWO CARIBBEAN MARINE ECOSYSTEMS: II. METABOLISM AND ENERGY FLOW,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
For primary bibliographic entry see Field 5C.
W75-04480

ABUNDANCE, DIVERSITY AND SEASONAL PATTERNS OF ESTUARINE FISH POPULATIONS,
Environmental Protection Agency, Washington, D.C. Office of Technical Analysis.
For primary bibliographic entry see Field 5C.
W75-04485

LITTORAL FISH POPULATIONS AFTER AN OIL TANKER DISASTER IN THE FINNISH SW ARCHIPELAGO,
Turku Univ. (Finland). Archipelago Research Inst.
For primary bibliographic entry see Field 5C.
W75-04487

DISTRIBUTION AND ECOLOGY OF AMPHIPODES (ESPECIALLY GAMMARIDES) IN THE BASIN AND ESTUARY OF THE DOURDUFF RIVER (BRITTANY, FRANCE), (IN FRENCH),
Amsterdam Univ. (Netherlands). Inst. of Taxonomic Zoology.
For primary bibliographic entry see Field 2I.
W75-04488

THE OCCURRENCE OF YOUNG SARDINELLA AURITA IN THE BRACKISH WATER OF THE LAGOONS OF CANANEIA (BRAZIL), (IN GERMAN),
Sao Paulo Univ. (Brazil). Instituto Oceanografico.
V. Sadowsky.
Zool Anz, Vol 191, No 3/4, p 182-183, 1973.
Identifiers: *Brackish water, *Brazil(Lagoons of Cananeia), *Lagoons, Rain, *Sardinella-aurita, *Distribution patterns, Stenohaline fish.

Sardinella spp. are considered stenohaline fish whose distribution is confined to waters with a high salt content. However, young specimens of S. aurita have been seen for 20 yr in the lagoons of Cananeia, where they stay 8-10 mo. until they reach a length of 12-14 cm and have developed gonads, whereupon they return to the sea. Mass deaths of Sardinella occurred on the surface when tropical rains reduced the salt content of the water to 8% up to a depth of 5 m. When rains lower the salt content to the practical limit of 10-12%, the schools of fish leave the lagoons prematurely.--Copyright 1974, Biological Abstracts, Inc.
W75-04492

PARTICULATE MATTER AT THE SEDIMENT-WATER INTERFACE IN COASTAL ENVIRONMENTS,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
R. G. Johnson.
J Mar Res, Vol 32, No 2, p 313-330, 1974, Illus.
Identifiers: Aggregates, Coastal environment, Deposits, *Massachusetts, Minerals, Organic matter, Particulate matter, Quartz, Sediments, *Sediment-water interfaces.

A microscopic study was made of marine sediments to identify the kinds of materials present at the sediment-water interface and to describe these materials from a biological point of view. Fifty-two samples were collected at 26 stations in the vicinity of Woods Hole, Massachusetts. A total of 42 particle species was recognized. Up to 69% of the quartz particles were encrusted with organic matter. All of the samples contained flocculent organic-mineral aggregates in amounts varying from 13 to 71% particle abundance. Nearly all of the clay and silt size particles were incorporated in an organic matrix. The organic-mineral aggregates probably are the products of the recycling of organic matter by deposit feeders. An average of 61% of the particles examined in samples of surficial sediments were potential food particles. The standard methods of describing sediments are inadequate for understanding animal-sediment relations and geological processes. Encrusted particles and organic-mineral aggregates must have different sedimentological properties than clean or free mineral particles. Thus, while the bulk analysis of a sediment may reveal only a few percent organic matter, that may be one of its most important properties.--Copyright 1974, Biological Abstracts, Inc.
W75-04497

DISSOLVED AND PARTICULATE HUMIC ACID IN AN EAST COAST ESTUARY,
Adelphi Univ., Oakdale, N.Y. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W75-04504

COMPARATIVE PHOTOSYNTHETIC CAPACITIES OF INTERTIDAL ALGAE UNDER EXPOSED AND SUBMERGED CONDITIONS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 5C.
W75-04524

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6A.
W75-04558

ACID-IRON WASTE AS A FACTOR AFFECTING THE DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON IN THE NEW YORK BIGHT: II. SPATIAL VARIATIONS IN THE FIELD AND IMPLICATIONS FOR MONITORING STUDIES,
Harvard Univ., Cambridge, Mass. Biological Labs.
For primary bibliographic entry see Field 5B.
W75-04574

COASTAL RESOURCES MANAGEMENT AND CONSERVATION REPORT PUBLISHED,
Pollution Control Guide, Vol 3, paragraph 19733, p 19256-19260, 1974. 5 p.

Descriptors: *Coasts, *Legislation, *Federal government, Jurisdiction, Grants, Economics, Research and development, Conservation, Coastal plains, Coastal marshes, Governmental interrelations, Environmental effects, Comprehensive planning, Resources development, Water conservation, Water resources development.
Identifiers: *Coastal Zone Management Act, Coastal zone management.

The Coastal Zone Management Act provides federal support as an incentive to coastal states, to develop and implement coastal zone management programs within that state. The Act specifies that a state management program must define the boundaries of the coastal zone, list areas of particular state concern, propose a governmental structure to administer the program, and control land and water uses within the coastal zone. The legislation seeks cooperation among federal, state and local governments in dealing with land and water use decisions. Also provided is grant assistance to states for the acquisition, development, and operation of estuarine sanctuaries. Administrative regulations stipulating an allocation formula were made available so that the first grants can be issued by early 1974. Guidelines describing the federal approval process for proposed state management programs are being drafted. (Sperling-Florida)

W75-04583

ROTATING HYDRAULICS OF STRAIT AND SILL FLOWS,
Woods Hole Oceanographic Institution, Massachusetts.
J. A. Whitehead, A. Leetmaa, and R. A. Knox.
Geophysical Fluid Dynamics, Vol 6, No 2, p 101-125, 1974. 8 fig, 11 ref, append.

Descriptors: *Ocean currents, *Atlantic Ocean, *Straits, *Density stratification, *Rotational flow, Weirs, Model studies, Energy equation, Flow, Analytical techniques, Laboratory tests, Theoretical analysis.
Identifiers: *Straits of Gibralter, Cross channel balance, Strait flows, Sill flows.

An understanding of the elementary dynamical schemes of hydraulic rotating flows and laboratory testing were stressed for analyzing observed strait and sill flows. For example, there is tremendous interest in calculating transports and exchanges between the Atlantic Ocean and the Mediterranean Sea through the Straits of Gibraltar. The stratification effects were considered by examining a two-layer fluid. The upper layer is at rest and the lower layer flows from one large basin to another via a connecting channel. The flow was assumed to be principally in a down-channel direction. The flow down the channel or the strait was assumed straight or with little curvature of streamlines. The usual non rotating hydraulic principle of maximum transport in flow over a weir (the end of the channel) was applied and relations between transport, rotation rate, and upstream interface height were calculated. One of these relations was tested experimentally with favorable results. A nonsteady decaying flow in the same system was analyzed similarly and also compared well with experimental results, as did a flow in both layers driven by an initial density imbalance. Some connections with oceanic strait and sill flows were discussed. (Singh-ISWS)
W75-04716

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TAR SAMPLES FROM THE MARINE ENVIRONMENT,
Shell Development Company, Houston, Tex. Bellaire Research Center.
For primary bibliographic entry see Field 5A.
W75-04718

AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN,
Linguistic Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 2B.
W75-04729

THE PROBLEM OF ORGANIZATION OF A COASTAL COORDINATING COMPUTER CENTER,
For primary bibliographic entry see Field 7C.
W75-04732

A SYSTEM OF AUTOMATED PROCESSING OF DEEP WATER HYDROLOGICAL INFORMATION,
For primary bibliographic entry see Field 7C.
W75-04733

ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD,
For primary bibliographic entry see Field 7A.
W75-04734

THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY,
For primary bibliographic entry see Field 7B.
W75-04735

A SMALL-PARAMETER MODEL OF CIRCULATION IN AN HOMOGENEOUS BAROCLINIC OCEAN,
Ye. P. Borisenkov.
In: NASA TT F-801, p 121-144, November 1974. 6 ref.

Descriptors: *Mathematical models, *Ocean circulation, Oceanography, Meteorology, Hydrodynamics, Equations, Model studies.
Identifiers: Baroclinic ocean.

A small-parameter model of circulation in an homogeneous baroclinic ocean was presented. The principles common to the construction of small-parameter models and certain energetic principles developed in connection with atmospheric processes were used. These principles have already been applied in the study of processes in a baroclinic ocean. (See also W75-04729) (Sims-ISWS)
W75-04738

THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES,
V. G. Savchenko, and Z. R. Fuks.
In: NASA TT F-801, p 145-158, November 1974. 20 ref.

Descriptors: *Gravity waves, *Oceanography, Ocean currents, Water circulation, Mathematical models, Model studies, Theoretical analysis.

The influence of ocean currents on free internal gravity waves was discussed. The dependence of the parameters of gravity waves on the characteristics of stationary marine currents was described. The necessary conditions for existence of these waves were obtained, and the phenomenon of abrupt changes in phase of the internal oscillation with depth was explained. (See also W75-04729) (Sims-ISWS)
W75-04739

JURISDICTION OF SUBMERGED LANDS--GUAM, THE VIRGIN ISLANDS AND AMERICAN SAMOA.
For primary bibliographic entry see Field 6E.
W75-04783

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

THE WORLD'S LARGEST DESALTING COMPLEX--A REPORT ON TWENTY YEARS EXPERIENCE,
J. Reside, and A. M. S. Al-Adsani.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 1-14, July 1974. 1 fig, 3 tab, 4 ref.

Descriptors: *Desalination, *Potable water, *Foreign research, *Desalination processes, Desalination apparatus, Desalination plants, Descaling, Desalination wastes, Water supply, *Distillation, Flash distillation, Electrodialysis, Evaporators.
Identifiers: *Kuwait.

Kuwait is the largest producer of desalted water in the world. Kuwait presently has 65 mgd of desalting plant capacity and plans another 12 mgd by 1975. The first municipal desalting plant was built in 1953. The original desalting units were the submerged tube type distillation process. The first multistage flash desalting plant was installed in 1960. Currently there are three main plant sites with 24 individual desalting units distributed among them. The units have capabilities ranging from 0.6 to 6.0 mgd. The design, operating procedures, and experiences of these units are described. The by-product recovery and water distribution systems are also described. By-products produced include hydrogen, chlorine, sodium hydroxide, sodium chloride, and hydrochloric acid. Chemical treatment used to reduce the scale formation in the desalting units consists of a mixture of tri-polyphosphate, lignum sulphonate and anti foam. The plants are cleaned manually by water washing and by rods and brushes or they can be cleaned by acid washing. The advanced use of desalting technology in Kuwait has made available an inexpensive supply of electricity and potable water from the sea. (Orr-FIRL)
W75-04422

GEOTHERMAL WELLS IN IMPERIAL VALLEY, CALIFORNIA: DESALTING POTENTIALS, HISTORICAL DEVELOPMENT, AND A SELECTED BIBLIOGRAPHY,
N. El-Ramly, R. E. Peterson, and K. K. Seo.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 31-38, July 1974. 1 fig, 1 tab, 26 ref.

Descriptors: *Geothermal studies, *Desalination, *Energy, *Brines, Brine disposal, Corrosion, Scaling, Temperature, Thermal water, Heat transfer, *California, Potable water.
Identifiers: *Imperial Valley(Calif).

Possible solutions to future water shortages include wastewater reclamation, importation, and desalting of sea or brackish water, but all of these are energy-intensive and energy is also in short supply. A potentially important source of readily available energy is geothermal brine, which is an underground resource found in abundance in the Imperial Valley, California. The background of geothermal well drilling in the Imperial Valley region is presented. Field research is being performed in the areas of heat-exchange technology and geothermal desalting. Brine disposal has been one problem holding back geothermal development. About two pounds of brine are produced for every pound of steam generated. The corrosive and scaling nature of the geothermal brines have stopped large scale commercial development so far. One process appears to offer promise for future developments; the Magmama power process is a vapor-turbine cycle. Hot brine is pumped up from the geothermal reservoir and the phase change of water to steam is suppressed. The brine is cooled in a heat exchanger where it heats a secondary fluid with a low boiling point, such as isobutane or freon, which is then used to drive a turbogenerator in a closed cycle. The cooled brine is injected into a well to maintain the underground reservoir pressures. The establishment of the feasibility of geothermal power in Imperial Valley will provide electrical energy and will better the prospects of a dual purpose geothermal power-desalting project in the Valley. (Orr-FIRL)
W75-04423

UTILIZATION OF THE EARTH'S NATURAL HEATING SYSTEM TO DESALT GEOTHERMAL BRINES FOR AUGMENTATION OF THE COLORADO RIVER SYSTEM,
Bureau of Reclamation, Boulder City, Nev. Region 3.
E. A. Lundberg.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 39-51, July, 1974. 9 fig, 3 tab.

Descriptors: *Geothermal studies, *Desalination, *Brines, *Energy, Thermal water, Potable water, Water resources development, Water quality control, *California, Water supply, Colorado River Basin.
Identifiers: *Imperial Valley(Calif).

The available surface water supplies in the Colorado River Basin are being depleted by increasing agricultural demands and by an expanding population which is using water at a higher per capita rate. Water quality problems also exist in the Imperial Valley, California, because of the presence of highly saline soils and many saline springs which add significant quantities of salt to the river. Geothermal sources stored in the form of a hot brine underground in the Imperial Valley have the potential to yield economical new supplies of fresh water by desalting and also to yield mineral by-products and the production of electricity. A program for water production from the geothermal resources consists of three proposed stages: the research and development stage; the demonstration stage; and, the large-scale development stage. The research and development stage is now in progress and includes extensive geological, geophysical, and water chemistry investigations to determine the potential and extent of the geothermal resource. The demonstration stage would show the viability of large-scale development. The large-scale development stage is the fully operational stage which could augment the Colorado River by several million acre-feet of desalted water annually and would have an associated electric power production. Investigations completed include the drilling of two geothermal wells, one to 8030 feet and the other to 6005 feet and the installation of two desalting test units, a multistage flash unit and a vertical tube evaporator. The proposed next step is the construction of a pilot plant capable of processing 200,000 to 500,000 gallons per day. (Orr-FIRL)
W75-04430

ROCESS AND APPARATUS FOR SEPARATNG WATER FROM NON-VOLATILE OLUTES,
. S. Smith, Jr.
.S. Patent No 3,856,631, 10 p, 5 fig, 13 ref; Offial Gazette of the United States Patent Office, ol 929, No 4, p 1687, December 24, 1974.

escriptors: *Patents, *Distillation, Evaporation, *Electric powerplants, Fresh ater, Sea water, Separation techniques, Desalination.
dentifiers: *Heat of condensation, Immiscible quids, Waste heat.

he apparatus and method for distilling aqueous olutions, especially saline water, for the purpose producing fresh water are disclosed. A heat ansfer medium in the form of a lower boiling imiscible liquid is employed in a manner to give up latent heat of condensation directly to the soluon. The resulting condensate is re-evaporated by at from the resulting fresh water. In this process e immiscible liquid may be denser than, but eferably lighter than water. This method and apratus can efficiently utilize the waste heat of a eam-electric power plant and is able to work tween temperature limits of, for example, 60 g. and 180 deg F. (Sinha-OEIS)
75-04451

ERTICAL, MULTISTAGE-FLASH, FALLING LM COLUMN FOR DISTILLING BRINE,
ciete General d'Entreprises, Paris (France). signee).
Barckhausen.
S. Patent No 3,859,173, 5 p, 8 fig, 8 ref; Official zette of the United States Patent Office, Vol), No 1, p 421, January 7, 1975.

scriptors: *Patents, *Distillation, *Flash distilon, *Desalination, *Waste water treatment, Equipment, Brine, Potable water, Prestressed concrete, Sea water.
Identifiers: Multistage-flash distillation.

A vertical distilling column is made of prestressed concrete. It is comprised of a vertical cylindrical casing, condensing means in its central part and a series of horizontal floors limiting, between them, a number of successive distilling chambers. Each chamber is characterized by the flow in a thin sheet of the brine to be evaporated on its vertical inside wall. Distilled liquid is conveyed on the vertical tubes of the condenser which is situated towards the center and on which are fixed the successive floating floors. The floors have cylindrical symmetry and are installed floating inside the casing. They have two opposite slopes, the one directing the brine towards the periphery, and the other directing the distilled liquid towards the center. Steam-tight sealing of the enclosure is necessary. The prestress necessary for ensuring fluid-tight sealing of the concrete is ensured in the vertical direction by the inside pressure, and in the horizontal direction by outside overpressure and by peripheral cables. (Sinha-OEIS)
W75-04459

METHOD AND APPARATUS FOR PRODUCING A DISTILLATE,
Fried-Krupp G.m.b.H., Essen (West Germany). (assignee)
K. D. Peter.
U.S. Patent No 3,856,632, 5 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1687, December 24, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Flash distillation, Brackish water, Sea water, Water treatment.
Identifiers: Multi-stage flash evaporator, Flash evaporators.

Improvements in a method of distilling raw water in a multistage flash evaporation system are described. The method includes preheating the raw water in condensers of the flash evaporator, partially evaporating the heated water in a plurality of evaporators connected to the flash evaporator, condensing the evaporated water in condensers connected to each evaporator stage, collecting the condensed vapor from each evaporator stage, removing inert gases from the evaporator stages by means of a vacuum pump (a water or steam ejector), and adding additional heat energy to the raw water by means of a tube-shell heat exchanger. The raw water is conducted from the condensers of the flash evaporator into at least one vertical tube evaporator to partially evaporate it by the addition of heat provided by a heating medium, which is the produced vapor of the vertical tube evaporator that has been removed, compressed to a higher temperature, and returned to the vertical tube evaporator by a heat pump means, to transfer its latent heat to the raw water. The condensed vapor is then passed as a distillate from the vertical tube evaporator to the flash evaporator to transfer part of its liquid heat by stepwise evaporation to the raw water being heated in the condensers of the flash evaporator. The distillate is collected in the trough of the respective stages of the flash evaporator and mixed with distillate from the vertical tube evaporator and removed from the last stage of the flash evaporator. (Sinha-OEIS)
W75-04465

HYDRATE FORMING IN WATER DESALINATION,
Institute of Gas Technology, Chicago, Ill. (assignee)
D. L. Klass.
U.S. Patent No 3,856,492, p 7, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1651-52, December 24, 1974.

Descriptors: *Patents, *Desalination, *Hydration, Sea water, Potable water, Brines, Heat exchangers, Specific gravity, Gases.
Identifiers: *Heat of hydration, *Ice formation.

A process for water desalinization compirses the following steps: commingling in a hydrate formation zone at a temperature above ice formation, brine and a heat-exchange liquid which is substantially immiscible with brine and water, has a specific gravity different from the specific gravities of brine, water and the range there between, and has a dissolved gaseous hydrating agent therein. The hydrating agent is capable of forming a solid hydrate having a specific gravity on the same side of both water and brine as the specific gravity of the heat-exchange liquid and is substantially insoluble in the heat-exchange liquid. The temperature, pressure or a combination of them is adjusted to form a solid hydrate. A portion of the heat of hydration is absorbed by the heat-exchange liquid. Concentrated brine is withdrawn from the hydrate formation zone. The heat-exchange liquid and solid hydrate are withdrawn from the hydrate formation zone to a hydrate decomposition zone. The solid hydrate, aided by the heat of hydration, is transferred directly from the heat-exchange liquid in the decomposition zone, into water and gaseous hydrating agent. The heat-exchange liquid containing gaseous hydrating agent is separated from desalinized water. (Sinha-OEIS)
W75-04466

UNIVERSAL DESIGN OF A 2.5 MGD UNIVERSAL DESALTING PLANT, REVISED: VOLUME 1.
Burns and Roe, Inc., Oradell, N.J.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 920, $7.25 paper copy, $2.25 microfiche. Revised 1974 edition of June 1969, Volume I - Report (193p); Volume II - User's Manual - Part I (92p); Volume III - User's Manual - Part II (144p); Volume IV - Bidding Specification (101p); and Volume V - Technical Specification (288p).

Descriptors: *Desalination plants, Desalination processes, Design criteria, *Flash distillation, *Specifications, *Design standards, *Evaporators, Potable water, Water management(Applied), Treatment facilities, *Fabrication, Water treatment, Waste water treatment.

Design criteria and associated prototype specifications and drawings provide engineers skilled in the water management field with sufficient detailed engineering information to specify, purchase and install a multi-stage flash desalination plant in any location which will produce 2.5 MGD of potable water. Sufficient guidance in operation and startup is provided so that skilled engineers can successfully operate such a plant. The work is limited to the design, specification and cost analysis of the desalting plant only. The large variety of saline water sources, heat sources an distribution arrangements possible precludes their consideration, and so the desalting plant design must be skillfully integrated into the complex by engineers who represent the sponsoring public authority. The revised technical specifications and the user's manual provide information in complete detail to select, specify, purchase and install the desalting plant. The drawings provide all the information needed by steel fabricators to construct the evaporator. The evaporator will deliver the desired potable water output provided additional skills, such as tube rolling, tube sheet machining and other similar work, are available in certain specialized areas. Available from the National Technical Information Service, Springfield, Va. 22161 as PB-239 919-SET, $29.00. Also available as PB-239 920(Vol. 1, $7.25); PB-239 921(Vol. 2, $5.25); PB-239 922(Vol. 3, $7.50); PB-239 923(Vol. 4, $5.25); PB-239 924(Vol. 5, $8.75). Each volume available in microfiche at $2.25 each.
W75-04850

3B. Water Yield Improvement

CONTROL OF GAMBEL OAK WITH THREE HERBICIDES,
Utah State Univ., Logan. Dept. of Plant Science.
G. A. Van Epps.
Journal of Range Management, Vol 27, No 4, July 1974. p 297-301, 3 fig, 1 tab, 13 ref.

Descriptors: *Water yield improvement, Large watersheds, Soil treatment, Herbicides, Oak trees, Ranges, Range grasses, Foliar application, Soil types, Soil water, Utah, Water yield, 2-4-D, 2-4-5-T, Defoliants.
Identifiers: Gambel oak, Picloram, Fenuron.

Prior studies have indicated that Gambel oak (Aqercus gambellii Nutt.) is a species found on watersheds in the Western United States that is a high user of water. Eradication of this species on important watersheds may increase water yields and improve the value of forestry, grazing, and recreation. Three herbicides were applied to Gambel oak on study sites on various exposures and soil types in central Utah. Picloram, fenuron, and phenoxy compounds were applied at various rates and mixtures as soil treatments and foliar treatments in order to attain complete kill of the plant. Fenuron was the only reliable chemical that killed Gambel oak at rates used, but also caused sterilization of the soil and consequent elimination of desirable plants. Foliar spraying with a mixture of picloram and the 2,4-D and 2.4,5-T compounds showed promise in killing Gambel oak crowns. This would open up the rangeland for additional grazing but would contribute little to increased water yields on the watershed. Additional studies are needed to find effective techniques that are more selective in controlling Gambel oak. (Mastic-Arizona)
W75-04366

MANAGEMENT OF PHREATOPHYTE AND RIPARIAN VEGETATION FOR MAXIMUM MULTIPLE USE VALUES,
Forest Service (USDA), Port Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
J. S. Horton, and C. J. Campbell.
Research Paper RM-117, 23 p, April, 1974. 1 tab, 6 fig, 91 ref.

Descriptors: *Phreatophytes, *Southwest U.S., Riparian water loss, Floodplains, Evapotranspiration, *Groundwater, *Evapotranspiration control, Riparian plants, Riparian rights, Flood control, Arroyos, Recreation, Antitranspirants, Perennail streams, Water table, Cottonwoods, Mesquite, Wildlife, Grazing, Multiple purpose, Floodplain zoning, Watershed management.

Information about the relations of vegetation along water courses in the southwestern United States, and impacts on resource values of vegetation management to reduce evapotranspiration is presented. Literature is reviewed on measurement and evaluation of water losses, ecological relationships, usage of phreatophyte areas, and methods for control of phreatophytes. Approaches to floodplain management are discussed, based on floodplain zones which are defined primarily by water table depth, elevation, and tree species. Optimum management requires consideration of both environmental factors and economic needs of the area. Only rarely are there phreatophyte areas in the Southwest that would be best managed by complete vegetation conservation. (Mastic-Arizona)
W75-04379

WOOD BORING INSECT INFESTATIONS IN RELATION TO MESQUITE CONTROL PRACTICES,
Texas Tech Univ., Lubbock. Dept of Range and Wildlife Management.
D. N. Ueckert, and H. A. Wright.
Journal of Range Management, Vol 27, No 5, p 383-386, September, 1974. 4 fig, 2 tab, 13 ref.

Descriptors: *Insects, *Mesquite, *Water yield improvement, *Burning, 2-4-5-T, *Range management, Forage grasses, Texas, Brush control, Moisture content.
Identifiers: *Wood boring insects, Girdling.

Mesquite trees that are infested by wood boring insects are much easier to burn down than uninfested trees. Six different methods of killing mesquite were studied to determine which treatments enhance borer activity. In addition to the control, treatments included aerial spray of 2,4,5-T, and girdling. Basal spraying with diesel oil at 2,4,5-T and girdling resulted in the most significant increase in wood borer activity. Basal spraying with diesel oil and burning resulted in intermediate borer activity; felled trees produced slight activity; and insignificant activity was found in trees sprayed with 2,4,5-T and the control. The use of mesquite control practices which enhance wood borer activity followed by prescribed burning can produce a significant increase in forage production and quality. (Mastic-Arizona)
W75-04380

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
National Academy of Sciences, Washington, D.C. 1974. 153 p, 77 fig, 16 chapters, Arabic, French, and Spanish summaries.

Descriptors: *Water harvesting, *Water conservation, *Arid lands, *Irrigation programs, *Irrigation efficiency, Rainfall stimulation, Transpiration control, Evaporation control, Groundwater mining, Artificial recharge, Irrigation, Irrigation water, Water reuse, Percolation, Technology, Desalination, Runoff, Wells, Water wells, Dug wells, Remote sensing, Saline water.
Identifiers: Runoff farming.

Arid lands have an underexploited agricultural potential. This report presents a number of promising technologies and research opportunities which may play a role in supplying needed water. Two approaches are considered: increasing the supply of usable water, and reducing the demand for water. Technologies discussed include: rainwater harvesting, runoff agriculture, irrigation with saline water, reuse of water, wells, other sources such as desalting, weather modification and groundwater mining, evaporation reduction, seepage loss, trickle irrigation, innovative irrigation methods, reduction of percolation losses, transpiration reduction, use of more water-efficient plants for agriculture, controlled-environment agriculture, and some promising water conservation techniques such as artificial recharge of groundwater. (Mastic-Arizona)
W75-04508

WATER RIGHTS AND ASSESSMENTS, (PROPOSALS INVOLVING ANTARCTIC ICEBERGS FOR THE COLORADO RIVER BASIN, CALIFORNIA, MEXICO AND OTHER ARID LANDS),
J. L. Hult.
(Rand Corporation), p 5271, July, 1974. 14 p, 5 ref.

Descriptors: *Water resources development, *Water supply development, *Arid lands, *Icebergs, Water rights, Water allocation(Policy), Water quality, Water law, Cost allocation, Antarctic, Water costs.

Some principles are presented with the purpose of proposing solutions to water rights and cost allocation problems associated with the use of Antarctic icebergs as a fresh water resource in the Colorado River Basin, California, Mexico, and other arid lands. The adoption of the proposed principles would provide unrestricted nondiscriminitory access to water anywhere and would therefore facilitate the initiation and evolution of water use for the greatest world-wide economic benefit. It would relieve the unfair competition and subsidy from established water users, recognize the value of water quality, and offer opportunities to improve water quality. The principles offered would encourage the development and implementation of new technologies and enable the employment of the world's largest reserves of fresh water, the Antarctic icebergs which would otherwise continually waste away. (Mastic-Arizona)
W75-04610

INADVERTENT RAIN MODIFICATION AS INDICATED BY SURFACE RAINCELLS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W75-04703

AN ASSESSMENT OF WARM FOG - NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W75-04717

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM - BRIDGER RANGE CLOUD SEEDING EXPERIMENT,
Montana State University, Bozeman. Dept. of Earth Sciences.
A. B. Super, J. A. Heimbach, J. T. McPartland, and V. L. Mitchell.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-234 012, $10.50 in paper copy, $2.25 in microfiche. REC-14-06-D-6798, p 416, April 15, 1974. 15 fig, 54 tab, 32 ref, 3 append. Contract No 14-06-D-6798.

Descriptors: *Cloud seeding, *Artificial precipitation, Artificial storms, Precipitation(Atmospheric), Meteorology, Precipitation gages, Radiosondes, Snow management, Storms, Weather, *Weather modification, Winds, Meteorology, Clouds, Silver iodide, Topography, Snow packs, Water equivalent, Snowfall, Orography, *Montana, Water resources.
Identifiers: Silver iodide generators, *Bridger Range(Mont).

Discussed were winter cloud seeding experiments conducted in the Bridger Range of southwestern Montana, and the analysis of a three-winter radomized seeding experiment. Also considered was airborne plume tracing of silver iodide over and downwind of the Bridger Range, confirming earlier work indicating that tareting was usually successful with westerly flow. Several studies discussed support the statistical analysis of the randomized cloud seeding experiment. These include a stepwise multiple regression analysis relating nonseeded precipitation to upper air parameters. Cloud thickness was most closely related to snowfall of the parameters considered in this analysis. Snowfall amounts and frequency were greatest during nighttime at mountain stations. Pooling daytime and night-time 6-hour precipitation totals to increase sample size for statistical analysis was not valid. Attempts to utilize a target-control analysis were unseccessful due primarily to lack of a control gage adequate for this type of analysis. Application of nonparametric statistical tests to 6-hour precipitation totals did not indicate seeding effects. (Jones-ISWS)
W75-04721

ROUNDWATER PUMPAGE IN NORTHERN LINOIS, 1960-1970,
inois State Water Survey, Urbana.
r primary bibliographic entry see Field 4B.
75-04727

THORIZING THE SECRETARY OF THE IN-RIOR TO CONSTRUCT, OPERATE, AND AINTAIN THE EAST GREENACRES UNIT, THDRUM PRAIRIE PROJECT, IDAHO, AND R OTHER PURPOSES.
mmittee on Interior and Insular Affairs (U. S. use).
r primary bibliographic entry see Field 6E.
5-04787

C. Use Of Water Of Impaired Quality

E WORLD'S LARGEST DESALTING COM-EX--A REPORT ON TWENTY YEARS EX-RIENCE,
primary bibliographic entry see Field 3A.
5-04422

ROGEN MASS BALANCE DETERMINA-N FOR SIMULATED WASTEWATER ND-SPREADING OPERATIONS,
as Tech Univ., Lubbock. Water Resources ter.
primary bibliographic entry see Field 5D.
5-04449

ICON CONTENT OF WHEAT HUSKS IN LATION TO WATER TRANSPIRED,
mmonwealth Scientific and Industrial Research anization, Glen Osmand (Australia). Div. of s.
primary bibliographic entry see Field 2D.
-04484

RE WATER FOR ARID LANDS, PROMIS-TECHNOLOGIES AND RESEARCH OP-TUNITIES.
Hoc panel of the Advisory Committee on nology Innovation, Board on Science and nology for International Development, Com-ion on International Relations.
primary bibliographic entry see Field 3B.
-04508

BILIZATION OF AEOLIAN LANDS IN DI ARABIA'S AL HASA OASIS,
am Univ. (England).
Stevens.
al of Soil and Water Conservation, Vol 29, May-June 1974. p 129-133 4 fig, 3 ref.

riptors: *Aeolian soils, *Soil stabilization, dbreaks, *Tamarisk, Soil physical properties, e soils, Saline soil treatment, Water, Dunes, tion, Dune sands, Reclamation.
ifiers: *Saudi Arabia, Oases.

mation on the cultivated portion of the oasis een accomplished through soil stabilization iques and planting of Tamarix aphylla, which elected because it requires no irrigation after or four years due to its deep rooting system. ast growing and can be propagated success-with cuttings. The species can withstand high and wide temperature extremes; and is nt to drought and to the use of saline water. is supplied by artesian flow which appears merous springs. In addition to stabilizing g dunes, these projects provide secondary its including: a small timber industry, recrea-acilities, improved microclimate, especially duction of wind speed, and a reduction of in-ourne deseases due to elemination of many swampy areas. (Mastic-Arizona)
4512

DRAINAGE FOR AGRICULTURE,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3F.
W75-04537

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 3F.
W75-04538

3D. Conservation In Domestic and Municipal Use

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04352

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4D.
W75-04362

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4A.
W75-04440

A METHOD FOR DETERMINING PEAK FLOWS AND DETENTION STORAGE REQUIREMENTS IN URBANIZING AREAS.
Soil Conservation Service, Indianapolis, Ind.
For primary bibliographic entry see Field 4A.
W75-04694

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
For primary bibliographic entry see Field 7C.
W75-04726

THE URBAN REGION PLAN: SAINT JOHN, (NEW BRUNSWICK), URBAN REGION IMPACT STUDY.
Proctor, Redfern, Bousfield and Bacon, Saint John (New Brunswick).
For primary bibliographic entry see Field 6B.
W75-04756

A COMPENDIUM OF INFORMATION, (THE METROPOLITAN TORONTO AND REGION CONSERVATION AUTHORITY).
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario).
December 31, 1972. 102 p, 1 map, 49 ref.

Descriptors: Conservation, *Water conservation, *Flood control, *Land management, *Resources development, *Canada, Fish conservation, Wildlife conservation, Forest management, Land use, Lake Ontario, *Comprehensive planning.
Identifiers: *Toronto(Canada).

The Authority, created by the national government to develop a comprehensive program of resource management, has jurisdiction over 1126 square miles, an area defined by the watersheds of all streams entering Lake Ontario between Etobicoke and Carruthers Creek. Its 55 appointed members formulate and administer programs through 10 boards which deal with various conservation areas. Much of the enforcement depends on funding by the government. Accomplishments and goals are outlined for: flood control and water conservation; reforestation and land used including fish and wildlife management; recreation program; a water development program; land acquisition, acquisition and development of Niagara escarpment, information and education, historical planning; and ancillary conservation measures. The financial foundation of the Authority and its relationship with the different levels of government are discussed. The Metropolitan Toronto and Region Waterfront Plan 1972-76 undertaken by the Authority, prepared on the basis of $4 million per year expenditure for 5 years, is now operative and involves acquisition and development of sites for land fills, parks, conservation areas. The policy of the Authority concerning the planning, development and management of the waterfront of Lake Ontario is given. All of the proposed projects will be carried out within the context of planning and land use controls in force which, under the Planning Act, are administered by the municipalities in which the works are to be located. (Salzman-North Carolina)
W75-04760

LIVING CITY, (MELBOURNE, AUSTRALIA, REVIEW OF OPERATIONS, 1972-73).
Melbourne and Metropolitan Board of Works, (Australia).
Report No 14, Spring/Summer 1973. 24 p, 9 fig, photos.

Descriptors: Water resources, *Planning, Forest watersheds, Runoff, *Water supply, *Water storage, *Sewers, *Reservoirs, Expenditures, Hydrology, Electricity, Electrolysis, Corrosion, Preservation, Dams, Environment, Sites, Administration, Efficiency, Capital costs, Budgeting, *Australia, Water yield improvement.
Identifiers: *Melbourne(Aust), Water retriculation, Policy analysis, Creeks, Cardinia Reservoir(Australia), Renewal.

Eight articles relating to water resources in the Melbourne area are summarized: (1) In order to evaluate the present policy of closed or single use catchments for managing the limited areas which yield water, the forestry staff of the Melbourne and Metropolitan Board of Works (MMBW) analyzes runoff from different types of forest areas, and conducts forest hydrology research to study vegetation-water relationships to determine whether a multiple use policy can be safely adopted without detriment to Melbourne's water supply. (2) Stray electricity from train and tram services creats a problem for water supply engineers due to electro-chemical corrosion of pipes of the water reticulation system. (3) A community clean-up group, coordinated by MMBW is working to change the creeks which have become rubbish choked eyesores back into parkland areas and storm water channels. (4) The Cardinia Reservoir experience provides insight into the planning that goes into the siting of a water storage dam, and once built, how the new environment is shaped. Important factors in site selection are reliable flow of water, topography, impermeable underlying rocks and soils, and availability of construction materials on site. (5) Renewal of original 80-year old sewers presented a problem. (6) The history of Melbourne's first reservoir, conceived by engineer James Blackburn and completed in 1857 is presented. (7) MMBW moved to new head office for 2,300 staff in August 1973, facilitating more efficient central administration and extended use of the computer. (8) Major expenditure in capital works program for 1973/74 is water supply augmentation and major sewerage works. Also included is a review of 1972/73 operations wherein capital expenditures exceeded $100 million. (Diefendorf-North Carolina)
W75-04762

HYDRAULIC ANALYSIS OF WINNIPEG SUMP INLETS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04804

3E. Conservation In Industry

LIGNIN SEPARATION BY CONTINUOUS ION FLOTATION: INVESTIGATION OF PHYSICAL OPERATIONAL PARAMETERS,
Rutgers - the State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 5D.
W75-04476

WASTEWATER CHARACTERIZATION FOR THE SPECIALTY FOOD INDUSTRY,
American Frozen Food Inst., Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-04560

SEPARATION, DEWATERING AND DISPOSAL OF SUGARBEET TRANSPORT WATER SOLIDS, (PHASE I),
American Crystal Sugar Co., Denver, Colo.
For primary bibliographic entry see Field 5D.
W75-04565

WATER RECYCLE/REUSE POSSIBILITIES: POWER PLANT BOILER AND COOLING SYSTEMS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W75-04566

THE DESIGN AND PROMOTION OF A SCHEME USING MIXED WATER FROM THE RIVERS ANCHOLME, WITHAM AND TRENT FOR INDUSTRIAL SUPPLY TO HUMBERSIDE,
Rofe, Kennard and Lapworth, London(England).
M. Lindley, F. J. Bowyer, and H. S. Hawkins.
Journal of the Institution of Water Engineers, Vol 28, No 5, p 272-298, July, 1974. 3 fig, 7 ref.

Descriptors: *Water importing, *Water demand, *Water supply, *Water management(Applied), *Water conveyance, Water utilization, Water conservation, Water delivery, Economics, Rivers, Bodies of water, Inland waterways, Watersheds, Management, Planning, Economic impact, Industrial plants, *Industrial water, Costs.
Identifiers: *Inter-river transfer works, North Lincolnshire(Eng), River Ancholme(Eng), River Witham(Eng), River Trent(Eng), National Water Plan(Eng), New towns, Humberside(Eng).

To accommodate rising water demand for industrial purposes, a major inter-river transfer scheme involving two river authorities and the North Lindsey Water Board in England was devised. Transfers are first made from the river Witham, and then from the river Trent via the river Witham; this water transfers to the river Ancholme in North Lindsey. Water quality concerned industrialists, who need water for demineralization and cooling processes. The proposed source change required changes in the newly-constructed treatment plant, increasing costs for chemicals and water. To meet opposition by industrialists, the Water Board had to initiate the distribution system ahead of the intended schedule. A new town and rapid industrial development following construction of the Humber Bridge were forecast for the area by the National Water Plan, so flexibility in the scheme is important if it was to coincide with future water development. This scheme may be the forerunner for other similar programs, and lessons learned in its planning and operation should be valuable to future planners. Little was known, for example, about what effect the quality and cost of the supply would have on water demand. (Grden-North Carolina)
W75-04764

WASTEWATER ANALYSIS AND ITS RELATION TO COMPANY PROFITS,
Harnish and Lookup, Associates, Newark, N.Y.
For primary bibliographic entry see Field 5A.
W75-04817

3F. Conservation In Agriculture

USE OF LEAF RESISTANCE FOR PREDICTING IRRIGATION SCHEDULING,
Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
A. Chen.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 342, $4.25 in paper copy, $2.25 in microfiche. Kansas Water Resources Research Institute, Master's Thesis, 56 p, 1972. 21 fig, 2 tab, 3 append 42 ref. OWRT A-044-KAN(1).

Descriptors: *Soil water, *Sorghum, *Irrigation, *Sprinkler irrigation, *Soil-water-plant relationships, Leaves, Soil moisture, Tensiometers, Transpiration, Water requirements, Meteorological data.
Identifiers: Soil water potential, Leaf diffusion porometer.

Objectives of this study were to find the characteristics of leaf resistance in sorghum plants, to develop a relationship between soil water potential and leaf resistance, and to evaluate the use of leaf resistance as a criterion for irrigation scheduling. Leaf resistance was reassured both on field and potted plants by a leaf diffusion porometer. resistance was found to be high at the base of the leaf and low at the tip. The leaf resistance readings taken during the growing season were found to correspond closely with the soil water potential at 45 cm of depth. From potted plants measurements, a rapid increase in average leaf resistance occurred at a soil water potential of -5 to -6 bars. This corresponds to 50 percent of available soil water, the level at which irrigation should be initiated to provide adequate moisture for optimum grain growth. (Mastic-Arizona)
W75-04351

EFFECTS OF AGRICULTURAL ACREAGE REDUCTION ON WATER AVAILABILITY AND SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado Univ., Boulder. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-04368

IRRIGATION, ROW WIDTH, AND PLANT POPULATION IN RELATION TO GROWTH CHARACTERISTICS OF TWO SOYBEAN VARIETIES,
Auburn Univ., Ala. Dept. of Agronomy and Soils.
B. D. Doss, and D. L. Thurlow.
Agronomy Journal, Vol 66, No 5, p 620-623, September-October, 1974. 5 tab, 2 fig, 8 refs.

Descriptors: *Irrigation, *Plant populations, *Alabama, *Crop production, Soil water, Soybeans, Stress, Regime, Plant growth, Field capacity, Southeast U.S.

Water stress at critical growth periods appears to be one of the most frequent limiting factors in soybean production. The effects of soil water, row width, and plant population on water use, growth rate, and bean yields of two soybean varieties were examined in central Alabama. Irrigation and bean variety influenced bean yields more than row width or plant population which showed little influence. Water use rates by soybeans were affected more by soil water regime than high irrigation amounts. Soybean plants appear to recover quickly even after showing severe signs of water stress by wilting or slow growth rate. This characteristic reduces the chances of a high response to irrigation. It is doubtful that irrigation of soybeans would be economical in most years. (Mastic-Arizona)
W75-04369

PATTERN OF WATER AVAILABILITY AND WATER REQUIREMENT FOR GRAIN SORGHUM PRODUCTION AT SAMARU, NIGERIA,
Institute for Agricultural Research, Zaria(Nigeria).
J. Kowal, and D. J. Andrews.
Trop Agric. Vol 50, No 2, p 89-100. 1973 Illus.
Identifiers: Climates, *Grain sorghum, Growth rates, Hybrids, Irrigation, *Nigeria(Samaru), Rainfall, Sensitivity, Soils, Sorghum-bicolor, Temperature, *Crop production, *Water requirements, *Water availability.

The performance of rain-fed sorghum (S. bicolor (Moench)) in a dry sub-humid region of northern Nigeria is analyzed in terms of adaptability to climate with particular reference to crop water availability. The water requirement of a 'Short Kaura' sorghum crop is about 700 mm. The average annual rainfall of 1100 mm is distributed over 140 to 160 days. The water storage capacity of the soil is adequate to provide the water requirements of sorghum after the end of the rains and to extend the growing season by about 60 days. The pattern of the crop water requirement is then well matched to the pattern of water availability for rain-fed sorghum production. The indigenous long season sorghum varieties are photosensitive and their heading coincides with the end of the rains when grain formation is dependent on the reserves of stored soil moisture. These varieties have a low grain yield potential and the period of vegetative growth is too long for efficient grain production a high levels of fertility. High growth rates during the 1st 9 wk suggest that the crop could be used for forage production. Non-photosensitive exotic sorghums (i.e., American hybrids and combine varieties) have short seasons relative to Nigerian varieties and give high grain yields, but a quality unacceptable for human consumption in Nigeria. Sown at the beginning of the rains, the crop ma tures at the peak of the rainy period rendering har vest difficult. Because of wet harvest condition the grain quality is poor. Late sown crops are dif ficult to establish; the yields are lower than those from early sowings. Production of local sorghum under irrigation during the dry season is not possible at Samaru because of low temperatures.
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W75-04384

CHANGES IN TRANSPIRATION, NET CARBON DIOXIDE ASSIMILATION AND LEAF WATER POTENTIAL RESULTING FROM APPLICATION OF HYDROSTATIC PRESSURE TO ROOTS OF INTACT PEPPER PLANTS,
Connecticut Univ., Storrs. Dept. of Plant Science
B. E. Janes, and G. W. Gee.
Physiol Plant, Vol 28, No 2, p 201-208, 1973, Illus
Identifiers: Aperture, Capsicum-annuum, *Carbon dioxide, Flow, Hydrostatic pressure, Light, Mesophyll, *Pepper plants, Roots, Stomatal, *Transpiration, *Leaf water potential, Absorption.

Hydrostatic pressures varying from 0-6.0 bar were applied to roots of intact Capsicum annuum L. 'California Wonder' plants growing in nutrient solution and the rates of transpiration. and net CO2 assimilation, apparent compensation point and leaf water potential measured. Increasing the pressure on the roots of plants with roots in solution with either -0.5 or -5.0 bar osmotic potential with 1 bar increments resulted in a decrease in transpiration. With the application of 1 or 2 bars pressure the rate of transpiration returned to near

or above the original rate. An application of 3 or 4 ar pressure reduced the rate of transpiration of all lants. The transpiration of plants with roots in olution with -0.5 bar osmotic potential remained t the reduced rate for as long as these pressures ere maintained. The transpiration of plants with oots in solution with -5.0 bar was only temporarily uppressed at these pressures. Changing the aplied pressure from 3 or 4 bar to 0 resulted in a apid increase in transpiration which lasted approximately 15 min. This was followed by a ecrease in transpiration to a rate lower than bere the pressure was applied. The pattern of esponse was similar for plants at low or high light tensity or at normal or low CO2 concentrations. hen leaf diffusive resistance was 6.0 s cm to the inus 1 or greater, changes in net CO2 assimilaon were similar to those of transpiration. The arent CO2 compensation point increased as presre was applied and decreased with a release in essure. Leaf water potential increased with an crease in pressure and decreased with a decrease pressure.--Copyright 1974, Biological Abstracts, c.
75-04399

FECTIVENESS OF TWO NITRIFICATION HIBITORS FOR ANHYDROUS AMMONIA NDER IRRIGATED AND DRYLAND CONDIONS,
ricultural Research Service, Pullman, Wash.
r primary bibliographic entry see Field 5G.
75-04425

NCH-DRIVEN IRRIGATION APPARATUS,
I2O, Inc., La Grande, Dreg. (assignee).
Courtright.
S. Patent No 3,848,805, 6 p, 7 fig, 4 ref; Official zette of the United States Patent Office, Vol , No 3, p 1070, November 19, 1974.

scriptors: *Patents, *Irrigation systems, *Water ribution(Applied), Equipment, Design, Applion equipment.
ntifiers: Winch-driven apparatus.

irrigation apparatus comprises: a horizontal ne provided with supporting wheels; an erect, er delivery structure mounted to the frame; a drive line including a speed-reduction transsion having input and output drives. A watersure-to-revolving-mechanical-power conver has a water inlet structure constructed for pling to an external water-carrying hose, a lving output drive coupled to the transmission t drive, and a fluid outlet coupled to the fluid t of the water delivery structure. A winch n journaled to the frame has an input drive pled to the output drive of the transmission. winch cable has its inner end upon the winch n and the outer end constructed to extend for- of the frame to be anchored to an external ct. A stop abutment on the cable simultaney brakes the wheels and also the revolving outdrive of the converter. (Sinha-OEIS)
-04452

ECT OF QUALITIES OF IRRIGATION TER AND FERTILIZERS ON SOIL PROTIES, YIELD AND NUTRIENT UPTAKE BY CAT,
N. Coll. of Agriculture, Jobner (India). Dept. ricultural Chemistry and Soil Science.
l, and K. S. Singh.
n J Agric Sci, Vol 43, No 4, p 392-400, 1973.

riptors: Alkalinity, *Fertilizers, *Irrigation , *Nutrients, Salinity, *Soil properties, um-aestivum, Water quality, *Wheat yield, rption.

d experiment was conducted for 2 yr with 3 of water and 3 fertilizer levels on the same of loamy-sand soil with similar layout to determine the cumulative effect of poor quality or irrigation waters on wheat (Triticum aestivum L.). In both the years 'RS 3-1' cultivar was grown. At the end of the experiment, the ECe of the soil was less than the electrical conductivity (EC) of the irrigation water. After the rainy season, there was a drastic reduction in the ECe (EC of saturation extract) values of the soil. The SAR, pH and ESP (exchangeable Na percentage) of the soil at all depths increased with an increase in the SAR of the irrigation water. After the rainy season, there was a marked reduction in the SAR, ESP, pH and hydraulic conductivity values of the soil at all depths. The main effects of fertilizer doses on soil properties were significantly not different in both the years at all depths. The grain and straw yields and the uptake of N, P, K, Ca and Mg decreased with a rise in the EC and SAR of waters, but they increased with an increase in the level of fertilizers. The response of fertilizers on yields was negated when the salinity and alkalinity of the waters were excessively high (EC 7.0 mmhos/cm, SAR 25.97). Fertilization would be beneficial if the EC and SAR of water are up to 3.45 mmhos/cm and 16.73, respectively.--Copyright 1974, Biological Abstracts, Inc.
W75-04482

SUSCEPTIBILITY OF GRAIN SORGHUM TO WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
R. B. Lewis, E. A. Hiler, and W. R. Jordan.
Argon J, Vol 66, No 4, p 589-591, 1974.
Identifiers: *Grain sorghum, *Growth rates, Irrigation, *Soil water deficit, Sorghum-bicolor, Susceptibility, *Water loss, Crop production, Vegetation.

Susceptibilities of grain sorghum (Sorghum bicolor (L.) Moench, cv. 'Oro') to a moderately severe soil water deficit were determined. The crop susceptibility was expressed as the fractional reduction in yield caused by a given soil-water potential at a particular growth stage as compared with a well-watered control. The soil-water potential was allowed to drop to -12 to -13 bars during one stage of growth only, while being maintained above -0.7 bar during the remainder of the growing season. This level of soil-water deficit resulted in yield reductions of 17, 34 and 10% when the deficit occurred during the late vegetative to boot stage, the boot through bloom stage, and the milk through soft dough state, respectively. These values were compared with values calculated from data reported in the literature and discussed in terms of applicability in irrigation timing.--Copyright 1974, Biological Abstracts, Inc.
W75-04483

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
For primary bibliographic entry see Field 2G.
W75-04507

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5G.
W75-04526

THE DESIGN OF A LIVESTOCK WATER DISTRIBUTION SYSTEM--LARGE SCALE,
Nebraska Univ., Lincoln. Agricultural Experment Station.
H. R. Mulliner.
Transactions of the ASAE, American Society of Agricultural Engineering. Vol 17, No 3, p 436-439, May-June 1974. 2 fig, 3 tab, 4 ref.

Descriptors: *Water distribution(applied), *Design, *Planning, Livestock, Cost analysis, Economics, Engineering, Feasibility, Flexibility, Sites, Inspection, Water demand, Water requirements, Piping, Size, Pumping, Equipment, Materials, Construction, Operation and maintenance, Installation, Evaluation, Domestic water, Alternative planning, *Nebraska, *Distrubution systems.

The design procedure used to develop a large-scale livestock water distribution system for the U.S. Meat Animal Research Center in Nebraska is summarized. The format was general to allow system flexibility; however, minimums were considered to safeguard the final system operation and insure adequate sanitation. This format was divided into four phases. Phase 1 was general, wherein objectives were defined and available facilities and their requirements were recorded on a detailed map. Phase 2 was a specific site inspection; data were collected, capacities of existing facilities were determined, domestic water demands were estimated, fire protection and soil characteristics were examined, and alternative water system layouts were considered. Phase 3 was a preliminary report summarizing findings from Phase 2 and considering system design factors, such as: water demand and the demand interval; water delivery at design rate; peak water demand rates, pipe size, and pumping requirements; water quality standards; and type of piping and installation method. A cost analysis of equipment and pipes was completed to evaluate the alternative systems prior to recommending a system design to the Center. Phase 4 was the final engineering report, including all information pertinent to planning and installing the system. Installation-, operation-, and maintenance-flexibility were found to be the most important design considerations. Initial depreciation costs were considered secondary to functional operation of a water distribution system. (Bell-Cornell)
W75-04527

DEMAND FOR IRRIGATION: A CASE STUDY OF GOVERNMENT TUBE-WELLS IN UTTAR PRADESH,
Institute of Economic Growth, Delhi (India).
For primary bibliographic entry see Field 6D.
W75-04529

ADOPTION OF NETWORK TECHNIQUES IN THE PLANNING AND EXECUTION OF IRRIGATION AND POWER PROJECTS,
Hindustan Construction Col. Ltd., Bombay (India).
K. M. Kulkarni.
Irrigation and Power, Vol 30, No 3, p 273-288, July 1973. 6 fig, 4 tab.

Descriptors: *Irrigation, *Projects, *Planning, *Management, *Critical path method, *Scheduling, Rivers, Diversion, Diversion dams, Hydroelectric power, Construction, Computers, Costs, Mathematical models, Systems analysis, *Networks, Risks.
Identifiers: Network techniques, Project control, Site control, Power projects, Multiobjective.

'PERT' (Program Evaluation and Review Technique) and 'CPM' (Critical Path Method) are versatile planning and management tools which form a part of Network Management Technique (NMT). The introduction of network techniques to irrigation and power projects is discussed; also, the developments of CPM and its application to the Yamuna Hydro Electric Project, Stage II, by the Hindustan Construction Co. Ltd., in its work of river-diversion for construction of Ichari Dam. The network technique is admirably suited to the construction industry, particularly for river valley projects where the nature of project execution involves many processes and uncertainties and where the construction period is limited to only 6 to 8 months per year. In the construction industry, as the time estimates are more deterministic, CPM

is more often used. The use of CPM in project scheduling is discussed. The following aspects of network modeling are studied: drawing and preparing the network; the reporting system of progress of the model; feedback information for corrective measures for effective control of the project; and resource analysis. The use of PERT/COST in developing a project cost control plan is examined; the method is found to improve program management by providing more accurate forecasts of time and cost required to accomplish objectives and better measurement of progress in meeting the scheduled costs and technical objectives. Finally, the use of computers for PERT/CPM network management is considered. (Bell-Cornell)
W75-04533

PREDICTION OF DRAINAGE REQUIREMENTS -- BUYUK MENDERES RIVER BASIN, TURKEY,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 4A.
W75-04534

DRAINAGE FOR AGRICULTURE,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
Number 17 in the series AGRONOMY. American Society of Agronomy, Inc., Madison, Wisconsin, 1974. J. Van Schilfgaarde, Ed., p 700, 225 fig, 64 tab, 1,045 ref.

Descriptors: *Drainage, *Agriculture, *Flow, *Soils, *Water management(Applied), Crop production, Salinity, Land use, Design criteria, Humid areas, Materials, Construction, Saturated flow, Steady flow, Unsteady flow, Wells, Drains, Water table, Salts, Effects, *Water quality, Drainage water, Chemicals, Nutrients, Groundwater movement, Analog models, Hydraulic models, Digital computers, Finite element analysis, Soil properties, Networks, Mathematical models, Systems analysis, Europe, United States.
Identifiers: Flat areas, Drain tubes, Heterogeneous media, Drain envelopes, Drainage analogues, Finite difference methods.

This monograph is the second volume in a series devoted to drainage, the improvement of soil water conditions to enhance agricultural land use. It stresses developments in agricultural drainage since 1957 and covers a highly comprehensive area. The effects upon crop production of drainage and their translation into design criteria are discussed. Current engineering practices in the USA and Europe are reviewed and recent developments in construction techniques are described. Five chapters deal with the theory of drainage flow systems, attempting to interpret these theories in terms of practical applications. Current increased concern with water quality has led to the inclusion of a detailed discussion of soil and water quality in relation to drainage as well as of drainage water quality. The increasing availability of computers has warranted four chapters on physical and mathematical models, including analogues and hydraulics. The application of drainage theory requires a knowledge of the pertinent soil properties; the discussion herein emphasizes field methods and practical applications of theoretical concepts. Finally, the use of systems techniques to solve broad-based water management problems is considered. (Bell-Cornell)
W75-04537

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
N. Buras.
In: Drainage for Agriculture, Jan Van Schifgaarde, Ed., Number 17 in the Series AGRONOMY, American Society of Agronomy, Inc., Madison, Wis., 1974, p 675-694, 3 fig, 5 tab, 35 equ, 15 ref.

Descriptors: *Water management(Applied), Agriculture, *Drainage, *Irrigation, *Salt balance, *Soils, *Simulation analysis, *Design criteria, Root zone, Crops, Annual, Salinity, Precipitation, Evapotranspiration, Leaching, Hydrology, Arid lands, Evaluation, Optimization, Equations, Systems analysis, Mathematical models.
Identifiers: Systems engineering, Conjunctive operation, Moisture control, Uncertainty.

The design of soil moisture control systems should include comparison of possible alternatives and selection of the design which optimizes the decision criterion. This can be accomplished using an analytical model incorporating physical, engineering, probability and risk, and crop value aspects. Water management in agriculture is accomplished by fairly complex systems. The two major components of these systems are the irrigation subsystem and the drainage facilities. In order to insure the effectiveness of the entire system, these two components must be designed, constructed, and operated conjunctively. Systems engineering is used to analyze an irrigation-drainage problem where the salt balance in the root zone is an important aspect of the environment in which crops are grown. An annual model is derived, which indicates the changes in soil salinity during a yearly cycle as a function of the precipitation and irrigation quantities and salinity. To evaluate separately the effects of the natural precipitation and those of irrigation, a two-season model is developed, which may be used for designing water management systems. Finally, four sets of criteria for evaluating water management systems are identified and discussed: physical (technical), economic, social, and environmental. (See also W75-04537) (Bell-Cornell)
W75-04538

SURFACE WATER QUALITY IS INFLUENCED BY AGRICULTURAL PRACTICES,
Minnesota Univ., Morris.
For primary bibliographic entry see Field 5B.
W75-04548

AMENDING THE ACT OF JULY 4, 1955, AS AMENDED, RELATING TO THE CONSTRUCTION OF IRRIGATION DISTRIBUTION SYSTEMS.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W75-04597

COMPARISON OF BANDED AND BROADCAST FERTILIZER APPLICATIONS IN RELATION TO COMPACTION AND IRRIGATION IN MAIZE AND WHEAT,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
M. R. Chaudhary, and S. S. Prihar.
Agron J. Vol 66, No 4: p 560-564. 1974 Illus.
Identifiers: Banded fertilizers, Broadcast fertilizer, Compaction, *Fertilizers, Growth rates, Irrigation, Loan, Nitrogen, Nutrients, Phosphorus, Potassium, Sandy, Seed, Seedling, Soils, Tricitum-Aestivum, *Wheat, Zea-Mays, *Corn(Field), Absorption.

For maximum utilization of applied nutrients, the zone of nutrient concentration and root activity must synchronize. Since irrigation and compaction influence nutrient mobility and root configuration, their effect on growth and nutrient uptake were studied under different methods of fertilizer application in deep sandy loam and loamy sand soils. In studies with maize (Zea mays L.) and wheat (Triticum aestivum L.), fertilizer was banded or broadcast with and without irrigation and interrow compaction. Because seedling growth was faster when fertilizer was placed 20 cm below the seed, this treatment ultimately resulted in higher grain yield than when fertilizer was broadcast. In 1970, placement of fertilizer P was banded alone and increased corn yield by 40% while in 1971, placement of NPK increased maize yield by 170% over broadcast. The differences were greater with interrow compaction. Compared with broadcast, band placement of NPK increased the yield of irrigated wheat by 48% and 26% and that of unirrigated wheat by 288% and 150% with and without compaction, respectively. Treatment effects on nutrient uptake followed the same trends as those on grain yield. Fertilizer should not be broadcast where root growth in the surface layers is likely to be restricted due to surface drying or compaction. In compacted plots, heavy and infrequent irrigations appeared to be desirable because they resulted in significantly higher uptake of N. In the absence of compaction, nutrient uptake in the 2 irrigation practices was similar but grain yields were higher with frequent light irrigations than with frequent heavy irrigations. Copyright 1974, Biological Abstracts, Inc.
W75-04611

EFFECTS OF FERTILIZER AND AVAILABLE MOISTURE ON THE YIELD AND N AND P CONTENT OF WHEAT AND ON SOIL NUTRIENTS,
Department of Agriculture, Swift Current (Saskatchewan). Research Station.
W. C. Hinman.
Can J Soil Sci. Vol 54, No 2. p 187-193. 1974.
Identifiers: *Fertilizers, *Moisture content, Nitrate, *Nitrogen, Nutrients, *Phosphorus, Soil nutrients, Wheat, *Crop production.

That cher wheat was grown in tank-type lysimeters over a 7-yr period to determine the effect of fertilizer, 2 levels of available water and 2 cropping systems on the yield and nutrient content of grain and on some soil nutrients. Fertilizer did not change the yield of grain materially under natural rainfall. Added water only increased the yield by 1/2 and 3/4 of continuous wheat and fallow, respectively. Fertilizer with added water nearly doubled the yield of continuous wheat and increased by 1/3 the yield from the wheat-fallow rotation. The P content of the grain was not affected by fertilization, but was higher in the treatments to which additional water was applied than in those receiving natural rainfall only. It was also higher in continuous wheat than in fallow wheat. There was an interaction between the N and P uptake ratio and the N content of the grain. Fertilizer or additional water or both increased or decreased the N content, depending upon which way the N or P balance was shifted. Surplus available N not utilized by the crop grown with natural rainfall accumulated as nitrates at lower soil depths, particularly under the wheat-fallow system. Al the NO3-N produced where supplemental water or water and fertilizer were applied was utilized and non ac cumulated. The organic N content of the surface soil increased along with a reduced loss in organic C where water and fertilizer were applied, as compared to the other treatments. Fertilizer application resulted in a sharp increase in NaHCO3 soluble P, particularly following the supplemental water plus fertilizer treatments where an excess of P was supplied with the fertilizer over that removed by the crop. There was an increased demand on soil P where water only was applied, and the soluble P content was appreciably reduced. Copyright 1974, Biological Abstracts, Inc.
W75-04628

IRRIGATION FOR LAND APPLICATION OF ANIMAL WASTE,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-04638

PROCEDURAL METHODS FOR IMPLEMENTING COLORADO RIVER WATER CONSERVATION MEASURES.
Bureau of Reclamation, Washington D.C.
For primary bibliographic entry see Field 6E.

W75-04778

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE TOUCHET DIVISION, WALLA WALLA PROJECT, OREGON-WASHINGTON, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W75-04790

MANURE PROMOTED FOR CROPLAND.
For primary bibliographic entry see Field 5G.
W75-04839

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04356

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04360

THE RISING WATER TABLE IN THE WEST NUBARYA AREA OF EGYPT,
International Inst. for Land Reclamation and Improvement, Wageningen (Netherlands).
For primary bibliographic entry see Field 4B.
W75-04363

FLOOD HAZARD REPORTS: TOOLS FOR RESOURCE PLANNING AND MANAGEMENT,
Soil Conservation Service, Grand Rapids, Mich.
T. A. Ringler, and J. H. Kennaugh.
Journal of Soil and Water Conservation, Vol 29, No 4, p 182-185, July/August, 1974. 2 fig, 8 ref.

Descriptors: *Flood plains, *Flood forecasting, Flood data, *Flood control, Flood plain zoning, Flood plain insurance, Flood protection, Legislation, Regional flood, *Planning, *Management.
Identifiers: Flood plain management, Flood hazard reports.

The mechanics and advantages of flood hazard reports are discussed. Flood hazard studies consist of two major technical reports. The flood plain areas subject to flooding by select-frequency floods are outlined on aerial photomosaics and soil survey information that identifies the different types of soils within the flood-plain and its surroundings are also shown on the photomosaic maps. The reports contain soil descriptions and interpretative data. Flood hazard reports provide local and state governments and community residents with a technical basis for carrying out flood-plain management programs. Suggested nonstructural measures for flood-plain management resulting from legislation and flood hazard reports include flood-plain zoning ordinances, flood-plain development regulation, flood-plain filling regulation, flood insurance program, open space acquisition, upstream land treatment, and regional land use planning. Structural corrective measures include runoff-retarding dams, levees or walls, channel improvement, and flood-proofing. The key to developing technical data for flood planning programs is cooperation between city, county, regional, state, and federal agencies. Successful metropolitan resource management programs must ignore political boundaries. (Orr-FIRL)
W75-04432

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
M. B. McPherson, and G. F. Mangan, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 404, $3.75 paper copy, $2.25 microfiche. ASCE Urban Water Resources Research Program, Technical Memorandum No 25, October, 1974, 40 p, 13 ref. OWRT C-5045(4224)(1).

Descriptors: *Urbanization, *Research and development, *United States, *Local governments, *Comprehensive planning, *Water management(Applied), Abstracts, Surveys, Hydrologic aspects, Environmental effects, Water quality control, Social aspects, Operations, Data collections, Federal project policy, Systems analysis, Control system, Computer models, Instrumentation, International Hydrological Decade.
Identifiers: *Urban water resources, National assessment, Integrated management, Technology transfer, Information dissemination, National urban water policy, Metropolitan studies, Data needs, Innovation, Urban hydrology, Metropolitan areas.

Since 1967 the ASCE Program has served as the full-time operating arm of the American Society of Civil Engineers Urban Water Resources Research Council. The basic purpose of the Program is to help establish coordinated long-range research on urban water resources on a national scale. Briefly summarized is the progress made through mid-1974, on research needs assessment, urban water management, translation of research findings into practice, facilitation of urban runoff research, and collaboration and participation in research of local governments and other organizations. Also noted are activities scheduled for 1974-1975. Included are one-page abstracts for all twenty-eight Program reports and technical memoranda. (McPherson-ASCE)
W75-04440

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04448

FLOATING WAVE BARRIER,
For primary bibliographic entry see Field 8A.
W75-04453

INFLATABLE BARRIERS FOR WATERCOURSES,
Pneumatiques, Caoutchouc Manufacture et Plastiques Kleber-Colombes (France). (assignee)
For primary bibliographic entry see Field 8A.
W75-04467

A FRAMEWORK FOR UNCERTAINTY MANAGEMENT IN WATER RESOURCES PLANNING,
Decision Sciences Corp., Jenkintown, Pa.
For primary bibliographic entry see Field 6B.
W75-04519

A TWO-DIMENSIONAL MULTI-STAGE PROGRAMMING MODEL: WITH APPLICATION TO RESERVOIR SYSTEMS,
Army Construction Engineering Research Lab., Champaign, Ill.
O. E. Rood, M. I. Dessouky, and D. D. Meredith.
November 1974, 27 p, 3 fig, 8 ref, append.

Descriptors: *Multiple-purpose reservoirs, *Dynamic programming, *Cost analysis, Flow, *Reservoir storage, *Hydrologic data, Water policy, Reservoir operation, Optimization, Constraints, *Networks, Equations, Algorithms, Evaluation, Mathematical models, Systems analysis.
Identifiers: Multi-stage programming, Time-and-distance programming, Grid size, Benefit maximization.

A simultaneous time- and distance-staged programming approach is developed for determining the optimal, time dependent, storage and flow policies in a network with only feed-forward flow connections and nonlinear cost functions. The approach is applied to a multipurpose reservoir system which is subject to time varying demands, prices, availabilities, and movement restrictions. The model is a two-dimensional extension of the concepts of dynamic programming through the definition of partial multidimensional recursive relationship. This reduces the size of the state space. The conditions for global optimality are presented, which include separable and concave cost functions. These conditions are seldom restrictive in the operating environment of large scale multipurpose reservoir systems. The computational results indicate that the approach is efficient in computer memory requirements and computation time. (Bell-Cornell)
W75-04523

EXPECTATION AND DISPERSION MATRICES FOR THE ESTIMATION OF DISTRIBUTIONS ASSOCIATED WITH DISCRETE RESERVOIRS,
Natal Univ., Durban(South Africa).
G. G. S. Pegram.
Journal of the Royal Statistical Society, Vol 36, No 2, p 299-304, 1974. 2 ref.

Descriptors: *Reservoir storage, *Stochastic processes, *Estimating, Reservoirs, Design, Markov processes, Equations, Mathematical models, Systems analysis, Disperion, Distribution systems.
Identifiers: *Stochastic reservoir theory, Linear approximations, Maximum likelihood, Input transition probability matrix.

Reservoir design problems involving chance fluctuations currently rely heavily on simulation for their solution. However, Stochastic Reservoir Theory, which employs finite Markov chains for the solution of problems associated with single reservoirs, is expressible in matrix form and thus lends itself to fast solutions using a digital computer. Stochastic Reservoir Theory can be useful in the analysis of small systems, as a precursor or an adjunct to simulation. In the case of a particular input transition probability matrix model, approximate expressions are found for the mean and dispression matrix of its elements and of the elements of the storage distribution for Moran and Lloyd reservoirs. The discussion is confined to stationary, non-seasonal models and is therefore to be regarded as only a preliminary survey. (Bell-Cornell)
W75-04525

THE DESIGN OF A LIVESTOCK WATER DISTRIBUTION SYSTEM--LARGE SCALE,
Nebraska Univ., Lincoln. Agricultural Experment Station.
For primary bibliographic entry see Field 3F.
W75-04527

COMPUTER USE FOR RIVER REGULATION,
Corps of Engineers, Portland, Oreg. North Pacific Div.
C. E. Abraham.
Journal of the Hydraulics Division, American Society of Civil Engineers Vol 101, No HY2, Proceedings paper No 11140, p 291-297, February 1975. 3 fig, 6 ref.

Descriptors: Water resources, *River regulation, *Hydrologic data, *Hydroelectric power, *Computer programs, *Simulation analysis, *Multiple-purpose reservoirs, Scheduling, Reservoir operation, Reservoir storage, Constraints, Streamflow, Design, Optimum development plans, Projects, Columbia River, Water policy, Forecasting, Equations, Mathematical models, Systems analysis.
Identifiers: *Computer applications, Data communication.

The complexity that occurs in regulating multiple-purpose reservoir systems has necessitated the use of computer programs for scheduling reservoir regulation. The need for real-time use of scheduling computer programs coupled with the aforementioned complexity has made automated regulation schemes and interactive computer processing highly desirable. The scheduling engineer must be able to examine easily the results of a trial computer simulation and modify operating constraints and forecasted information as necessary to retry the simulation. A package of stand-alone computer programs with interfacing capability is considered. These programs are used in real-time reservoir regulation and streamflow forecasting analyses in the North Pacific Division office of the Corps of Engineers. Since the simulated operation is sensitive to given target elevations, target ranges guide the operation along desired operating policies while recognizing physical system and project constraints. No optimization procedures are used, but experience indicates that the target technique used to simulate reservoir regulation coupled with the interactive computer processing features effectively provides a tool for finding optimum multiple-purpose operation policies within actual operating constraints. (Bell-Cornell)
W75-04531

OPTIMAL OPERATION OF MULTIPLE RESERVOIR SYSTEM,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
D. D. Meredith.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings paper No 11128, p 299-312, February, 1975. 4 fig, 5 tab, 14 ref.

Descriptors: *Multiple-purpose reservoirs, *Reservoir storage, *Water management(Applied), *Dynamic programming, Economics, Flow, Water allocation(Policy), Constraints, *Optimization, Hydraulics, Recreation, Irrigation water, Water supply, Decision making, Reservoir releases, Equations, Algorithms, Mathematical models, Systems analysis, *Operations.
Identifiers: *Multiple reservoir systems, *Operating policy, Benefit maximization.

The operation of multiple purpose reservoirs located on a river is a complex problem if the reservoirs are to be considered as an integrated system. The water in the system has multiple beneficial uses, such as water supply, irrigation, low flow augmentation, recreation, power generation, and navigation. Excess water in the system can result in reservoir overtopping or in flooding along a reach of the river. Presented is a method for determining the quantities of water to be stored in each reservoir, the flow between reservoirs, and the amount of water to be allocated to each beneficial use such that the total return from the system is maximized for a selected sequence of stream inflows. The method is a facility stage discrete differential dynamic programming approach for determining the optimal operating policy for a multiple purpose multiple reservoir system. The approach was developed to take advantage of the congruity between the time and distance dimensions of the problem. The stages in the dynamic programming formulation are defined to represent reservoirs and the state variables are defined to represent the amounts of release from reservoirs. The approach requires that the problem be formulated such that stages in the algorithm represent reservoirs rather than times at which decisions concerning releases must be made. The method is applied to an example problem consisting of three serially linked multiple purpose reservoirs; all of the five different initial trial release policies tried converged to within 2% of the optimum obtained previously by gradient projection and conjugate gradient techniques. (Bell-Cornell)
W75-04532

PREDICTION OF DRAINAGE REQUIREMENTS -- BUYUK MENDERES RIVER BASIN, TURKEY,
California Univ., Davis. Dept. of Water Science and Engineering.
J. N. Luthin.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1092-1094, 1973. 6 fig, 3 ref.

Descriptors: *Drainage, *Irrigation, Projects, *River basins, *Irrigation water, Water table, Perched water, Artesian aquifers, Pressure, Hydraulic conductivity, Groundwater, Water quality, Leaching, Water costs, Farms, Management, Soils, *Forecasting.
Identifiers: *Buyuk Menderes River Basin(Turkey).

The prediction of the ultimate extent and development of drainage problems following the introduction of irrigation water in new areas is always difficult due to inadequate data available for such analysis. Although improved methods are needed, present predictions are based mostly on judgment related to experience with existing irrigation projects. Factors influencing the rate of development of the formation of drainage problems in the Buyuk Menderes River Basin of Turkey are outlined. Such factors are: (1) soil stratification causing perched water table conditions; (2) artesian conditions, including depth to artesian aquifer and magnitude of artesian pressure; and (3) hydraulic conductivity of various soil strata. The Menderes River Basin area is described, and soils, topography and shallow stratigraphy, the quality of applied irrigation water, on-farm management, and present groundwater conditions are discussed. Finally, present and future drainage problems in the Basin are briefly considered. It is expected that, in the flooded lower basin area, the rate of installation will lag behind the need for drainage construction for a number of years. A systematic way of analyzing the situation is needed since drainage problems can be a substantial portion of total project cost. Presently, a rational method for calculating the drainage requirement must be tempered by experience because of the difficulty of evaluating all of the factors affecting the development of the drainage problem. (Bell-Cornell)
W75-04534

DRAINAGE FOR AGRICULTURE,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3F.
W75-04537

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 3F.
W75-04538

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6D.
W75-04541

AQUATIC PLANT CONTROL PROGRAM, STATE OF FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 5G.
W75-04598

AQUATIC PLANT CONTROL.
For primary bibliographic entry see Field 6E.
W75-04599

FLOOD DISASTER PROTECTION ACT OF 1973.
For primary bibliographic entry see Field 6F.
W75-04600

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX E--COMMERCIAL NAVIGATION.
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-04601

AUTHORIZATION FOR SECRETARY OF INTERIOR TO ACQUIRE ADDITIONAL WETLANDS.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W75-04651

A METHOD FOR DETERMINING PEAK FLOWS AND DETENTION STORAGE REQUIREMENTS IN URBANIZING AREAS.
Soil Conservation Service, Indianapolis, Ind.
Indiana Technical Note Engineering-2, September 1973. 28 p, 8 fig, 4 tab, 1 ref. OWRR B-002-IND(7), and B-022-IND(3).

Descriptors: *Urban hydrology, *Urban runoff, *Urbanization, *Storage requirements, *Design flow, Storm runoff, Storage, Detention reservoirs, Hydrographs, Design flood, Statistical methods, Soil types, Rainfall-runoff relationships, Regression analysis, Indiana, Peak discharge, Small watersheds.
Identifiers: Instantaneous hydrographs.

A method was provided for computing the instantaneous peak flows for differing degrees of urbanization and runoff values for drainage areas between 10 and 600 acres. Relationships between runoff amounts, degrees of urbanization, reservoir release rates, and detention storage were presented. It was shown that the above relationships can be used to generate a complete unit hydrograph. The detention storage requirement was shown to be a function of the inflow hydrograph and the release rate of the detention structure. Factors for converting maximum release rates to normal release rates were presented for single stage pipe drop, orifice control, and weir drop spillway structures. (Terstriep-ISWS)
W75-04694

SEDIMENT TRAP EFFICIENCY OF SMALL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W75-04702

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
For primary bibliographic entry see Field 7C.
W75-04726

SPECIAL FLOOD HAZARD INFORMATION: CYPRESS CREEK, HARRIS COUNTY, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, June 1972. 17 p, 1 fig, 4 tab, 10 plates.

Descriptors: Floods, *Flood control, *Flood protection, *Flood plains, *Flood plain zoning, *Texas, Flooding, Flood profiles, Flood frequency, Flood plain insurance.
Identifiers: *Cypress Creek(Tex), Harris County(Tex), Intermediate Regional Flood, Standard Project Flood, Flood prone areas.

Cypress Creek has a long history as a source of major floods in the Houston Metropolitan area. Sloping at 2.5 feet per mile, the stream bed adjoins flood plain of prairie land used for rice production and pasture in upper reaches and heavily wooded land undergoing residential and commercial development in lower reaches. Backwater from Lake Houston affects water surface elevation as well as flooding from intense local thunderstorms of short duration, rainstorms extending over periods of several days, or tropical storms with torrential rainfall. Long flood duration is caused by flat slopes and small channel capacities. Since the watersheds of Cypress Creek and adjacent Buffalo Bayou overlap giving an inaccurate account of Cypress Creek flood discharges, known data from coastal streams in the general geographical region and U. S. Weather Bureau data were used to compute larger flood discharges. Estimates for peak discharges of an Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) were made at 34,420 cfs and 51,310 cfs, respectively. Areas that would be inundated by a 50-year flood, by an IRF and SPF are shown on plates. Possible solutions to bring about most feasible and economic land use of flood plain include regulatory ordinances, subdivision regulations, building codes and zoning ordinances, especially flood plain zoning. Nonregulatory techniques are acquisition of flood plain lands for green belts and parks, acquisition of flood easements, flood proofing by site filling and structural adjustments, flood insurance to reduce high losses of flood victims who must continue as residents of flood prone areas, avoiding extension of public services into flood prone areas, urban renewal and temporary and permanent evacuation from flood plains. (Salzman-North Carolina)
W75-04742

SPECIAL FLOOD HAZARD INFORMATION: CLEAR CREEK, BRAZORIA, FORT BEND, GALVESTON AND HARRIS COUNTIES, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, June 1972. 13 p, 1 fig, 15 plates.

Descriptors: Floods, Flooding, *Flood plain zoning, *Planning, *Flood control, *Flood protection, Flood plains, Dams, *Texas.
Identifiers: *Clear Creek(Tex), Harris County(Tex), Intermediate Regional Flood, Standard Project Flood, Brazoria County(Tex), Fort Bend County(Tex), Galveston County(Tex).

With a total drainage area of 250 square miles, Clear Creek Watershed is 45 miles long and varies from 2 to 13 miles in width, flowing in an easterly course through wooded and grass covered terrain into Clear Lake which flows into Galveston Bay in Houston SMSA. Watershed is subject to intense local thunderstorms of short duration, general storms extending over periods of several days and to torrential rainfalls associated with tropical storms. High flood peaks are furthered by the impervious clay soil conducive to rapid runoff. Although damaging floods occurred in the area of sparse development, no floods have been recorded since 1962 when intensive development on flood plain began. Intense urbanization of the Houston SMSA has intensified the potential for flood devastation. Residential areas like Clear Lake Shore, oil tank farms, commercial and industrial areas would be greatly damaged by an Intermediate Regional Flood (IRF) or a Standard Project Flood (SPF) which would peak 1 to 2 feet higher than an IRF. Regulatory methods to reduce flood damage include: floodway encroachment limits to be established through flood plain zoning, subdivision control ordinances restricting construction to levels above selected flood levels, and building codes that establish minimum first floor elevations and flood proofing of structures. Nonregulatory techniques involve purchase of lands for open spaces and/or flood easements, flood proofing by site filling and structural adjustments, temporary and permanent evacuation of people and structures from flood plains, posting of warning signs in high flood hazard areas, and nonextension of utilities and roads by the city into the flood zone. (Salzman-North Carolina)
W75-04743

FLOOD PLAIN INFORMATION: BLUE RIVER AND TRIBUTARIES, JOHNSON COUNTY, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the Johnson County Commissioners and the Kansas Water Resources Board, May 1970. 38 p, 12 fig, 5 tab, 23 plates.

Descriptors: Floods, Flooding, *Flood control, *Flood protection, *Flood plains, *Flood profiles, *Kansas.
Identifiers: *Blue River(Kan), Wolf Creek(Kan), Coffee Creek(Kan), Indian Creek(Kan), Tomahawk Creek(Kan), Brush Creek(Kan), Johnson County(Kan), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Several major streams, including Blue River, Wolf Creek, Coffee Creek, Indian Creek, Tomahawk Creek and Brush Creek compose the Blue River Basin with a total drainage area of 272 square miles. Characterized by rolling topography with steep slopes adjacent to larger streams, flood plains average 2000 to 4000 feet wide for Blue River and 1000 to 3000 feet wide for the creeks. The river bed slopes 4 feet per mile with channel varying from 50 to 70 feet wide and banks 10 to 20 feet high. Creeks have steeper slopes. Channels' widths and depths vary. Drainage patterns are well developed and no major impoundments exist. Except for intense development on Brush and Rock Creek flood plains, most of the area is rural, on the verge of total urbanization. Flood protection includes bridge improvements, channel enlargements and bank protection by stone and concrete walls. Floods generally rise rapidly and are of short duration. The greatest flood on Indian Creek was recorded on June 5, 1965 with a peak discharge of 5,250 cubic feet per second. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would cause extensive damage to the flood plain cresting at 14,900 cfs and 22,000 cfs respectively. A SPF would rise to its peak in about 12 hours on the average, remaining out of banks one to three days. Flood depths for various locations in Johnson County can be made by referring to plates included. (Salzman-North Carolina)
W75-04744

FLOOD PLAIN INFORMATION: NORTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the Albemarle County Board of Supervisors, March, 1973. 30 p, 5 fig, 11 tab, 15 plates.

Descriptors: Floods, *Flooding, *Flood control, *Flood protection, *Flood plain, *Virginia.
Identifiers: North Fork Rivanna River(Va), *Rivanna River(Va), Albemarle County(Va).

Located in the west central part of the county, North Fork Rivanna River receives run-off from about 176 square miles before merging with South Fork Rivanna River to form the Rivanna River, which flows for 31 miles southwardly falling about 3 feet per mile. The flood plain remains largely undeveloped being mostly pastures and woodlands. Several gaging stations on the Rivanna River supplemented by newspapers, historical documents and interviews provided data. Floods occur during all seasons resulting from intense rainfall often associated with tropical storms. The duration of flooding depends on duration of run-off producing rainfall; floods may last several days. No flood damage reduction measures exist although several are currently being studied as a part of the Corps' investigation of the entire James River Basin. The largest and most damaging flood occurred in October 1942 with intense rainfall from a hurricane lasting for 3 days. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would inundate the flood plain with peak discharges of 36,000 cubic feet per second (cfs) and 63,000 cfs respectively. During an IRF flood water depths may range between 30 and 40 feet in the main channel while overbank depths may average about 18 feet. Substantial damage would occur with the main channel having a possible velocity of 9 feet per second causing severe erosion. Overbank flow might reach 4 feet per second. Duration above bankfull may be as much as 31 hours for an IRF. (Salzman-North Carolina)
W75-04745

FLOOD PLAIN INFORMATION: REPORT ON THE DES PLAINES RIVER, ILLINOIS AND WISCONSIN.
Army Engineer District, Chicago, Ill.
Prepared for Northeastern Illinois Metropolitan Area Planning Commission and Southeastern Wisconsin Regional Planning Commission. March, 1966. 36 p, 20 photo, 4 tab, 18 plates, 19 ref, append.

Descriptors: Floods, Flooding, *Flood data, *Flood forecasting, *Flood plains, *Illinois, *Wisconsin, Flood control, Flow characteristics, Flood frequency, Flood recurrence interval, Maximum Probable Flood, Flood damage, Flood water.
Identifiers: *Des Plaines River(Ill-Wis), Des Plaines(Ill), Standard Project Flood(SPF), Greater Probable Flood.

Flooding of the main stem of the Des Plaines River from Riverside, Illinois to the headwaters in Racine County, Wisconsin was investigated. The Des Plaines flood plain encompasses 14,200 acres: 8,100 acres in Illinois and 6,100 acres in Wisconsin. Damage has been limited in Illinois counties by the use of flood plains as open space. In Cook County, Illinois, forest preserves cover 80% of the flood plain and in Lake County, Illinois, only 4% of the flood plain is occupied by housing. Flooding has occurred in February through April due to thawing, and damage has increased due to increased development. The major flood of record was measured in 1938 with a discharge of 5,500 cubic feet per second at Des Plaines and stage levels approached the 635.3 feet record on seven other occasions. The Greater Probable Flood (Intermediate Flood on study maps) is predicted to have a recurrence of 10 years and a discharge of 7000 cubic feet/second whereas the Standard Project Flood would have a 34,500 cubic feet/second discharge. Comparable data for other areas are given. Proposals for reducing flood damage include control of land use in the flood plain in both Illinois and Wisconsin, dredging, widening, and straightening of the channel, levee construction, reservoirs, and watershed treatment measures. (Park-North Carolina)
W75-04746

FLOOD PLAIN INFORMATION -- WILLIAMSON CREEK, AUSTIN, TEXAS.
Army Engineer District, Galveston, Tex.

Prepared for City of Austin, Texas. p 37, June, 1973. 5 tab, 6 fig, 14 plates, glossary.

Descriptors: *Flood control, *Flood damage, *Maximum probable flood, *Non-structural alternatives, Flood discharge, Flood flow, Flood peak, Flood plain zoning, Flood protection, Flooding, Floods, Erosion, Flash flood, *Texas.
Identifiers: *Flood plain management, *Williamson Creek(Tex), Austin(Tex), Standard Project Flood, Intermediate Regional Flood.

Williamson Creek, a major tributary of Onion Creek, passes Oak Hill and Pleasant Hill, Texas, just southwest of Austin. Recently six miles of Williamson Creek and its flood plain were incorporated into rapidly expanding Austin. Subdivision development is encroaching on its flood plain. Newspaper records, interviews, and studies of nearby streams indicate the Creek is subject to flash flooding -- floods of short duration with very sharp crests. A relatively steep topography funnels the region's intense spring and fall rains (up to 19.03 inches in 24 hours, recorded - 1921) and, though the resulting floods are not widespread, they have high velocities and are very destructive to all improvements in the flood path. In 1971 the Austin City Council resolved to work on flood plain management and has passed two ordinances requiring conformity to a Master Drainage Plan and initiating flood plain development criteria. This report serves as a basis for further action and encourages zoning, subdivision regulations, and an end to government encouragement of flood plain development. Data on statistically probable severe floods can be used to delineate protected areas. A Standard Project Flood would flow at 8.2 feet per second in the channel, 3.1 feet per second overbank, with a peak discharge of 31,700 cfs. Cross sections and maps are provided. (Herr-North Carolina)
W75-04747

FLOOD PLAIN INFORMATION - CEDAR BAYOU, HOUSTON METROPOLITAN AREA, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, and Texas Water Development Board, Austin, Texas. June, 1972. 27 p, 6 tab, 4 fig, 28 plates, glossary.

Descriptors: *Flood forecasting, *Flood control, *Non-structural alternatives, *Surges, Floods, *Floods profiles, Peak discharge, River forecasting, Floodproofing, Flood plains, Flood data, Texas.
Identifiers: *Hurricane tidal flooding, *Cedar Bayou(Tex), Intermediate Regional Flood, Standard Project Flood, Intermediate Regional Hurricane, Stand Project Hurricane, Houston SMSA(Tex).

Baytown, Texas, extends 11 miles up the west bank of Cedar Bayou from its mouth at Galveston Bay. Cedar Bayou meanders through relatively flat forest and agricultural land but is heavily developed along its lower reaches, and unprecedented growth of this area 30 miles east of Houston is causing increased urbanization along and in the bayou's flood plain. Cedar Bayou is subject to intense rain storms and thunderstorms as well as tropical hurricanes. Its relatively flat slopes and small channel capacity produce widespread flooding which lasts for days. In 1951 Harris, Liberty, and Chambers Counties jointly contracted to widen, deepen, and partially straighten the channel, but serious flooding continues with considerable property damage. A maximum probable flood (Standard Project Flood) combined with hurricane tidal flooding in the lower 10-mile reach would produce a surge level of 18.0 feet at river mile 10 (in a Standard Project Hurricane). Maximum discharge would be 33.300 cfs with an overbank velocity of 1.2 feet per second, which would deposit considerable amounts of debris. Nonstructural alternatives ot lessen flood damage, include zoning, subdivision regulations, building codes, flood proofing of structures already built, and development policies. (Herr-North Carolina)
W75-04748

FLOOD PLAIN INFORMATION: BIG CREEK, CHETOLAH CREEK AND LINCOLN DRAW, HAYS, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Hays, Kansas and the Kansas Water Resources Board, p 36, June 1969, 12 fig, 5 tab, 10 plates.

Descriptors: Floods, Flooding, *Flood plains, *Flood control, *Flood protection, Dams, Levees, *Kansas, Velocity conduits, Storm runoff, Conduits.
Identifiers: *Big Creek(Kan), *Chetolah Creek(Kan), *Lincoln Draw(Kan), Hays(Kan), Intermediate Regional Flood, Standard Project Flood.

Big Creek, a tributary of Smoky Hill River, and its tributaries, Lincoln Draw and Chetolah Creek pass through Hays covering 13.4 stream miles in the study area. Although much of Hays is on high ground, the flood plain contains much development. Floods are of rapid rise and short duration. Flood damage prevention measures on Big Creek include channel improvements and a levee system which tends to raise the water surface elevations behind it creating a backwater effect thereby reducing effective capacity of the levied channel. A low water dam and sewerage plant do not influence the flood situation. Lincoln Draw's drainage is affected by limited carrying capacity of conduits and a detention dam which overflows in periods of heavy rain. Trees growing in the channel also impede Lincoln Draw's flood flow. Chetolah Creek's flood plain is largely agricultural except for an Interstate Highway which detains flows. The Channel has been realigned and cleared and no damaging flood has been experienced since the flood plain has been under development. The greatest flood on Big Creek occurred June 17, 1957 with a peak discharge of 22,400 cubic feet per second. An Intermediate Regional Flood (IRF) would have peak discharges of slightly larger than the flood of June 1957. A Standard Project Flood on Big Creek would discharge 51,500 cfs, greatly exceed capacity of the levees and inundate an area much larger than that affected by an IRF. Velocities generated by all major floods will be dangerous. Overflow areas, depths of flow and contours of flooded areas can be determined from plates included in report. (Salzman-North Carolina)
W75-04749

FLOOD PLAIN INFORMATION -- GOOSE CREEK, BAYTOWN, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for: The City of Baytown, Texas. p 39, September 1973. 6 tab, 6 fig, 11 plates.

Descriptors: *Flooding, *Maximum Probable Flood, *Peak discharge, *Floods, Floodways, Flood control, Flood data, Flood discharge, Flood profiles, *Texas.
Identifiers: Intermediate Regional Flood, Standard Project Flood, Intermediate Regional Hurricane, Standard Project Hurricane, *Baytown(Tex), Goose Creek(Tex).

Baytown, Texas, located along the Houston Ship Channel where it flows into Galveston Bay 30 miles downstream from Houston, is the center of one of the world's largest oil producing areas. Goose Creek flows from north to south through Baytown into the bay. Like other Texas coastal streams, it drains low flat land; maximum relief in its 30.5 square mile basin is 43 feet above mean sea level. With the growth of Baytown due to expanding oil refineries there has been rapid encroachment on the Goose Creek flood plain. Stream gaging records from similar nearby coastal streams as well as newspaper records show that there have been 20 damaging floods in the area from 1854 to 1973 caused by severe thunderstorms or associated with tropical hurricanes, usually lasting up to two days. Baytown's 1971 flood plain ordinance is included. The city limits construction to land above the 100-year flood level and only allows properly floodproofed nonresidential structures on the flood plain. Swelled by 13 inches of rain in June, 1973, Goose Creek rose between 2 and 3 feet over its banks, destroyed Goose Creek Bridge, and did considerable damage. The computed Intermediate Regional Flood would be slightly higher. A Standard Project Flood would crest at 5.0 feet. In the lowest 5 miles of the river a Standard Project Hurricane would raise the level 19.0 feet driving water into the river from the bay. (Herr-North Carolina)
W75-04750

FLOOD PLAIN INFORMATION: SHUNGANUNGA CREEK, TOPEKA, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Topeka, Kansas and the Kansas Water Resources Board, December 1968. 25 p, 10 fig, 6 tab, 13 plates.

Descriptors: Floods, Flooding, *Flood control, *Flood protection, *Flood profiles, *Levees, Flood plain, Dams, *Kansas, Flood flow, Velocity.
Identifiers: *Shunganunga Creek(Kan.), Topeka(Kan), Intermediate Regional Flood, Standard Project Flood.

Shunganunga Creek, a right bank tributary of the Kansas River, and its tributaries comprise the primary drainage system for the southern portion of Topeka. Development in the flood plain consists of commercial and residential structures. The stream basin has a length of 14 miles and width of 7 miles with 22.5 square miles of drainage area in this study. Topography ranges from hilly in upper reaches to flat in the lower reaches sloping at about 7.15 feet per mile. Main flooding season occurs during the summer months resulting from general heavy rain. Floods are characterized by rapid rise, high velocity and a quick return to bankfull level. Obstructions to flood flow consist of 29 bridges. Flood protection includes widening of channel, construction of a left bank levee, replacement of bridges and two detention dams. Greatest known flood occurred on April, 1945 when the Kansas River was at a high stage with a peak discharge of 8,800 cfs. Severe flooding also occurred in 1951, 1957, 1964, 1965, and 1967. An Intermediate Regional Flood (IRF) discharge would be equal to the April 1945 flood. A Standard Project Flood would be three times as great as the IRF with channel velocity reaching 15 feet per second or a little more than 10 miles per hour. Profiles of Shunganunga Creek and its tributaries are provided on plates. (Salzman-North Carolina)
W75-04751

FLOOD PLAIN INFORMATION: MECHUNK CREEK, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the Albemarle County Board of Supervisors, November, 1973. 22 p, 12 fig, 5 tab, 12 plates.

Descriptors: *Floods, *Flooding, Flood control, Flood protection, *Flood plains, *Virginia, Flood damage, Flood profiles.
Identifiers: *Mechunk Creek(Va), Rivanna River(Va), Albemarle County(Va).

Mechunk Creek flows south from its headwaters in the Southwestern Mountains in Albemarle County and empties into the Rivanna River near Union Mills in Fluvanna County. The study covers approximately 6.5 miles of the creek which slopes at 11.4 feet per mile. The main channel which is mostly free from vegetation varies from 40 to 50 feet in the lower reach to 20 to 30 feet in the upper

ach. Adjacent flood plains vary from open farm nd to heavy forest. Several small earthfill dams ı tributaries have no flood control capacity. Five the seven bridges which cross the creek would e overtopped by an Intermediate Regional Flood RF). There are no stream gaging stations there- re data were provided from nearby streams. oods occur during all seasons resulting from hur- canes or intense rainfall. Concentration of flood- ater can occur within 12 hours after beginning of noff creating extreme flood heights in a short ne. Duration of flooding depends on duration of n-off producing rainfall usually lasting several ys. No flood damage reduction measures exist. ajor flooding occurred in April 1937 and October 42. The most recent flood was in June 1972 used by tropical storm 'Agnes' with damage in bemarle County estimated at $3.8 million. An F and Standard Project Flood would inundate rmland and bridges with peak discharges of ,500 cubic feet per second (cfs), and 42,900 cfs. alzman-North Carolina)
75-04752

OOD PLAIN INFORMATION--COASTAL OODING, CITY OF CHESAPEAKE, VIR- NIA.
my Engineer District, Norfolk, Va.
epared for the City of Chesapeake, Virginia. cember, 1972. 38 p, 3 tab, 6 fig, 30 plates, glos- y.

scriptors: *Flood control, Tidal waters, *Flood ves, *Surges, *Flood damage, Flood profiles, acuation, Flood frequency, Flood peak, Flood otection, Historic floods, Hurricanes, *Virginia, ooding.
ntifiers: Standard Project Tidal Flood, Inter- diate Regional Tidal Flood, *Chesapeake(Va), zabeth River(Va), Hampton Roads(Va), rthwest River(Va).

e City of Chesapeake, Virginia, covers 353 are miles and is very flat with an average eleva- ı of only 12 feet. It contains three branches of Elizabeth River and tidal estuaries of Hampton ads and the Chesapeake Bay in the north. In the theastern part of the city is the Northwest er and the Albemarle and Chesapeake Canal. se bodies of water are subject to tidal flooding the heavy residential, industrial, and commer- development on the flood plains. Gage records the Elizabeth River, as well as newspaper ac- nts, show that flooding comes in the spring ı northeast storms, and from May to vember with tropical hurricanes. There are no ulations of land use on the flood plain in spite requent flooding. In August, 1933, the deepest od on record reached depths up to 13 feet, mean level. As recently as 1962 tidal flooding accom- ying a northeast storm reached 7.4 feet and ed several days. An Intermediate Regional al Flood would be about a foot deeper than the 3 flood. The maximum probable flood, a Stan- d Project Tidal Flood, would reach 13.0 feet, se much damage, and isolate many areas caus- extreme hazards. Data in this report will help in nulating evacuation plans and show areas ch require flood plain management legislation. nplete structural protection is dismissed as un- istic. (Herr-North Carolina)
5-04753

OOD PLAIN INFORMATION: (PATUXENT ER) WESTERN BRANCH (FOLLY, LOTT- RD AND VALD HILL BR.), PRINCE ORGES COUNTY, MARYLAND.
y Engineer District, Baltimore, Md.
pared for the Maryland-National Capital Park Planning Commission. December, 1972. 33 p, , 14 plates, 10 tab.

criptors: *Floods, *Flooding, *Flood data, od forecasting, *Flood plains, *Flow charac- tics, *Maryland, Flood control, Flood uency, Flood recurrence interval, Maximum able Flood, Flood damage, Flood water.

Identifiers: *Patuxent River(Md), Prince Georges County(Md), Intermediate Regional Flood(IRF), Standard Project Flood(SPF), Bald Hill Branch(Md), Folly Branch(Md), Lottsford Branch(Md).

The Western Branch of the Patuxent River includes three tributaries: Bald Hill Branch, Folly Branch, and Lottsford Branch. The area is substantially developed and has projected further development. Continuous records of river stage and discharge 11.2 miles upstream from the mouth have been maintained by the U.S. Geological Survey. The largest known flood occurred in August, 1955 with five others of approximately the same elevation, 8.51 stage feet, occurring between 1952 and 1972. The Intermediate Regional Flood (IRF), 100 year occurrence, has a projected stage elevation of four feet higher on Western Branch than the 1955 flood while the Standard Project Flood(SPF) would average five feet higher than the IRF. Peak discharge would be 14,000 cubic feet per second at the mouth of Western Branch for an IRF compared to 33,700 cfs at the mouth of Western Branch, assuming a total rainfall of 14.2 inches in 96 hours, for a SPF. The long duration of flood and the high velocity of flow which might reach a maximum of 7-10 feet per second in the channel for an IRF could cause extensive damage in the heavily developed areas, with the 21 bridges across the Western Branch and the three tributaries which accumulate high water causing safety hazards. This report is intended as basis for future study for the highly urbanized south-central area of Maryland bordering Washington, D.C. (Park-North Carolina)
W75-04754

COMPREHENSIVE PLAN FOR WATER, SEWER AND STORM DRAINAGE IN THE LOWER RIO GRANDE VALLEY, (VOLUME II).
Nelson (B.L.) and Associates, Inc., Dallas, Tex.
For primary bibliographic entry see Field 5D.
W75-04759

NUECES RIVER PROJECT, TEXAS, PART 1.
For primary bibliographic entry see Field 6E.
W75-04786

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE EAST GREENACRES UNIT, RATHDRUM PRAIRIE PROJECT, IDAHO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U. S. House).
For primary bibliographic entry see Field 6E.
W75-04787

AUTHORIZING THE CITY OF SHERMAN, TEX., TO CONSTRUCT A BARRIER IN DENISON DAM (LAKE TEXOMA) RED RIVER, TEX. AND OKLA., FOR THE PURPOSE OF PROVIDING A MUNICIPAL AND INDUSTRIAL WATER SUPPLY.
For primary bibliographic entry see Field 6E.
W75-04789

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE TOUCHET DIVISION, WALLA WALLA PROJECT, OREGON-WASHINGTON, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W75-04790

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
For primary bibliographic entry see Field 6G.
W75-04845

4B. Groundwater Management

THE RISING WATER TABLE IN THE WEST NUBARYA AREA OF EGYPT,
International Inst. for Land Reclamation and Improvement, Wageningen (Netherlands).
F. E. Schulze, and N. A. de Ridder.
Nature and Resources, Vol 10, No 1, January-March 1974, p 12-18, 2 fig, 1 ref.

Descriptors: *Water table, *Subsurface investigations, *Surface drainage, *Groundwater, *Seepage, Soil surveys, Pumping, Systems analysis, Irrigation, Crop production, Aquifers.
Identifiers: *Egypt.

Problems of the rising water table and accompanying salinity phenomena were studied in the Project area for the purpose of establishing a program to be carried out by the Egyptian Ministry of Reclamation. A number of subsystems with the West Nubarya area system can be isolated to study, some of which can be controlled to an extent, while others are beyond effective control. These include the climatological subsystem, the agricultural production subsystem, the groundwater subsystem, the surface-water distribution subsystem, and the artificial drainage subsystem. Some components of the recommended program requiring investigation are the groundwater characteristics of the area, including subsurface geology and hydraulic properties of aquifers and confining layers; surface water hydrology, including inflow, outflow, and seepage; consumptive uses and deep percolation losses using lysimeter measurements; and water application techniques on a practical scale to be conducted in conjunction with consumptive use and deep percolation loss investigations. (Mastic-Arizona)
W75-04363

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04402

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 4: GEOLOGIC DISPOSAL.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04404

GEOTHERMAL WELLS IN IMPERIAL VALLEY, CALIFORNIA: DESALTING POTENTIALS, HISTORICAL DEVELOPMENT, AND A SELECTED BIBLIOGRAPHY,
For primary bibliographic entry see Field 3A.
W75-04423

UTILIZATION OF THE EARTH'S NATURAL HEATING SYSTEM TO DESALT GEOTHERMAL BRINES FOR AUGMENTATION OF THE COLORADO RIVER SYSTEM,
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 3A.
W75-04430

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 2F.
W75-04441

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 5D.
W75-04449

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
For primary bibliographic entry see Field 3B.
W75-04508

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04540

REDUCING FEEDLOT NITRATES IN YOUR GROUND WATER,
For primary bibliographic entry see Field 5B.
W75-04547

ORGANIC COMPOUNDS ENTERING GROUND WATER FROM A LANDFILL,
Oklahoma Univ., Norman. School of Civil Engineering and Environmental Science.
For primary bibliographic entry see Field 5B.
W75-04573

EPA POLICY ON INJECTION WELLS.
For primary bibliographic entry see Field 5G.
W75-04592

FACTORS AFFECTING THE ESTIMATE OF AREAL AVERAGE SUMMER AND WINTER PRECIPITATION IN A SMALL CATCHMENT OF THE SWISS PREALPS,
Swiss Forest Research Inst., Birmensdorf.
For primary bibliographic entry see Field 2B.
W75-04686

GROUNDWATER PUMPAGE IN NORTHERN ILLINOIS, 1960-1970,
Illinois State Water Survey, Urbana.
R. T. Sasman, C. R. Benson, G. L. Dzurisin, and N. E. Risk.
Available from the National Technical Informatiop 46, n Service, Springfield, Va. 22161, as PB-239 695, $3.75 in paper copy, $2.25 in microfiche. Report of Investigation 73, p 46, 1974. 27 fig, 13 tab, 16 ref.

Descriptors: *Groundwater, Surface waters, *Pumping, *Illinois, Sand aquifers, *Aquifers, Gravels, Sandstones, Dolomite, Water users, Water utilization, Groundwater resources, *Water supply, Conjunctive use.

Large supplies of groundwater are developed from three aquifer systems in northern Illinois for public, industrial, and domestic uses. Sand and gravel and shallow dolomite aquifers are generally encountered at depths less than 500 feet; the depth of sandstone aquifers generally exceeds 500 feet. Pumpage increased from 303.08 mgd in 1960 to 424.30 mgd in 1970. Of the total 1970 pumpage, 61% was for public supplies, serving 274 municipalities, 248 subdivisions, and 308 institutions; 971 industries pumped 25% of the total pumpage. Cook County pumped considerably more groundwater than any other county, nearly 24% of the 1970 total. Other major withdrawals of groundwater are in Du Page, Kane, Will, and Winnebago Counties. In addition to groundwater pumpage, 1112.25 mgd was pumped from Lake Michigan for public supplies in 1970. An additional 29.42 mgd surface water pumpage for public suplies was pumped from the Kankakee, Mississippi, and Vermilion Rivers. Data were provided for planning growth of groundwater pumpage in this area. (Dawes-ISWS)
W75-04727

NUTRIENT ENRICHMENT OF GROUNDWATER FROM SEPTIC TANK DISPOSAL SYSTEMS,
Wisconsin Univ., Madison. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5C.
W75-04758

SUBSURFACE SEWAGE DISPOSAL AND CONTAMINATION OF GROUND WATER IN EAST PORTLAND, OREGON,
Oregon State of Environmental Quality, Portland. Water Quality Div.
For primary bibliographic entry see Field 5B.
W75-04798

SAMPLING OF VARIABLE, WASTE-MIGRATION PATTERNS IN GROUND WATER,
Michigan State Geological Survey, Lansing.
For primary bibliographic entry see Field 5B.
W75-04799

WILL CURRENT RESEARCH ANSWER TODAY'S PROBLEMS AT THE SANITARY LANDFILL.,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-04800

4C. Effects On Water Of Man's Non-Water Activities

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
J. T. Ligon, and D. B. Stafford.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 407, $4.75 paper copy, $2.25 microfiche. South Carolina Water Resources Research Institute, Clemson, Report No 50, December 1974. 75 p, 16 fig, 10 tab, 9 ref, 2 append. OWRT A-024-SC (5).

Descriptors: *Land use, *Urbanization, Hydrology, *Simulation analysis, *Streamflow, Aerial photography, *South Carolina, *Model studies, Computer programs, Watersheds(basins), Watershed management.
Identifiers: *Reedy River(SC), *North Tyger River(SC), Piedmont region(SC), Stanford watershed model.

Results are described of a research project in which the effects of progressive land use changes in watersheds on the hydrologic response of the water sheds were investigated. The study examined two watersheds in the Piedmont Region of South Carolina. The North Tyger River near Spartanburg was selected for study because it was believed to be typical of watersheds which have experienced significant changes in agricultural land use practices. The Reedy River near Greenville was selected as being typical of watersheds in which rural land is being converted rapidly to urban land use. The distribution of land use in each watershed was determined at six intervals over the past 30 years from measurements on aerial photographs. A computer program for the Kentucky version of the Stanford Watershed Model was used to simulate streamflow in the two watersheds. A comparison of simulated and recorded streamflow was used to optimize model parameters so that reasonable agreement between simulated and recorded streamflow was obtained. Correlation of the optimized model parameters and watershed land use was the technique used to examine the relationship between watershed hydrologic response and land use changes. The watershed model parameter, basic maximum infiltration rate, was found to increase significantly with the percentage of the watershed in forest and pasture and to decrease significantly with the percentage of the watershed which consisted of impervious area and residential area. The other three watershed model parameters studied were not significantly correlated with watershed land use.
W75-04448

INADVERTENT RAIN MODIFICATION AS INDICATED BY SURFACE RAINCELLS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W75-04703

DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY PAVEMENT STRUCTURAL SECTIONS,
Cedergren/KOA, Long Beach, Calif.
For primary bibliographic entry see Field 8A.
W75-04809

4D. Watershed Protection

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
J. D. Hewlett.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 350, $3.75 in paper copy, $2.25 in microfiche. Georgia Forest Research Council Report No 30, August 1972. 27 p, 4 fig, 2 tab, append. OWRT A 022-GA(1).

Descriptors: *Water resources, *Forests, *Georgia, Hydrology, Forest management, Watershed management.
Identifiers: *Forest hydrology.

The influences of the forests of Georgia on water flows, erosion and flooding are discussed. The impact of man's various management activities on soil and water resources begins in this complex segment of the hydrologic cycle. The water resources of the State are summarized in terms of the adequacy or inadequacy of the supply or availability by the six major geologic provinces. The overall pattern shows that the Lower Coastal Plain is abundantly endowed with water and water-related resources, while the Ridge and Valley region is in rather short supply. The forest may be used largely to moderate the ecological and hydrological impacts of continued urbanization and industrialization of the Piedmont, and its role in this respect may eventually exceed that of timber supply. Forestry has a greater stake in the Lower Coastal Plain than in any other part of Georgia. About 30% of the total, or 1.5 million acres, is in bays, swamps, ponds, and marshes which the forest managers believe could be greatly improved for timber production by surface drainage. Beach erosion by wind and wave on the outer islands is serious enough to warrant attention from foresters. In developing the multiple use of forest, hydrologic research and trained foresters watershed managers will play a key role. (See also W75-04357 and W75-04358) (Knapp-USGS)
W75-04356

STUDY OF SUBSURFACE FLOW INTO MOUNTAIN STREAMS AS RELATED TO TOPOGRAPHY AND PARTIAL (VARIABLE) SOURCE AREAS,
Georgia Univ., Athens. School of Forest Resources.
J. D. Hewlett.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 351, $3.25 in paper copy, $2.25 in microfiche. Termination Report, December 1972. 5 p, 4 ref. OWRT A-022-GA(1).

Descriptors: Hydrology, *Small watersheds, Base flow, Hydrographs, Groundwater, *Storm runoff, *Demonstration watersheds, *Water sources, *Model studies, Watersheds(Basin).

Results are summarized of a series of studies designed to model the mechanism by which rainfall and snowmelt become streamflow in headwater areas, particularly on forests, ranges and wildlands. The study was intended to further develop the concept of a variable source area of streamflow and a model. The report describes the contributions of the research to the IHD program and cites scientific publications resulting from the research. (See also W75-04356 and W75-04358)
W75-04357

THE VARYING SOURCE AREA OF STREAMFLOW FROM UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
J. D. Hewlett, and W. L. Nutter.
Available from the American Society of Civil Engineering, 345 E. 47th Street, New York, NY, $6.00 in paper copy, $2.25 in microfiche. In: Proceedings of the Symposium on Interdisciplinary Aspects of Watershed Management, Montana State University, Bozeman, Montana, August 3-6, 1970, p 65-83. 10 fig, 14 ref. OWRT A-022-GA(1).

Descriptors: *Subsurface runoff, Overland flow, Small watersheds, Base flow, Groundwater, Water sources, *Demonstration watersheds, Model studies, *Storm runoff, Watersheds(Basins).

To counteract continued insistence by some hydrologists that subsurface stormflow cannot contribute substantially to the storm hydrographs, the variable source area concept is reviewed and hydrograph data from various parts of the world are assembled to prove that subsurface stormflow is both a general and a major hydrologic phenomenon. In addition, subsurface stormflow hydrographs from a large (200 x 8 x 4 feet) watershed segment model are explained in relation to actual watershed discharge under the same storm rainfall. A conceptual model for the first order stream hydrograph is proposed to define hydrologic terms and to serve as a physically valid core model for hydrograph simulation programs. The conceptual model is not yet operational. (See also W75-04356 and W75-04357.)
W75-04358

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
I. L. Strong.
July, 1972, revised September, 1972. 26 p, 1 fig.

Descriptors: *Delaware River Basin Commission, Legal aspects, *Erosion control, *Local governments, *Watershed management, *Water management(Applied), Planning, Water pollution control, Water law, *Regulation, Delaware, New York New Jersey, Pennsylvania, Water zoning, Water sources, Institutional constraints, Government, Law enforcement, Management, Constraints, Permits, Water permits, Public rights, Public access, River regulation, Flood plain zoning, *Runoff, Runoff forecasting, *City planning, *Urbanization, Surface-groundwater relationships.

Identifiers: Runoff and erosion control ordinances, *Ordinances, Subdivision regulations.

Since relationships between development and increased runoff are known, it is possible to design permanent runoff management programs to control the rate and amount of runoff discharged into streams. Through adequate planning prior to development and effective enforcement programs during and after development, public costs from erosion, sedimentation, and flooding can be averted. A runoff and erosion control ordinance is proposed for use in the Tri-County region of Delaware River basin, and it should be incorporated by local governments as an amendment to subdivision ordinances or as an independent ordinance. The Delaware River Basin Commission (DRBC) reviews projects whose effects are on water resources, so almost all local subdivision projects are outside of the Commission's review power. This proposed ordinance stipulates permits, inspection, protection of adjacent properties, maintenance of runoff and erosion control measures, penalties, exemptions, and other general provisions. The ordinance states objectives and established procedures for enforcement, but leaves detailed specifications for protection measures to the Soil and Water Conservation Districts. It therefore should serve as a starting point for local governments when developing an ordinance appropriate for their needs and circumstances. (Grden-North Carolina)
W75-04362

DIFFERENCES BETWEEN PLANNED AND ACTUAL COSTS AND BENEFITS IN SMALL WATERSHED DEVELOPMENT,
Economic Research Service, East Lansing, Mich. Natural Resource Economics Div.
J. D. Sutton.
Soil and Water Conservation, Vol 29, No 4, p 165-168, July/August, 1974. 4 tab, 4 ref.

Descriptors: *Small watersheds, *Water resources development, *Watershed management, *Projects planning, Environmental effects, Cost-benefit analysis, Cost-benefit ratio, River basin development, *Costs, *Benefits.

Water resource planners design projects on the basis of future benefits; the discounted future benefits must exceed the economic costs. The difficulty in planning is that many of the costs and benefits do not become apparent until several years after planning, therefore the variables that relate to the costs and benefits must be projected. Evaluations of projects several years after they have been in operation allow an analysis of the planning process and supplies a way to perfect future planning. Four completed small watershed projects that had operated for four to five years were evaluated by qualitatively comparing current values of primary costs and benefits with planners' estimates and identifying reasons for devergences between planned and achieved values. The results indicated that planners should encourage local involvement in planning; analyze socioeconomic trends at the project and river basin levels; and, use a multiobjective planning approach to reduce the difference between the planned estimates and the actual values. The projects were largely considered to have no effect on the environment. Beauty of the area involved was most often considered improved. In areas where the natural streams were channeled negative responses were received for the effects on hunting, fishing, and wildlife cover. (Orr-FIRL)
W75-04433

THE DISTRIBUTION OF PRECIPITATION IN SOME MOUNTAINOUS CANADIAN WATERSHEDS,
Atmospheric Environment Service, Calgary (Alberta).
For primary bibliographic entry see Field 2B.
W75-04671

SOIL EROSION AND SEDIMENT TRANSPORT FROM GULLIES,
Agricultural Research Service, Columbia, Watershed Research Unit.
For primary bibliographic entry see Field 2J.
W75-04707

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

IDENTIFICATION AND EVALUATION OF WATER TRACERS AMENABLE TO POST-SAMPLING NEUTRON ACTIVATION ANALYSIS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
W. A. Jester, and K. A. Uhler.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 348, $4.75 in paper copy, $2.25 in microfiche. Research Publication Number 85, September 1974. 92 p, 16 fig, 5 tab, 10 ref, 2 append. OWRT A-026-PA(4).

Descriptors: *Neutron activation analysis, *Analytical techniques, *Chemical analysis, *Acidic waters, Hydrogen ion concentration, Ions, *Pollutant identification, Halogens, Chlorine, Iodides, Cobalt, Bromides, *Tracers.
Identifiers: *Tracer techniques, Short irradiation, Vanadium, Cobaltous ions, Chlorine ions, Iodide ions, Bromide ions.

The halogen ions Br-, I-, and Cl- appear to be suitable water tracers for use in waters having a pH range between pH 5 and pH 8 with neutron activation analysis. The bromide and iodide ions can experience very great dilutions and still be detected above normal background concentrations. Chlorides are limited because of the normally substantial natural backgrounds which, in the 27 samples analyzed, range from 1.3 mg/l to 62 mg/l. When using several tracers in one program the chlorides should be injected closest to the sampling point because of the dilution factor limitation. Sensitivities and detection limits are variable and depend upon background concentrations and maximum allowable tracer concentrations. In very acid waters the vanadium and cobaltous ions appear to offer promise, with the divalent cation of vanadium offering the greater sensitivity of the two. Bromides and chlorides appear to be reliable in this pH range with the same limits of detection as at more neutral pH values. Successful application of these tracer techniques is strongly dependent on analysis of the carrier water to determine background concentrations of the tracers. These analyses must be made using activation analysis, since wet chemical analyses do not provide sufficient sensitivity. (Sink-Penn State)
W75-04355

SUPERSONIC AIRCRAFT AND THE OZONE LAYER,
California Univ., Berkeley. Lawrence Berkeley Lab.
H. S. Johnston.
Available from NTIS, Springfield, Va 22161 as Rept. No. LBL-2748, $5.45 in paper copy, $2.25 in microfiche. Report No. LBL-2478, May 1974. 52 p, 15 fig, 3 tab, 29 ref. AEC W-7405-ENG-48.

Descriptors: *Ozone, *Oxygen, *Nitrogen, Movement, Nitrogen compounds, Oxides, Aircraft, Solar radiation, *Model studies, *Air pollution, *Pollutant identification, Path of pollutants, Air pollution effects, Atmosphere.
Identifiers: *Photochemistry, *Stratosphere.

Model calculations including atmospheric motions and the photochemistry of oxygen, water, and

nitrogen oxides indicate that 500 supersonic transports would reduce the stratospheric ozone shield between 3 and 30 percent. Stratospheric ozone has been observed to change with solar-cycle modulated cosmic rays, presumably by virtue of the nitric oxide produced. The ozone data of 1960-70 are consistent with a small decrease and then increase of ozone associated with nitric oxide from nuclear-bomb tests. These observed changes of ozone with nitric oxide indicate a greater sensitivity of stratospheric ozone to nitric oxide than is given by most model calculations. (Houser-ORNL)
W75-04393

METHOD FOR THE CONSTRUCTION OF THREE-DIMENSIONAL ELECTRON MICROGRAPHS,
California Univ., Livermore. Lawrence Livermore Lab.
R. J. Grabske.
Available from NTIS, Springfield, Va 22161 as No. UCRL-51611, $4.00 in paper copy, $2.25 in microfiche. Report No. UCRL-51611, Sept. 10, 1964. 6 p, 3 fig, 1 ref.

Descriptors: Digital computers, Research and development, Dimensions, Shape, Size, Photography, Molds, Plastics, Polymers, Heat, *Pollutant identification, *Instrumentation, Measurement, Fabrication, *Electron microscopy.
Identifiers: *Micrographs(Three dimensional).

A method is described for the construction of three-dimensional pictures from the computer output of the polytropic montage process for three-dimensional representation in electron microscopy. The final computer output is a series of two-dimensional images on photographic film, each of which corresponds to one increment in the third dimension. These film positives (dark images on light background) are stacked alternately with U-shaped spacer bars, with aluminum backing plates top and bottom. The entire assembly is bolted together firmly to form a mold. The mold is subsequently filled with a transparent plastic monomer and polymerized by heat. (Houser-ORNL)
W75-04394

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH PART 4. PHYSICAL AND ANALYTICAL SCIENCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04410

RADIATION INSTRUMENTATION - RADIOLOGICAL CHEMISTRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
N. A. Wogman, R. L. Brodzinski, L. A. Rancitelli, J. R. Kosorok, and C. W. Thomas.
In: Report No BNWL-1850, Part 4, p 1-26, Feb. 1974. 5 fig, 4 tab, 6 ref.

Descriptors: *Pollutant identification, *Environment, *Sampling, *Measurement, *Analytical techniques, *Research and development, *Instrument, Radiochemical analysis, Radioecology, Technology, Movement, Transport, Tracers, Radioactive tracers, Absorption.

This program provides the development of radiochemical instrumentation and analytical technology required for analysis of biomedical and environmental samples and their application in (a) research studies to characterize the inventories and the routes and rates of transport of natural, tracer or waste radionuclides in environmental systems, (b) comparison of radioelement and stable element counterpart behavior in the environment, and (c) the study of physical and chemical transformations which occur and affect the transport and uptake processes. The development of this program provides the instrument technology and the pilot environmental studies needed to delineate advanced research program needs of the Division of Biomedical and Environmental Research. (See also W75-04410) (Houser-ORNL)
W75-04411

NUCLEAR TECHNIQUES IN MEDICAL SCIENCE,
Battelle-Pacific Northwest Labs., Richland, Wash.
H. E. Palmer, L. A. Braby, T. K. Lewellan, W. P. Nelp, and G. M. Hinn.
In: Report BNWL-1850-Part 4, p 27-39, February 1974. 5 fig, 1 tab, 6 ref.

Descriptors: *Pollutant identification, *Research and development, *Nuclear energy, Technology, *Biology, *Instrumentation, *Beneficial use, Public benefits, Public health, Environment, Measurement, Plutonium.
Identifiers: Alpha emitters.

The purpose is to perform research in the application of nuclear technology and radioisotopes to medicine and biology by combining the advanced knowledge, techniques, and instrumentation of the nuclear field with the talent and knowledge of the medical profession to improve and to increase the direct medical benefits to mankind. Advanced instrumentation concepts, detectors, and circuitry are also being developed for use in health physics environmental studies, particularly in measuring in vivo plutonium and other alpha emitters. These studies usually culminate in a cooperative effort with a medical institution for their practical application. (See also W75-04410) (Houser-ORNL)
W75-04412

RADIATION PHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04413

RADIATION DOSIMETRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04414

RADIATION BIOPHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04415

NUCLEAR POWERED PROSTHESES - BIOLOGICAL EFFECTS OF INTRA-CORPOREAL RADIOISOTOPE HEAT SOURCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04416

MEDICAL USES OF ISOTOPES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04417

MEDICAL GRADE PLUTONIUM-238 FROM AMERICIUM-241,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04418

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. THIRD SEMI ANNUAL REPORT TO THE NATIONAL SCIENCE FOUNDATION.
California Univ., Livermore. Lawrence Livermore Lab.
Available from NTIS Springfield, Va., 22161 as Rept. No UCRL-51660, $4.00 paper copy, $2.25 microfiche. Report No UCRL-51660, Sept. 23, 1974. 12 p, 1 tab, 3 ref.

Descriptors: *Research and Development, *Air pollution, *Control, *Model studies, Management, Bays, Operations, Census, *California, Path of pollutants, Pollutant identification.
Identifiers: *San Francisco Bay, Photochemistry.

An interagency effort is underway at the University of California Lawrence Livermore Laboratory (LLL), the NASA-Ames Research Center (ARC) and the Bay Area Air Pollution Control District (BAAPCD) to develop and validate a regional air pollution model which can be applied to the air quality problems facing the San Francisco Bay Area. Previous Semi-annual Reports (UCID-16301, July 9, 1973; UCRL-51537, February 27, 1974) reported on the organization of the development project, progress made, and plans for the remaining time. The planned research activities were divided into five major subtasks, and a joint working group was established for each -- Operational Planning, Source Inventory, Photochemistry, Model Development and Validation, and Model Applications. (Houser-ORNL)
W75-04421

INSTRUMENTATION IMPROVES WATER TREATMENT PLANT OPERATION,
For primary bibliographic entry see Field 5F.
W75-04434

TORULOPSIS AUSTROMARINA SP. NOV. A YEAST ISOLATED FROM THE ANTARTIC OCEAN,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
J. Fell, and I. Hunter.
Antonie van Leeuwenhoek, Vol 40, No 2, p 307-310, 1974. 8 ref.

Descriptors: *Yeasts, *Antarctic Ocean, Water pollution sources, Water pollution, Pollutants, Water quality, *Pollutant identification.
Identifiers: *Troulopsis austromarina, New species.

A new species of yeast, Torulopsis austromarina, has been found in the oceanic waters of the Indo-Pacific and Indian Ocean parts of the Antartic. T. austromarina is related to T. inconspicua but T. inconspicua can not assimilate galactose, trehalose, inulin or soluble starch and has a higher maximum temperature. (Orr-FIRL)
W75-04436

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 2F.
W75-04441

DEPOSITION OF WATER AND CATIONS ON ARTIFICIAL FOLIAR COLLECTORS IN FIR KRUMMHOLZ OF NEW ENGLAND MOUNTAINS,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
For primary bibliographic entry see Field 2K.
W75-04471

'LUORIDE CONCENTRATIONS IN TWO 'ACIFIC COAST INLETS-AN INDICATION OF NDUSTRIAL CONTAMINATION,
'isheries and Marine Service, West Vancouver British Columbia). Pacific Environment Inst.
'or primary bibliographic entry see Field 5B.
V75-04473

ETROLEUM HYDROCARBONS IN NAR-AGANSETT BAY: I. SURVEY OF YDROCARBONS IN SEDIMENTS AND LAMS (MERCENARIA MERCENARIA),
/oods Hole Oceanographic Institution, Mass.
ept. of Chemistry.
or primary bibliographic entry see Field 5B.
/75-04477

ETROLEUM HYDROCARBONS IN NAR-AGANSETT BAY: II. CHEMICAL AND SOTOPIC ANALYSIS,
/oods Hole Oceanographic Institution, Mass.
ept. of Chemistry.
or primary bibliographic entry see Field 5B.
/75-04478

ONTACT (OIL) WATER DETERMINATION IN ERRESTRIAL-WATERS USING AN OCEANO-RAPHIC METHOD,
nstitut za Oceanografiju i Ribarstvo, Split 'ugoslavia).
. Buljan.
cta Adriat, Vol 15, No 4, p 1-19, 1974, Illus.
dentifiers: *Contact water(Oil), Methodology, Oceanographic methods, *Oil pollution, Terstrial waters, *Pollutant identification, Sulfate alance.

method is described making it possible to deterine contact waters (water containing natural etroleum) among natural waters of all types. Two ew properties have to be found: the sulfate alance (SB), (equal to the loss of sulphate during e diagenesis of the water) and the index of aeraon (IA). Data from various countries including umania, Yugoslavia and the near east are given dicating a strong correlation between the negave values of SB and the occurrence of oil in the yers from which water samples were taken. A milar correlation is found for the IA of water and e oil occurrence in the strata. The SB and the IA ow the recent formation of contact water in the ea sediments. The method can sometimes give inrmation prior to boring for oil which concerns e content of oil in the strata. The methods of nding the values of the 2 new parameters are also ven.--Copyright 1974, Biological Abstracts, Inc.
75-04502

OLUTION OF SIMULTANEOUS PARTIAL IFFERENTIAL EQUATIONS: AN EXTENSION F PDEL,
alifornia Univ., Los Angeles.
or primary bibliographic entry see Field 6A.
75-04539

RGANIC COMPOUNDS ENTERING GROUND ATER FROM A LANDFILL,
klahoma Univ., Norman. School of Civil Enneering and Environmental Science.
or primary bibliographic entry see Field 5B.
75-04573

NTEROBACTERIA IN FEEDLOT WASTE AND UNOFF,
gricultural Research Service, Peoria, Ill. orthern Marketing and Nutrition Research Div.
R. Hrubant, R. V. Daugherty, and R. A.
nodes.
pplied Microbiology, Vol 24, No 3, p 378-383, ptember, 1972. 6 tab, 12 ref.

Descriptors: *Feed lots, *Farm wastes, Runoff, Waste disposal, Recycling, Sampling, Microorganisms, Cattle, Pollutant identification, Water pollution sources, Public health.
Identifiers: *Enterobacteria, Refeeding, Health hazards.

Refeeding of wastes is currently being investigated as a possible means of combating vast accumulations of waste from animal production. However, little attention has been given the possible microbiological aspects of feedlot waste. This study was done to determine the types of microflora found in feedlot waste and associated sites. Samples were taken from feedlot waste, runoff from the pens, and water from a large drainage ditch at the feedlot, and they were examined for Enterobacteriaceae. Five-hundred and fifty-three cultures were isolated. Feedlot waste contains about 50,000,000 enterobacteria per gram. More than 90% of these were Escherichia coli. Enrichment techniques allowed isolation of four Proteus spp., both Providencia spp., Klebsiella, Enterobacter aerogenes, Arizona, and single isolate of Salmonella. Neither Arizona nor Salmonella were isolated from the drainage ditch or runoff. Results indicate that the refeeding of unsterilized feedlot waste is potentially hazardous due to the wide spectrum of enterobacteria found in these wastes. (Russell-East Central)
W75-04633

SUBFLOOR MONITORING OF SHADY GROVE DAIRY LIQUID MANURE HOLDING POND,
San Bernadino County Agricultural Extension Service, Calif.
For primary bibliographic entry see Field 5D.
W75-04640

A LEAK-PROOF SAMPLING PORT IN GAS ANALYSES STUDIES,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 7B.
W75-04697

MEASUREMENT OF HYDROCARBONS IN WATER: APPLICATION TO CASES OF SURFACE WATER POLLUTION,
Societe Lyonnaise des Eaux et de l'Eclairage (France). Laboratoire.
J. Mallevialle.
Water Research, Vol 8, No 12, p 1071-1075, 1974. 4 fig, 2 tab, 11 ref.

Descriptors: *Analytical techniques, *Fuels, *Oil wastes, *Organic compounds, *Water analysis, Solvent extraction, Chemical analysis, Water pollution, Separation techniques, Analysis, Water pollution sources, Measurement, Estimating, Instrumentation, Oil, Gasoline, Oil pollution, Water pollution, Spectroscopy, *Pollutant identification.
Identifiers: *Carbon tetrachloride extraction, Florisil.

An analytical method for the determination of hydrocarbons in water by carbon tetrachloride extraction and infrared measurement of absorption was presented. It was found that 0.1 mg/l of hydrocarbons in water can be measured by extraction with carbon tetrachloride, florisil chromatography, and measurement of absorption over the 3000-2800/cm infrared range. While most interference is eliminated by chromatography, the method is unsuitable for aromatic hydrocarbons. Because of its relatively high sensitivity and particularly because of its rapidity and simplicity, the method is highly competitive with other methods, including gaseous phase chromatography. (Henley-ISWS)
W75-04709

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TAR SAMPLES FROM THE MARINE ENVIRONMENT,
Shell Development Company, Houston, Tex. Bellaire Research Center.
P. R. Mommessin, and J. C. Raia.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-787 788, $7.25 in paper copy, $2.25 in microfiche. Report No CG-D-20-75, p 240, June 1974. 2 fig, 7 tab, 8 ref, 6 append. DOT-CG-23,379-A.

Descriptors: *Waste identification, *Water pollution, *Oceans, *Pollutant identification, Analytical techniques, Chemical properties, Physical properties, Wastes, Water pollution sources, Mass spectrometry, Spectroscopy, Microscopy, Palynology, Sulfur.
Identifiers: Carbon isotope ratio, Tar samples.

A physical and chemical characterization of tar samples recovered from the marine environment was carried out. The task included the measurement of 32 physical and chemical parameters, photography, and microscopic analysis of each sample. Two distinct types of tar samples were indicated. One type appears to be urban and industrial waste products. The other includes petroleum-based materials which have been modified in varying degrees by weathering processes operating in the marine environment. This type included materials which were relatively high in sulfur and might originate from the sulfur-rich crudes known to be transported in the vicinity of their collection. Many of the petroleum-based samples contained substantial paraffinic material with a volatility distribution characteristic of that reported for materials found in discharge from tankers during tank cleaning operations. Particularly distinctive results were obtained from the volatility distribution. Other parameters such as sulfur content, carbon isotope ratios, pristane/phytane ratio, mass spectral analyses, and, to some extent, infrared analyses were also productive. The appendixes contain a description of analytical methods, many photographs and photomicrographs, results of a palynological study, and tables, charts, and analyses describing the analytical results. (Sims-ISWS)
W75-04718

DETERMINATION OF THE MOLECULAR SOLUBILITY OF NAVY OILS IN WATER,
Naval Ordnance Lab., White Oak, Md.
M. G. Lai, and C. E. Adams.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-784 414, $3.75 in paper copy, $2.25 in microfiche. Report No NOLTR 74-110, p 21, June 1974. 4 fig, 6 tab, 5 ref.

Descriptors: *Solubility, *Osmosis, *Oil pollution, Oil, Organic compounds, Aqueous solutions, Membrane processes, Separation techniques, Methodology, Measurement, Pollutant identification, Water pollution sources.
Identifiers: Dispersed oil.

A method for the determination of true molecular solubility of hydrocarbons in water was developed. The method, based on the principle of osmotic pressure, was capable of measuring true soluble hydrocarbon concentration in the presence of dispersed hydrocarbon in water. The method was applied to the determination of the molecular solubility of Navy oils in water. The solubility was found to be dependent on the water-to-oil ratio, and the rate of dissolution was a function of agitation of the water-oil mixture. (Sims-ISWS)
W75-04722

DETERMINATION OF THE THICKNESS OF PETROLEUM FILMS ON WATER,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
W. R. Barger, D. R. Sherard, and W. D. Garrett.

Available from the National Technical Information Service, Springfield, Va. 22161, as AD-786 353, $3.25 in paper copy, $2.25 in microfiche. NRL Memorandum Report 2883, p 15, August 1974. 4 fig, 5 tab, 10 ref.

Descriptors: *Oil spills, *Sampling, Liquid wastes, Surfaces, *Oil pollution, *Pollutant identification.
Identifiers: *Oil-layer thickness, Polyurethane foam, Hydrophilic teflon.

Two uncomplicated devices were developed to determine the thickness of petroleum films on water. Both techniques use oil collectors which quantitatively remove the oil layer from a known surface area. The devices are weighed before and after being placed on the oil-covered water, and a small correction factor for entrained water is applied to the calculation of oil layer thickness. Reticulated, polyurethane foam discs are mounted in an open-ended cylinder to form a floating oleophilic sponge. When placed on the water, oil is absorbed within the confined cylindrical area. For thicknesses of Navy distillate fuel oil between 0.25 and 20 mm, the accuracy of the floating absorber is plus or minus -4.8%, and for No. 5 fuel oil thicknesses between 0.5 and 6 mm, accuracy is plus or minus 7.9%. The second collector, a hydrophilic Teflon sheet, removes thin layers of oil from water upon contact. Satisfactory oil layer thickness results are obtained between 65 and 300 micrometers for heavy oils. For lighter oils, the hydrophilic sheet method is valid only between 30 and 85 micrometers. However, because of its chemically inert character, the hydrophilic Teflon collector is useful for sampling spills for chemical identification and analyses. (Sims-ISWS)
W75-04723

SUBSURFACE SEWAGE DISPOSAL AND CONTAMINATION OF GROUND WATER IN EAST PORTLAND, OREGON,
Oregon State of Environmental Quality, Portland. Water Quality Div.
For primary bibliographic entry see Field 5B.
W75-04798

SAMPLING OF VARIABLE, WASTE-MIGRATION PATTERNS IN GROUND WATER,
Michigan State Geological Survey, Lansing.
For primary bibliographic entry see Field 5B.
W75-04799

ROUTINE SURVEILLANCE ALTERNATIVES FOR WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
R. C. Ward.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2645-2652, December 1974. 1 fig, 18 ref. EPA Project 16080 FUO.

Descriptors: *Management, *Automation, *Monitoring, *Water quality control, Abatement, Baseline studies, Data collections, Remote sensing, *Sampling, Water quality standards, Water pollution control, Water pollution, *Colorado, Alternative planning.
Identifiers: Automatic monitoring, Grab sampling.

Grab sampling, automatic monitoring, and remote sensing techniques were reviewed and the adequacy of their respective roles in providing data bases suitable to the needs of water quality management programs and the character of the water to be managed were examined. Traditionally, grab sampling techniques have been used in documenting trends used in preventive strategies but have limited effectiveness for providing data on extreme water quality of the type needed for abatement activities. Automatic monitoring may be used to supplement grab sampling in a cost-effective manner within certain limitations. Remote sensing is not practical at the present time for routine water quality surveillance because of the high cost involved. However, its spatial coverage may provide a large amount of information in inventory and special survey work. (Harmeson-ISWS)
W75-04803

WATER QUALITY BY PHOTOGRAPHIC ANALYSIS,
Wisconsin Univ., Madison.
S. A. Klooster, and J. P. Scherz.
Photogrammetric Engineering, Vol 40, No 8, p 927-935, August 1974. 10 fig, 1 tab, 15 ref.

Descriptors: *Water quality, Management, *Water pollution, *Aerial photography, Turbidity, Air-water interfaces, Reflectance, Suspended solids, Sampling, Remote sensing, *Pollutant identification.
Identifiers: *Infrared film, *Microdensitometers, Bottom effects, Path luminance.

Five years of research have resulted in a workable and practical aerial reconnaissance technique for correlating water quality parameters to aerial photographs. A positive correlation was determined between reflectance of water and the water quality parameter of turbidity. This relationship is permanent for any particular waste. At certain times other parameters such as suspended solids, correlate to turbidity and may be mapped. Proper analysis of aerial photographs in determining water reflectance requires a standard reflectance panel somewhere in the frame. For such investigation color and color-infrared film are utilized and analyzed with a color microdensitometer which, with some modification, is employed to analyze reflectance of water samples. Noise in the analysis consists of bottom effects, reflection from the air-water interface, and path luminance; all of which may be dealt with by proper techniques. (Leibowitz-FIRL)
W75-04814

SOLUBILITY STUDIES OF METALLIC MERCURY IN PURE WATER AT VARIOUS TEMPERATURES,
Middle East Technical Univ., Ankara (Turkey). Dept. of Chemistry.
E. Onat.
Journal of Inorganic Nuclear Chemistry, Vol 36, No 9, p 2029-2032, September 1974. 3 fig, 2 tab, 24 ref.

Descriptors: *Mercury, *Solubility, *Spectrophotometry, Ions, *Ultraviolet radiation, Aqueous solutions, Heavy metals, *Pollutant identification, Analytical techniques.
Identifiers: *Mercurous perchlorate, Ionic dissociation, Dimeric mercury, Beer's Law, *Metallic mercury.

A method employing ultraviolet spectrophotometry was developed for a direct analysis of soluble mercury in aqueous solutions at various temperatures. Soluble mercury is converted into mercurous form in the presence of mercuric ions, and the absorbance of mercurous perchlorate measured at a wavelength of 236.5 nm was utilized for the quantitative determination of mercury in water. A determination can be made of mercury in as small an amount as 3 x 10 to the minus seventh power g-atom/liter. Twenty-three samples at 6 different temperatures were analyzed, with a standard deviation from compiled data of 0.004. A solubility curve was made on the basis of the results of this experiment. There was no indication of ionic dissociation in dimeric mercury or of deviation from Beer's law. (Leibowitz-FIRL)
W75-04815

WASTEWATER ANALYSIS AND ITS RELATION TO COMPANY PROFITS,
Harnish and Lookup, Associates, Newark, N.Y.
J. A. Kem, and R. Wilson.
Industrial Wastes, Vol 22, No 3, p 26-28, 52, May/June 1974. 8 fig, 2 tab.

Descriptors: *Waste water treatment, *Water pollution, *Industrial wastes, *Food processing industry, Sampling, Discharge, Effluent control, *Pollutant identification.
Identifiers: Peanut butter, Tomato products, Grape products.

In-plant sampling and waste water analysis to estimate the waste water resulting from increased output at the Red Wing Company of Fredonia, New York, was initiated so that individual sources of waste water discharge could be identified for individual control and/or elimination. The program was divided into two parts: an extensive in-plant analysis of the individual process lines and , the unit operation in each line. The sampling included grab samples with measured flow, grab samples with estimated flows, samples composited by flow, and samples composited with time. To double-check, the total waste water loads calculated from production records were compared to the results of a second sampling program on the control plant effluent. The production of jams, jellies, peanut butter, tomato products, grape juice and grape products were investigated. On the basis of the individual unit process sampling results, waste water discharge was accurately predicted for a particular day. It was also determined which production operations result in large waste loadings and which do not. By knowing the individual flows that attend each process, it was possible to determine when processing personnel became careless and discharge more than necessary for given unit operation. (Leibowitz-FIRL)
W75-04817

ASBESTIFORM AMPHIBOLE MINERALS: DETECTION AND MEASUREMENT OF HIGH CONCENTRATIONS IN MUNICIPAL WATER SUPPLIES,
Duluth, Minn. National Water Quality Lab.
P. M. Cook, G. E. Glass, and J. H. Tucker.
Science, Vol 185, No 5154, p 853-855, September 6, 1974. 2 fig, 18 ref.

Descriptors: Pollutants, *Water supply, *Municipal water, Lake Superior, Measurement, Fibers, Sampling, *Minnesota, *Pollutant identification, *Asbestos, Analytical techniques.
Identifiers: *Asbestiform amphibole minerals, Duluth(Minn).

Asbestiform amphibole minerals, which are associated with human health problems, were detected in substantial quantities in minicipal water supplies taken from western Lake Superior water. The total concentrations of amphibole minerals in the Duluth, Minnesota, water supply, were measured by x-ray diffraction of daily samples of suspended solids. They averaged 0.19 milligram per liter with large fluctuations due to seasonal and climatological effects on lake circulation. Electron microscopic examination of these water samples confirmed the presence of asbestiform amphibole fibers. A conservative estimate of the fiber count for 1973 Duluth water supply samples is one to thirty million amphibole fibers identifiable by electron diffraction per liter of water, with a mass concentration of one to thirty micrograms per liter. (Prague-FIRL)
W75-04818

SPHERE METHOD TURBIDIMETER,
Nippon Precision Optical Instrument, Co. Ltd., Tokoyo (Japan).
K. Sato.
Chemical Economy and Engineering Review, Vol 6, No 5, p 26-30, May 1974. 7 fig.

Descriptors: *Turbidity, *Suspended matter, Instrumentation, Effluents, Pre-treatment, Measurement, Activated sludge, Polymers, Pollutant identification, Waste water treatment, Analytical techniques.
Identifiers: *Turbidimeters.

he presence of suspended matter in pre-treated ffluents poses some problems such as an increase n fluid resistance and fluid film thickness. To emove solids attached to the membrane , it is im-ortant to measure and control the suspended natter in a given sample. A new instrument, the oic Sphere-Method Turbidimeter, is useful in nalysis of fine amounts of impurities. It operates n the principle of measuring both dispersive and arallel transmissions and comparing the two eadings: turbidity = Td/Tp x 100 percent. Experi-ents in Japan used the Turbidimeter to control ne quality of seawater and to analyze regional dif-erences in the suspended solids of different sea-vater. A positive relationship was found between rbidity and solid suspension. Applications of this strument include pollution control by measuring spended solids, oil concentration, and activated udge after pre-treatment; atmospheric research y measuring particulate concentrations; and, a ariety of applications in petrochemical and etroleum industries, pharmaceutical industries, nd high polymer industries. (Prague-FIRL)
/75-04819

IROLOGICAL STUDIES IN WATER YSTEMS: NATURAL OCCURRENCE OF EOVIRUSES AND THEIR INACTIVATION BY HYSICAL AND CHEMICAL AGENTS,
owa Univ., Iowa City.
or primary bibliographic entry see Field 5F.
/75-04821

NALYZING BIOLOGICAL PROPERTIES OF VASTES,
olorado State Univ., Fort Collins. Dept. of ficrobiology.
. M. Morrison, and K. L. Martin.
972), 12 p, 27 ref.

escriptors: Analysis, *Farm wastes, *Tests, athogenic bacteria, Air pollution, Water pollu-on, Bacteria, Coliforms, Sampling, Microorgan-ms, Ecology, *Pollutant identification, Analyti-al techniques, *Biological properties.
dentifiers: Fecal coliforms, Fecal streptococci, otal plate count.

ecause of the growing concern in the control of ollution and environmental hazards it is impera-ve that some standardization of tests be eveloped in the field of waste analysis. Many of ne problems encountered in the analysis of animal astes are caused by the variability of the crude roduct. Measurements or analyses of domestic nimal wastes fall into three main categories: (1) tandardized tests that have gained professional, overnmental, and judicial status; (2) tests which etect disease-causing organisms; and (3) tests for rganisms that cause pollution to the environment nd are involved in the aesthetic quality of agricul-ral businesses. The basic standardized tests are or total coliforms, fecal coliforms, enterococci or ecal streptococci, and total plate counts. In the etection of pathogenic organisms there are stan-ardized tests for a broad array of organisms. In ne tests for organisms that cause pollution, varia-les such as temperature, pH, salts, nutrients, ox-gen, moisture, nitrogen compounds, and minerals nould be taken into account because they affect ne growth of organisms. (Russell-East Central)
/75-04842

URFACE WATER DATA OF THE LLANO EXAS REGION, PROJECT SANGUINE.
DAW, Inc., San Francisco, Calif.
or primary bibliographic entry see Field 2E.
/75-04847

B. Sources Of Pollution

HE EFFECT OF TEMPERATURE AND HEMICAL POLLUTANTS ON THE BEHAVIOR OF SEVERAL ESTURINE ORGANISMS,
Ichthyological Associates, Inc., Middletown, Del.
For primary bibliographic entry see Field 5C.
W75-04353

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04356

THE VARYING SOURCE AREA OF STREAMFLOW FROM UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04358

NITROGEN RELEASE ASSOCIATED WITH THE DECREASE IN SOIL ORGANIC MATTER IN NEWLY CULTIVATED SOILS,
Technion - Israel Inst. of Tech., Haifa. Soils and Fertilizers Lab.
T. Reinhorn, and Y. Avnimelech.
Journal of Environmental Quality, Vol 3, No 2, p 118-121, April-June, 1974. 2 tab, 2 fig, 18 refs.

Descriptors: *Nitrates, *Potable water, *Soils, *Leaching, *Water pollution, Nitrogen, Cultivated lands, Soil water, Drainage water, Organic matter, Aquifers.
Identifiers: Virgin soils.

High nitrate concentration in sources of drinking water is a world-wide problem. A marked decrease in soil organic matter has been observed during the first years following the cultivation of virgin soils. A series of comparisons between cultivated and virgin soil plots were used to study the release of nitrogen as a result of this cultivation. Results from the area show that the decrease in organic nitrogen from the soil is rather rapid and a steady state is achieved during the first few years. During a certain transition period, the decrease in organic matter in the soil could account for increases in nitrate contents of drainage water. This transition period appears to be short in warm and dry climates, but could be more significant in cold and humid regions were organic matter contents of soils are high. (Mastic-Arizona)
W75-04367

THE USE OF CHIRONOMID PUPAL EXUVIAE FOR CHARACTERIZING STREAMS,
Bristol Univ. (England). Dept. of Zoology.
R. S. Wilson, and P. L. Bright.
Freshwater Biol. Vol 3, No 3, p 283-302. 1973 Illus.
Identifiers: *Chironomid pupal exuviae, *Stream classification, *United Kingdom(River Chew), *Path of pollutants.

Samples of chironomid pupal exuviae were collected by drift netting in the River Chew, Somerset (England) over a period of 4 yr. The samples were analyzed for precentage composition of types and in some cases for numbers of exuviae per unit volume of water sampled. Surface samples contained many more exuviae per unit volume sampled than subsurface samples in the same place, and the catch taken by adjacent nets varied by up to 4 times. The percentage composition of exuvial types remained very consistent under all sampling conditions. Samples taken from other rivers show both similarities and differences between themselves and the River Chew in percentage composition of types. In the River Biss, Wiltshire, a marked change in the exuvial types collected downstream from a sewage effluent outfall was shown after improvements were made to the sewage works. Spring samples from the River Chew showed a change from Tanytarsini- to Orthocladiinae-dominated populations between 1970 and 1972. In the River Chew, exuviae suspended in the stream disintegrated after approximately 1-2 wk. Colored polystyrene balls were used to investigate the downstream movement of floating material in the River Chew. The average stream flow rate was 0.36 m/sec. Some evidence is presented to show that the exuviae float for only about 2 hr in the River Chew before sinking. It is suggested that the area from which most of the sampled exuviae are derived is limited on the River Chew to, at most, 400 m upstream. Provisional identification to genus is given for those exuvial types mentioned. The possibility of using chironomid exuvial analysis as a method of characterizing streams is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04371

TEMPERATURE MEASUREMENTS AND INTERNAL WAVES IN SENACA LAKE, NEW YORK,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 2H.
W75-04400

RECIPIENT RADIATION EXPOSURE - CIRCULATORY SUPPORT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04419

POPULATION RADIATION EXPOSURE,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04420

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. THIRD SEMI ANNUAL REPORT TO THE NATIONAL SCIENCE FOUNDATION.
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W75-04421

THE UNRELIABILITY OF TILE EFFLUENT FOR MONITORING SUBSURFACE NITRATE-NITROGEN LOSSES FROM SOILS,
G. W. Thomas, and B. J. Barfield.
J Environ Qual. Vol 3, No 2, p 183-185. 1974 Illus.
Identifiers: Drainage, Effluents, *Monitoring, *Nitrate-Nitrogen, Soils, *Tile effluents, *Path of pollutants, Fertilizers, Water pollution sources.

Investigation of a completely tiled field showed that only a small proportion of the total flow reaching the drainage ditch came from tile effluent. In 2 measurements 63 and 89% of the flow to the drainage ditch came from seepage other than through tiles. The nitrate-N concentrations in the tile effluent were far higher than those calculated in the nontile flow by mass balance. Nitrate-N concentrations in tile effluents may not be reliable indicators of nitrate-N loses from agricultural land, when the tiles do not intercept all subsurface flow.--Copyright 1974, Biological Abstracts, Inc.
W75-04438

BIOLOGIC DETECTION AND CONTROL OF WATER POLLUTION,
Clemson Univ., S. C. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W75-04447

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.

For primary bibliographic entry see Field 5D.
W75-04449

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. I. FIELD OBSERVATIONS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04469

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. II. INHIBITION EXPERIMENTS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04470

FLUORIDE CONCENTRATIONS IN TWO PACIFIC COAST INLETS-AN INDICATION OF INDUSTRIAL CONTAMINATION,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
R. Harbo, F. McComas, and J. Thompson.
Journal of the Fisheries Research Board of Canada, Vol 31, No 6, p 1151-1154, 1974. 2 fig, 2 tab, 9 ref.

Descriptors: Water pollution, *Fluorides, Analytical techniques, Chemical analysis, Water sampling, Sampling, Statistical methods, Statistics, Water analysis, Connate water, Industrial wastes, Chemical wastes, *Water pollution sources, *Canada, *Path of pollutants.
Identifiers: *Anthropogenic fluoride, *Aluminum smelting wastes, Kitimat River estuary(Canada), Howe Sound(British Columbia).

This study was undertaken to better understand the effects of anthropogenic fluoride upon estuarine and marine ecosystems. A comparison of fluoride levels in Kitimat Arm, where fluoride wastes have been discharged for nearly twenty years, and of Howe Sound, British Columbia, where there is not known to be any input of non-natural fluoride, indicated that some contamination has occurred. A statistical treatment of the data further serves to demonstrate this conclusion. (Ott-FIRL)
W75-04473

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 5G.
W75-04474

A STUDY OF THE WASTE WASH WATER FROM EGG WASHING MACHINES,
Richard B. Russell Agricultural Research Center, Athens, Ga.
D. Hamm, G. K. Searcy, and A. J. Mercuri.
Poult Sci, 53(1): 191-197, Illus, 1974.
Identifiers: *Chemical oxygen demand, Egg washing machines, Solids, Waste wash, Water pollution sources, Industrial wastes, Southeast U.S.

The egg washer waste waters from 11 grading and breaking plants in the Southeast were sampled and characterized for the common pollution parameters. Egg grading plants studied used an average of 4.6 l of water per case for egg washing. Breaking plants used 3.4 l of water per case for washing. Measured median waste concentrations for the wash waters were: for the grading plants-Chemical Oxygen Demand (COD) 7300 mg/l, total solids 9300 mg/l, volatile solids 4600 mg/l; for the breaking plant washers-COD 22,500 total solids 27,000, and volatile solids 16,6000 mg/l.--Copyright 1974, Biological Abstracts, Inc.
W75-04475

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: I. SURVEY OF HYDROCARBONS IN SEDIMENTS AND CLAMS (MERCENARIA MERCENARIA),
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
J. W. Farrington, and J. G. Quinn.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 71-79, 1973. Illus.
Identifiers: Bays, *Clams, Mercenaria-mercenaria, *Oil pollution, Petroleum, Pollution, *Sediments, Sewage, Survey, Oil spills, *Massachusetts(Narragansett Bay), Pollutant identification.

Analyses of hydrocarbons in surface sediments from 8 stations in clams (M. mercenaria) from 3 stations in Narrangansett Bay show that both contain a very complex mixture of hydrocarbons which is not present in clams from Charlestown Pond, a relatively unpolluted coastal pond. This complex mixture of hydrocarbons is present in crude and fuel oils and it is not a likely product of recent biosynthesis by marine organisms. The sediments and clams from the areas sampled in Narrangansett Bay are probably contaminated by petroleum hydrocarbons. Sewage effluents and small oil spills are the most probable sources of the petroleum hydrocarbons. (See also W75-04478)--Copyright 1974, Biological Abstracts, Inc.
W75-04477

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: II. CHEMICAL AND ISOTOPIC ANALYSIS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
O. C. Zafiriou.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 81-87, 1973. Illus.
Identifiers: Agriculture, Bays, Carbon-14, Chemical analysis, Forests, Isotopic analysis, Microorganism, Oil, Petroleum, Sediments, Sewage, Oil spills, *Massachusetts(Narragansett Bay), Oil pollution, *Pollutant identification.

Upper Narragansett Bay surficial sediments contain a complex mixture of hydrocarbons at over 10 times the levels of the lower Bay. 14C and chemical analyses indicate that petroleum is the predominant source of these hydrocarbons; the data exclude as predominant sources microbiologically synthesized hydrocarbons, land runoff, domestic wastes and forest and agricultural products. The hydrocarbons are characterized by low 14C content, by the presence of over 1000 components, including the isoprenoid hydrocarbons pristane and phytane and several homologous series of alkylaromatic compounds. The ubiquitous normal alkanes are not present in significant amounts. Sewage effluents and small oil spills discharged to Narragansett Bay may be chemically modified by evaporation, dissolution and partial biochemical oxidation to yield the observed hydrocarbon distribution. (See also W75-04477)--Copyright 1974, Biological Abstracts, Inc.
W75-04478

EFFECT OF QUALITIES OF IRRIGATION WATER AND FERTILIZERS ON SOIL PROPERTIES, YIELD AND NUTRIENT UPTAKE BY WHEAT,
S.K.N. Coll. of Agriculture, Jobner (India). Dept. of Agricultural Chemistry and Soil Science.
For primary bibliographic entry see Field 3F.
W75-04482

ABUNDANCE, DIVERSITY AND SEASONAL PATTERNS OF ESTUARINE FISH POPULATIONS,
Environmental Protection Agency, Washington, D.C. Office of Technical Analysis.
For primary bibliographic entry see Field 5C.
W75-04485

DISSOLVED AND PARTICULATE HUMIC ACID IN AN EAST COAST ESTUARY,
Adelphi Univ., Oakdale, N.Y. Inst. of Marine Science.
M. E. Hair, and C. R. Bassett.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 107-111, 1973, Illus.
Identifiers: Coasts, *Estuary, *Humic acid, Particulates, Salinity, Seasonal, *Path of pollutants.

Seasonal variations in dissolved and particulate humic acids were studied for a 1 yr period in an East Coast estuary. Particulate humic acids accounted for the bulk of the 2 fractions. The general seasonal trend of both fractions showed a sharp increase in concentrations in the spring followed by a decrease during the summer and winter months. Concentrations of humic acids were related to salinity levels in this stratified system.--Copyright 1974, Biological Abstracts, Inc.
W75-04504

A SYSTEMS ANALYSIS OF WATER QUALITY SURVEY DESIGN,
Clemson Univ., S. C.
L. C. Wilcox, R. W. Gilchrist, M. Wolla, J. F. Andrews, and B. E. Gilliland.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD 787 529, $5.25 paper copy, $2.25 microfiche. Department of the Army, Second Annual Report. U.S. Army Medical Research and Development Command, Washington, D.C., July 1974. 101 p, 10 fig, 2 tab, 2 append.

Descriptors: *Systems analysis, *Water quality control, *Surveys, *Design, Measurement, *Simulation analysis, *Water sampling, Monitoring, Data collections, Management, Sewers, Networks, Mathematical models, Computer programs, Path of pollutants.
Identifiers: Army ammunition plants, Manufacturing processes.

The design of water quality surveys is being investigated in a 3-year project by an interdisciplinary team using systems analysis; this is the second annual report. The surveys being studied are 15 days in length and designed to characterize pollutant types and levels at the site being monitored. Needed are a 'best' sampling and analysis program to maximize data collection and an information management system. Each principal process associated with munitions manufacture is modeled to provide a pollutant load as a function of production level. These process models, plus a topological model of the plant site which defines the sewer network, produce the steady-state pollutant load at each point in the sewer network and at the plant effluent points. These are combined with a model defining United States Army Environmental Health Agency resources available for measurement, sampling, and analysis. The resulting resource matching model defines the feasible monitoring schemes and gives an indication of performance and utilization of resources. The second year's work reported here involved: creation of a library of processes sufficient to describe 6 different types of munitions manufacturing plants; changes in the process model to allow for differences in plants; collection of data for refinement of resource and topology models; improved user-model interface; demonstration of survey planning program on two sites; development and demonstration of data handling software; and documentation and workshops. (Bell-Cornell)
W75-04522

MODELING SEWAGE TREATMENT PLANT INPUT BOD DATA,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04528

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04540

REDUCING FEEDLOT NITRATES IN YOUR GROUND WATER,
J. R. Watson.
Crops and Soils, Vol 24, No 3, p 17-18, December, 1971. 4 fig, 1 tab.

Descriptors: *Nitrates, *Feed lots, *Groundwater movement, Soil profiles, *Nebraska, Leaching, Sampling, *Water pollution sources.

U.S. Department of Agriculture/Agricultural Research Service and Soil and Water Conservation scientists, and the Department of Agronomy at the University of Nebraska have been studying the movements of nitrates and other solubles in soil profiles under beef cattle feedlots. In general, oxygen and nitrogen concentrations are considerably depleted, while carbon dioxide and methane are plentiful. The ammonium-nitrogen and total nitrogen concentrations are higher near the surface, although no nitrates were found. To guard against the possibility of nitrate leaching, however, the following procedures are recommended to all cattle farmers: avoid frequent and extensive scraping of the feedlot surface, and leave the surface soil relatively undisturbed when removing manure from the feedlot. On-lot decomposition is encouraged. In this way, leaching of the soil will be minimized as will its oxygen concentration. Low oxygen concentrations are desirable since oxygen interferes with the reducing environment in which nitrates are converted to harmless nitrogen gas. (East Central State College)
W75-04547

SURFACE WATER QUALITY IS INFLUENCED BY AGRICULTURAL PRACTICES,
Minnesota Univ., Morris.
R. F. Holt.
Transactions of the ASAE (American Society of Agricultural Engineers,) Vol 16, No 3, p 565-568, 1973. 3 tab, 34 ref.

Descriptors: *Surface waters, *Water quality, *Water pollution sources, *Fertilizers, *Farm wastes, Pesticides, *Agricultural runoff, Phosphorus, Nitrogen, Feed lots, Soil contamination, Diseases, Nutrients, Soil conservation, Waste disposal, Fishkills, *Biochemical oxygen demand.
Identifiers: Agricultural practices, Leptospirosis.

The effects of fertilizer runoffs, pesticides, and feed lot wastes on surface water quality are discussed. The three constituents of animal waste that pose a threat to water quality are BOD, infectious agents, and dissolved chemicals, which are primarily nutrients. Rapid influxes of animal waste into waterways can cause massive fish kills, due to reduced oxygen levels; constant, but less rapid, contamination will simply drive the fish away, killing only less mobile forms. Medium textured, well drained soil can degrade 250 to 300 lb of BOD per acre per day. The soil also quickly destroys pathogens, such as streptococcus, anthrax, hog cholera, and mastitis. Although few of these diseases infect man, all can be transmitted to other animals. Plant nutrients, most frequently nitrogen and phosphorus, allowed to run off into streams, either directly from the feed lot or indirectly after application to frozen or saturated soils, are also detrimental to water quality. If manure is disced in as soon as applied, runoff of nutrients is avoided. (East Central State College)
W75-04548

THE DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT RUNOFF WATER QUALITY FROM WATERSHEDS,
Texas A and M Univ., College Station.
J. B. Malouf.
Available from Xerox University Microfilms, Ann Arbor, Mich, 48106, Order No 74-21,211. Ph.D. Thesis, p 196, 1974.

Descriptors: *Mathematical models, *Urban runoff, *Water quality, *Surface runoff, Storm runoff, Precipitation(Atmospheric), Runoff forecasting, Watersheds(Basins), Hydrographs.
Identifiers: Qual Model.

A mathematical model, the Qual Model, to predict the quality of watershed runoff has been developed. Runoff that moves over a basin and the pollutants that are dissolved or suspended in it are evaluated. The pollutants are substances generally deposited as a result of human activity within the basin that are present on streets, surfaces, sidewalks, driveways, roofs, grassed areas, alleys, gutters, and storm drains. The model is based on the assumption that the rate of pollutant removal by surface runoff is proportional to the amount of pollutant remaining and to the runoff intensity. The pollutants found on the basin before rain are obtained from literature and used to evaluate the quality of runoff with respect to time from any watershed. The simulation of urban runoff considers the urban runoff process as composed of precipitation, runoff, and quality which interact to predict the quality found in urban storm water runoff. The model may be applied to any watershed if the basic hydrographic data and surface characteristics are known. Improvements need to be incorporated into this model as more data and a further understanding of the basic mechanisms involved become available. (Orr-FIRL)
W75-04551

AN EXPERIMENTAL STUDY OF THE FREE SURFACE EFFECT ON A BUOYANT JET,
General Dynamics Corp., Groton, Conn. Electric Boat Div.
For primary bibliographic entry see Field 8B.
W75-04559

WASTEWATER CHARACTERIZATION FOR THE SPECIALTY FOOD INDUSTRY,
American Frozen Food Inst., Washington, D.C.
C. J. Schmidt, E. V. Clements III, and J. Farquhar.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-075, p.134, December 1974, 25 tab, 2 append. 1BB037, EPA Grant No R-801684.

Descriptors: *Industrial wastes, *Foods, Canneries, *Waste Identification, Waste treatment, Water pollution control, Water pollution sources, Waste water treatment.
Identifiers: Specialty foods, *Waste characterization.

The specialty food industry generally falls within standard industrial classification (SIC) Codes 2032, 2035 and 2037 and includes approximately 2,300 plants in the United States which produce a wide variety of food products. For waste categorization purposes the specialty food industry was divided into ten categories on the basis of ingredients used, type of product, and liquid waste generation. Twenty-six nationally distributed specialty food plants were investigated and 24 of these field sampled for ten days each to determine raw wastewater characteristics and volume. Related production and processing information was used to calculate the wastewater generation per 1,000 kilograms of production in terms of: 5 day Biochemical Oxygen Demand, Chemical Oxygen Demand, Suspended Solids, Volatile Suspended Solids, Total Phosphorus, Total Kjeldahl Nitrogen, and Grease and Oil. (EPA)
W75-04560

DRY CAUSTIC PEELING OF CLINGSTONE PEACHES ON A COMMERCIAL SCALE,
Del Monte Corp., San Francisco, Calif.
For primary bibliographic entry see Field 5D.
W75-04564

WATER RECYCLE/REUSE POSSIBILITIES: POWER PLANT BOILER AND COOLING SYSTEMS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W75-04566

MANUAL FOR DEICING CHEMICALS: APPLICATION PRACTICES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04567

MANUAL FOR DEICING CHEMICALS: STORAGE AND HANDLING,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04568

MERCURY IN AQUATIC SYSTEMS: METHYLATION, OXIDATION-REDUCTION, AND BIOACCUMULATION,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
H. W. Holm, and M. F. Cox.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.20402, price $1.05. Environmental Protection Agency, Corvallis, Oregon, report EPA-660/3-74-021, p 38, August 1974. 3 fig, 12 tab, 42 ref, 3 append. ROAP 21 AIM Task 11.

Descriptors: *Heavy metals, *Aquatic bacteria, *Food chains, Microbiology, Fish food organisms, Growth rates, *Mercury, Trace elements, *Path of pollutants, Absorption.
Identifiers: *Transformations, *Methylmercury, Bioaccumulation, Methylation.

The role of organisms on the fate of mercury in aquatic environments was evaluated. Objectives were (1) to quantitate transformations of mercury in water-sediment systems, (2) to investigate the fate of elemental mercury in microbial growth systems, and (3) to measure the concentration of total and methylmercury in food chain organisms. In anaerobic water-sediment systems spiked with calcium acetate and mercuric chloride, elemental mercury was produced in larger quantities than methylmercury. The rate of methylation of mercury in aerobic environments was comparable to that in anaerobic environments; however, the rate of release of elemental mercury to the atmosphere during aerobic incubation was nearly three times that observed during anaerobic incubation. No dimethylmercury was produced in these systems. In water-sediment systems, added elemental mercury was oxidized and deposited in the sediments where small amounts of methylmercury were formed. Six pure cultures of bacteria oxidized elemental mercury, but none formed methylmercury. Two Pseudomonas species did not grow in the presence of elemental mercury. In a stream receiving mercuric ion, mosquito fish contained more methylmercury than did tadpoles, snails, and aquatic insects. Algae did not contain methylmercury, even though their total mercury levels were high. (EPA)

W75-04570

ORGANIC COMPOUNDS ENTERING GROUND WATER FROM A LANDFILL,
Oklahoma Univ., Norman. School of Civil Engineering and Environmental Science.
J. Robertson, C. R. Toussaint, and M. Jorque.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 237 969, $4.25 paper copy, $2.25 microfiche. Environmental Protection Agency, Report EPA-660/2-74-077, September 1974, 47 p, 7 fig, 6 tab, 24 ref. 21 AKQ, Task 13, EPA R801417.

Descriptors: *Groundwater movement, *Landfills, *Water pollution sources, *Organic compounds, *Leachate, Water pollution, Water pollution control, Organic wastes, Gas chromatograph, Mass spectrometry, Path of pollutants, Activated carbon, Polychlorinated biphenyls, Environmental effects, Aquifers, Sampling, Organic acids, Pollutant identification.
Identifiers: *Carbon adsorption method, Organic Carbon, Refuse, Industrial organic chemicals.

Organic compounds leached into ground water from a landfill containing refuse deposited below or near the water table were investigated. Ground water from wells within or near the landfill and a control well was sampled by modified low-flow carbon adsorption procedures incorporating all glass-teflon systems to preclude introduction of extraneous organics. Column chromatography, solubility separation, and gas chromatography-mass spectrometry were employed for separation, identification, and quantitation of individual compounds in organic extracts. The ground water was shown to contain low levels of many undesirable organic chemicals leached from the landfill. Of those compounds identified (over 40), most were chemicals commonly employed in industry for manufacturing many domestic and commercial products. The source of these compounds was apparently manufactured products discarded in the landfill, since it had not received appreciable wastes from industrial operations. Because the age of the refuse in the area studied was at least three years, the compounds identified were believed to be substances leached very slowly from the refuse and/or transported away from the landfill very slowly because of adsorption on aquifer solids. Potential long-term pollution of ground water by industrial organic chemicals from landfills may be indicated by this work. (EPA)
W75-04573

ACID-IRON WASTE AS A FACTOR AFFECTING THE DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON IN THE NEW YORK BIGHT: II. SPATIAL VARIATIONS IN THE FIELD AND IMPLICATIONS FOR MONITORING STUDIES,
Harvard Univ., Cambridge, Mass. Biological Labs.
P. H. Wiebe, G. D. Grice, and E. Hoagland.
Estuarine Coastal Mar Sci. Vol 1, No 1, p 51-64. 1973 Illus.
Identifiers: *Acid-iron wastes, Biomass, Calanus-Finmarchicus, Distribution, *Monitoring, *New York Bight, Plankton, Pseudocalanus-Sp, Spatial variations, Temora-Longicornis, *Zooplankton.

A study was undertaken in the New York Bight in an effort to understand small scale variations of single populations and coastal zooplankton communities as they relate to the disposal of acid wastes. Two grids of 8 locations each, 1 day and 1 night station per location, were placed so that one covered the acid grounds and the other a similar area functioning as a control 9 km to the northeast. Thirty-nine taxonomic categories of zooplankton were counted from oblique net tow samples collected at the 32 stations. Biomass was determined from length measurements of individuals of 24 taxa. Species composition of the samples was typical of neritic waters of the northeast Atlantic coast. The spatial distribution of the majority of the species was markedly aggregated, but no trend was observed which would suggest that the acid wastes were an important factor in shaping the distributions. Species did not show collective agreement as to the area in which a higher average abundance for each occurred; and no significant trends in percent similarity or diversity (Simpson's D and the information theory H') were evident. Although Vaccaro et al. found zooplankton biomass to be approximately 30% higher from the control area than from the acid grounds, comparison of the biomass difference between the 2 areas on a species by species basis showed that 95% of the overall difference was accounted for by only 3 spp., Pseudocalanus sp. and its copepodids, Calanus finmarchicus copepodids and Temora longicornis. The acid-iron wastes appeared to be a minor factor affecting the distribution and abundance of zooplankton species during the time of this investigation. (See also W72-11570) --Copyright 1974, Biological Abstracts, Inc.
W75-04574

OPTIMAL WEIGHTING FUNCTION IN WATER QUALITY MODELING,
University of Southern California, Los Angeles. Dept. of Electrical Engineering, and Materials Science.
E. S. Lee, and P. K. Misra.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-234 419 $3.75 in paper copy, $2.25 microfiche. June 1973. 33 p, 10 fig, 3 tab, 49 equ, 5 ref. OWRT C-3051(No. 3678).

Descriptors: *Water quality, *Simulation analysis, *Mathematical models, *Optimization, Dissolved oxygen, Biochemical oxygen demand, Equations, Estimating, Least squares method, Time, Systems analysis.
Identifiers: *Weighting function, *Dynamic modeling, Gradient approach, Calculus of variations, Sequential search technique, Convergence rate.

In an earlier paper by Lee and Hwang (See W71-06587), the invariant imbedding concept was applied to the dynamic modeling of stream quality. In the approach presented herein, a set of weighting functions is introduced. The initial conditions for these weighting functions must be estimated. These initial conditions influence the convergence rate tremendously. In many water quality control situations, the number of experimental data points is limited. In order to obtain the best estimates with limited experimental data, the best convergence rate should be used. In this work, the least squares criterion combined with various optimization techniques, including a sequential search technique and a gradient approach, is used to obtain the optimal initial conditions for the weighting functions. The proposed schemes greatly improve the convergence rate. (Bell-Cornell)
W75-04614

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTES, VOL. I, CH.1 THRU 3,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04623

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTE, VOL II, CH. 4, THRU 7,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04624

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04625

MANURE APPLICATION GUIDELINES FOR THE PACIFIC NORTHWEST,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-04631

ENTEROBACTERIA IN FEEDLOT WASTE AND RUNOFF,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
For primary bibliographic entry see Field 5A.
W75-04633

NONPOINT AGRICULTURAL POLLUTION: STATUS OF ASSESSMENT METHODOLOGY,
Midwest Research Inst., Kansas City, Mo.
A. Aleti, S. Y. Chiu, and A. D. McElroy.
Paper No. 74-4025 presented at the 1974 Annual Meeting of American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974, 16 p, 2 fig, 2 tab, 27 ref.

Descriptors: Agriculture, *Water pollution sources, *Model studies, Nutrients, Microorganisms, Pesticides, Salts, Runoff, Pollutants, Forecasting, Sediments, Path of pollutants.
Identifiers: *Nonpoint pollution(Agricultural).

Agriculture is a major contributor to nonpoint pollution. Agriculture pollutes water with such substances as sediments, salts, nutrients, pesticides, biodegradable organics, and microbial populations. These pollutants are the result of natural factors and source practices. The present difficulty with nonpoint pollution control is the inability to assess, in quantitative terms, the effect of control measures. The overall need is to develop comprehensive models which include all pollutants, which are sensitive to the causes of these pollutants, and which recognize interdependencies between pollutants in order to facilitate development of simplified control measures. Some of the needs basic to the construction of these models are: data gaps; analyses of transport phenomena; evaluation of current and past case studies; model-orientated case studies conducted on a wide scope; collection and storage of information; and, systematic analysis of large volumes of data. (Russell-East Central)
W75-04645

FEEDLOT WASTE EFFECTS ON SOIL CONDITIONS AND WATER EVAPORATION,
Southwestern Great Plains Research Center, Bushland, Tex.
P. W. Unger, and B. A. Stewart.
Soil Science Society of America Proceedings, Vol 38, No 6, p 954-957, November-December, 1974. 2 fig, 1 tab, 14 ref.

Descriptors: *Soil water, *Feed lots, *Bulk density, Porosity, Organic matter, *Evaporation, *Farm wastes, Aggregation, Soil properties, Water pollution sources.

Feedlot wastes were applied to field plots at 0, 22, 67, 134, or 268 metric tons/hectare for 4 successive years. Core and bulk soil samples from the plots were used to evaluate treatment effects on soil water retention, bulk density, strength, porosity, organic matter content, and water-stable aggregates. Evaporation was determined from laboratory columns containing feedlot-waste-treated soil at the surface and untreated soil below the treated soil. For soils treated with feedlot wastes at high rates, water contents at saturation and at -0.2 and -1.5 bars matric potential were significantly higher, and bulk densities were significantly lower, than for untreated soils or those treated at low rates. Soil strength, porosity index

values, and water contents at -15 bars matric potential were not significantly affected by waste applications. Soil organic matter and aggregation increased and evaporation decreased as waste application rates increased. (Roberts-ISWS)
W75-04699

MICROMETEOROLOGICAL MEASUREMENTS FOR PESTICIDE DRIFT STUDIES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
C. E. Goering, and B. J. Butler.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 6, p 1104-1107, November-December 1974. 5 fig, 9 ref.

Descriptors: *Pesticide drift, *Micrometeorology, Atmospheric physics, Boundary layers, Winds, Bridges(Electric), Temperature, *Pesticide drift, *Path of pollutants.
Identifiers: Wind sensors, Thermistor bridges, Hygrothermographs, Temperature probes.

A weather instrumentation system was developed for use in pesticide drift studies initiated at the University of Illinois in the fall of 1972. A 10-m mast was erected in a level, open area for supporting the weather sensor. Six channels of strip chart recorder were used to record signals from three 3-cup anemometers, a microvane, a propeller anemometer, and a thermistor bridge. Mean values of these signals were obtained by planimetering the charts over 100 seconds of record. Mean values of horizontal wind were measured at 10-m, 2-m, and 0.5-m heights. A thermistor bridge measured the temperature difference between 2-m and 10-m height. Atmospheric instability was indicated by measuring vertical air speeds at 1 m with a propeller anemometer. A hygrothermograph and a microbarograph were used to record dry bulb temperature, relative humidity, and atmospheric pressure. Data collected were in reasonable agreement with accepted micrometeorological theory. (Roberts-ISWS)
W75-04714

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TAR SAMPLES FROM THE MARINE ENVIRONMENT,
Shell Development Company, Houston, Tex. Bellaire Research Center.
For primary bibliographic entry see Field 5A.
W75-04718

DETERMINATION OF THE MOLECULAR SOLUBILITY OF NAVY OILS IN WATER,
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 5A.
W75-04722

NUTRIENT ENRICHMENT OF GROUNDWATER FROM SEPTIC TANK DISPOSAL SYSTEMS,
Wisconsin Univ., Madison. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5C.
W75-04758

CHANNEL FLOW DRIVEN BY A STATIONARY THERMAL SOURCE,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 8B.
W75-04793

SUBSURFACE SEWAGE DISPOSAL AND CONTAMINATION OF GROUND WATER IN EAST PORTLAND, OREGON,
Oregon State of Environmental Quality, Portland. Water Quality Div.
E. L. Quan, H. R. Sweet, and J. R. Illian.
Ground Water, Vol 12, No 6, p 356-367, November-December 1974. 8 fig, 1 tab, 10 ref.

Descriptors: *Water pollution, *Cesspools, *Septic tanks, *Domestic wastes, *Soil disposal fields, Nitrates, Water pollution sources, Groundwater movement, Deep percolation, Groundwater recharge, *Oregon, *Path of pollutants, Pollutant identification.
Identifiers: Multnomah County(Ore), Portland(Ore).

East Portland and central Multnomah County have changed from a rural-suburban to a locally urban community with community water and sewer. However, a 30-square mile area within central Multnomah County remains usewered and reportedly disposes of 8 to 10 mgd sewage via cesspools, seepage beds, and drainfields. These methods of waste disposal have resulted in the degradation of the groundwater resource. Central Multnomah County receives groundwater recharge from the Cascade Mountains to the east and intermediate recharge from the Cascade foothills and other isolated hills bordering and within the area. The primary groundwater recharge source is infiltrating precipitation. However, due to development and its attendant reduction in infiltration area, there has been a decrease in natural recharge. The domestic waste which is disposed of via the subsurface is introduced as supplemental local recharge. The depth to which the local recharge can penetrate the water table is limited by its hydraulic potential and the vertical hydraulic conductivity of the substrata. Therefore, the NO3-N contaminated recharge is effectively buoyed up and migrates laterally along the upper portion of the water table to its eventual surface drain, Columbia Slough South Arm. Water samples from wells developing water in adjacent or upgradient sewered areas and/or from deeper aquifers within the unsewered area generally have NO3-N concentrations of less than 1 mg/1. Shallower wells and springs within the unsewered area and South Arm Slough, downgradient from the unsewered area, had NO3-N concentrations ranging from 4.7 to 11.86 mg/1, with a mean value of 7.74 mg/1 in July 1974. (Gibb-ISWS)
W75-04798

SAMPLING OF VARIABLE, WASTE-MIGRATION PATTERNS IN GROUND WATER,
Michigan State Geological Survey, Lansing.
K. E. Childs, S. B. Upchurch, and B. Ellis.
Ground Water, Vol 12, No 6, p 369-376, November-December 1974. 4 fig, 2 tab, 15 ref.

Descriptors: *Water pollution sources, *Septic tanks, *Path of pollutants, *Michigan, *Water pollution, Waste water(Pollution), Sampling, Monitoring, Chemicals, Soil contamination, Groundwater movement, Adsorption, Investigations, Measurement, On-site data collections, On-site investigations.
Identifiers: *Waste migration, *Plumes, Houghton Lake(Mich).

A survey of waste-migration patterns from septic-tank/tile-field systems surrounding Houghton Lake, Michigan, indicated that sampling plans designed to detect and quantify waste migration in groundwater should be predicted on the concept that the waste plume may be complex and that the plume may not follow regional, groundwater flow. The waste-migration plumes at Houghton Lake range from simple, multichemical plumes that move with regional flow to complex plumes that bifurcate, that show different migration patterns for different chemicals, and that move up the regional gradient for short distances. The complexity of these patterns was attributed to a combination of the following system properties: loading rate and recharge at the waste source, local hydrology, chemical-adsorption capacity of the soil, soil microbiology, regolith texture and fabric, and proximity to other waste sources. Based on the observed patterns, it was suggested that observation wells be placed so that an in-depth, 3-dimensional array of samples can be obtained. The wells should be of sufficient depth to insure that deep-moving plumes can be detected and, if the actual, vertical-migration pattern is of importance, the wells should allow collection of water samples at a number of depths. The waste-migration pattern should be monitored throughout the year in anticipation of vertical movement of the plume axis during periods of surface recharge. If more than one chemical is of interest, then it unsafe to assume that an index chemical, such as chlorides, demonstrates the migration of the other chemicals and analyses must be run for the other chemicals. (Sanderson-ISWS)
W75-04799

WILL CURRENT RESEARCH ANSWER TODAY'S PROBLEMS AT THE SANITARY LANDFILL.,
Auburn Univ., Ala. Water Resources Research Inst.
J. C. Warman, R. K. Rainer, and A. S. Chipley.
Ground Water, Vol 12, No 6, p 378-386, November-December 1974. 1 fig, 1 tab, 1 ref, 1 append.

Descriptors: *Landfills, *Waste disposal, *Waste dumps, *Solid wastes, *Alabama, Leachate, Soil management, Environmental engineering, Public health, Garbage dumps, Ultimate disposal, Monitoring, Inspection, Wastes, Water pollution sources, Regulation, Research priorities, Management, Training.
Identifiers: *Sanitary landfills.

Alabama's solid waste management program has been commended repeatedly by the U.S. Environmental Protection Agency for establishing and operating throughout nearly all of the state effective, county-wide, state-approved, rural solid waste collection and disposal systems. The program is administered and regulated by the Division of Solid Waste and Vector Control of the Environmental Health Administration. Collecton systems, sanitary landfills, and other parts of the program are rated by the regulatory agency; rating of landfills is used in enforcement. In 1974, 87.0% of the 67 counties in Alabama representing 97.0% of the total state population of 3,444,000 had total collection and disposal systems. The two greatest problems in the sanitary landfill program are disposal of hazardous industrial wastes and training of operators. Current research throughout the nation on groundwater pollution related to sanitary landfills was reviewed to identify expected research results that will help solve the problems. (Sanderson-ISWS)
W75-04800

RATIONAL BASIS FOR SEPTIC TANK SYSTEM DESIGN,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04801

SOURCES OF METALS IN NEW YORK CITY WASTEWATER,
New York City Dept. of Water Resources. Industrial Wastes Control Section.
L. A. Klein, M. Lang, N. Nash, and S. L. Kirschner.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2653-2662, December 1974. 1 fig, 13 tab.

Descriptors: *Water pollution sources, *Domestic wastes, *Industrial wastes, *Metals, *Storm water, *Water supply, Cadmium, Chromium, Copper, Effluents, Heavy metals, Nickel, Runoff, Sludge, Sludge disposal, Waste water treatment, Zinc, Atlantic Ocean, New York, Hudson River.
Identifiers: *New York City(NY).

In an attempt at rendering as strict an accounting as possible for copper, chromium, nickel, zinc, and cadmium found in New York City waste-

waters, samples from industrial effluents, surface runoff, waste treatment plant influents and effluents, the water supply, and the rivers and harbors were extensively analyzed. Results indicated that contributions of metals to wastewater from the electropolating industry may be significantly overshadowed by those from non-industrial sources which are more difficult to control. Electroplating is the largest single contributor of both chromium and nickel. On the other hand, water supply, storm water runoff, and residential wastes are larger contributors of copper and zinc. Cadmium contributed by residential wastes exceeds that from the electroplaters. Extensive tabulations of total daily weights of metals and average concentrations were presented. (Harmeson-ISWS)
W75-04805

TRACE METALS IN WASTEWATER EFFLUENTS,
University of Southern California, Los Angeles. Environmental Engineerig Program.
K. Y. Chen, C. S. Young, T. K. Jan, and N. Rohatgi.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2663-2675, December 1974. 8 fig, 7 tab, 6 ref.

Descriptors: *Centrifugation, *Metals, *Filtration, *Waste water treatment, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc, Effluents, Sediments, Sludge, Separation techniques, *Trace elements, Pacific Ocean, *California.
Identifiers: Atomic adsorption, Los Angeles(Calif).

Because of the nature of its primary and secondary treatments and the discharge of wastewater and sludge effluents, the Hyperion Treatment Plant, Los Angeles, California, was selected for an intensive study to characterize trace metals in the effluents of different waste treatment processes. The chief concern of the study was the portioning of trace metals into the dissolved and particulate phases and the size distribution of the particulate-borne fractions in wastewater effluents and digested sludge. With the exception of nickel, mangenese, and lead, secondary treatment was found to be moderately effective in removing trace metals in the particulate fraction. On a dry weight basis, trace metals in the particulate fractions of wastewater effluents and digested sludge were found to be within a narrow range. (Harmeson-ISWS)
W75-04806

UNIFORM DISTRIBUTION IN SOIL ABSORPTION FIELDS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04807

EFFECT OF RATION ON MANURE SALT CONTENT,
Texas Tech Univ. Center at Amarillo, Pantex.
For primary bibliographic entry see Field 5D.
W75-04834

AMOUNTS, COMPOSITION, AND MANAGEMENT OF FEEDLOT RUNOFF,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5D.
W75-04835

WATER QUALITY OF STORM RUNOFF FROM A TEXAS BEEF FEEDLOT,
Abraham Baldwin Agricultural Coll., Tifton, Ga.
G. G. Wise, and D. L. Reddell.
Paper No 73-441 presented at 1973 Summer Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 23 p, 9 fig, 5 tab, 23 ref.

Descriptors: *Water quality, *Storm runoff, *Texas, *Cattle, *Feed lots, Measurement, Sampling, Drainage area, *Farm wastes, Path of pollutants, Water pollution sources.

A study of feed lot runoff was conducted fr nine months on a 10,000 head feed lot. Over 250 runoff samples were collected from 11 natural storms on two drainage areas. Approximately .5 inch of rainfall was generally required to initiate runoff. Relationships between volatile solids, total solids, and chemical oxygen demand were established. Storm pattern and size had little effect on the average concentration of a chemical element. Chemical oxygen demand, phosphorus, and Kjeldahl nitrogen followed the variations in total solids concentrations. Potassium, sodium, and chloride and filterable solids were not related to the sediment load. Most chemical constituents' concentrations were greater from area one than from area two, probably because of a greater slope at area one. (Frantz-East Central)
W75-04843

OXYGEN SAG AND STREAM PURIFICATION, (LITERATURE REVIEW),
Georgia Dept. of Natural Resources, Atlanta.
L. A. Neal.
Journal of the Water Pollution Control Federation, Vol 46, No 6, p 1413-1418, June, 1974. 56 ref.

Descriptors: *Aeration, *Oxygen sag, *Stream purification, Photosynthesis, Nitrification, Stochastic processes, Estuaries, Runoff, Reaeration, Biochemical oxygen demand, *Reviews, *Bibliographies, Dissolved oxygen.
Identifiers: Benthic deposits, Dissolved oxygen models.

An extensive bibliography of U.S. and foreign literature on the aeration of natural waters was compiled. A generalized model including the effects of photosynthesis and nitrification was developed. Sornberger and Keshaven produced a stochastic DO simulation under constant and variable temperature conditions, comparing the range of probable DO concentrations against mean values from a deterministic model. A stochastic DO model for streams and estuaries was developed by Schofield and Krutchkoff and predicted values were compared against data from the Ohio River and the Potomac estuary. The method of moments, Reed-Theriault, Thomas slope, and log differences were used in estimating BOD data. Bochinski investigated the merits of the TOD test in using non-biological techniques for estimating BOD, and presented correlations to TOD to COD and TOD to BOD. The results of direct reaeration capacity measurements, employing a radioactive tracer gas for oxygen, and associated hydraulic properties in five rivers were presented by Wallace and Tsivaglou. (Leibowitz-FIRL)
W75-04849

5C. Effects Of Pollution

THE EFFECT OF TEMPERATURE AND CHEMICAL POLLUTANTS ON THE BEHAVIOR OF SEVERAL ESTURINE ORGANISMS,
Ichthyological Associates, Inc., Middletown, Del.
J. W. Meldrim, J. J. Gift, and B. R. Petrosky.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 347, $5.75 in paper copy, $2.25 in microfiche. Bulletin No 11, December 1974. 129 p, 17 fig, 57 tab, 31 ref. OWRT C-3041(No 3677)(1).

Descriptors: *Fish behavior, *Water pollution effects, *Delaware River, *Metabolism, *Thermal pollution, *Chlorine, *White perch, *Silversides, *Brackish-water fish, Striped Bass, Killifishes, Marine fish, Crabs, Fish physiology, Water temperature, Chemical wastes, Salinity, Dissolved oxygen, Light intensity, Regression analysis, Estuaries, Nuclear powerplants, Bioassay, Analytical techniques.
Identifiers: *Temperature avoidance, *Chemical avoidance, Scope for activity, Fish swimming speed, Hogchoker, Grass shrimp, Blue crabs, Sand shrimp, Hypochlorimeter.

The increased use of estuarine waters for cooling purposes by steam electric generating stations requires that responses of affected fishes and macroinvertebrates to temperature and to the antifouling chemical, chlorine, be known. Behavioral avoidance responses to temperature and to chlorine were determined under various combined conditions of salinity, light level, and level of dissolved oxygen over the annual range of temperatures found in the Delaware River estuary. Physiological responses in terms of metabolic rate and scope for activity were determined for different levels of salinity over the same annual range of estuarine temperatures. Multiple regression analysis was used to estimate avoidance temperatures, concentrations of chlorine which would be avoided, and active and resting metabolic rates. Acclimation temperature was the dominant factor influencing the response level in all these studies. However, the effects of the other variables under study significantly affected the response as well as the effect of acclimation temperature. Further, these variables were found to interact such that the effects of the individual variables were not consistent. In several cases, these interactions were more important in determining the response level than the main effects of their components. Data and graphs showing these effects are presented.
W75-04353

ROOKERY BAY: ECOLOGICAL CONSTRAINTS ON COASTAL DEVELOPMENT,
Conservation Foundation, Washington, D.C.
J. Clark.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 349, $5.25 in paper copy, $2.25 in microfiche. Partial Completion Report - Rookery Bay Land Use Studies, December 1974. 91 p, 17 fig, 9 tab, 34 ref. OWRT C-4022(No 9004)(5), C-1817(No 3170)(5), C-2201(No 3385)(5).

Descriptors: *Water pollution effects, *Water pollution sources, *Estuaries, *Water quality control, *Estuarine resources, *Planning, *Coasts, Management, *Flood protection, Wetlands, Zoning, Mangrove swamps, Legislation, Sediments, Eutrophication, Water circulation, Salinity, Turbidity, *Florida, Land use, Urban runoff, Surface drainage, Ecosystems.
Identifiers: Critical area protection., Land use constraints, Development standards, Ecosystem protection, Ecologically vital areas, Socio-economics, *Rookery Bay(Fla).

A coastal ecosystem was identified and analyzed to determine the needs and possibilities for protective management through controlling human activities which would adversely affect its natural drainage system estuarine resources. Three years of monthly sampling of the estuarine biota, and water chemistry, and continuous monitoring of tides and circulation, provided the basis for a detailed description of estuarine resources and amanagement diagnosis of its condition. Watershed vegetation, soils, and hydrology were surveyed. From this data base requirements for protection of the water system estuarine resources were determined. Social, economic, and land use surveys provided the basis for recommending a management plan consisting of: A system of identification of all water areas by use of vegetative indicators; specific development standards restricting water areas to light duty recreation use; contingency standards for low density residential development of water areas that cannot be

stricted to light recreational use; a plan for a 0,000-acre protected natural estuarine corridor r recreation and resource protection, and con-ols on land clearing and site preparation in the atershed. The management program is integrated ith provisions of the Federal Flood Disaster Pro-ction Act of 1973.
75-04354

COLOGICAL HISTORY OF DDT IN RIZONA,
rizona Univ., Tucson.
W. Ware.
urnal of the Arizona Academy of Science, Vol No 2, p 61-65, June 1974. 6 tab, 1 fig, 14 ref.

escriptors: *DDT, *Agricultural chemicals, esticides, *Arizona, Irrigation, Ecology, Histo-, Agronomic crops, Insecticides, Pesticide sidues.

DT first appeared in Arizona in 1943, for experi-ental purposes. Beginning in 1946 and for the xt 20 years it was used primarily on cotton and getable crops at the rate of 1 to 3 pounds per re. The estimated use on irrigated agricultural ops in 1959-60 was 4 million pounds annually. In 64, due to hay and milk contamination the use of DT was restricted to spray application. Failure to duce the milk and beef contamination problem used a moratorium to be placed on the agricul-al use of DDT by the U.S. Food and Drug Ad-nistration in 1969. This made Arizona the first te to have such a ban. The moratorium was re-ated in 1970, 1971, and 1972 until 1973 when the ncellation of all DDT uses in 1973 by the En-ronmental Protection Agency resulted in a na-nwide ban. (Mastic-Arizona)
75-04387

OSE-RATE EFFECT ON LIFE SHORTENING MICE,
s Alamos Scientific Lab., N. Mex.
F. Spalding, O. S. Johnson, R. F. Archuleta, and L. Tietjen.
ailable from NTIS, Springfield, Va 22161 as pt. No. LA-5722-MS, $4.00 in paper copy, $2.25 microfiche. Report No. LA-5722-MS, Sep-nber 1974. 5 p, 4 fig, 2 tab, 21 ref.

escriptors: *Radioactivity, *Radioisotopes, adiation effects, Animal physiology, *Age, ongevity, Laboratory animals, Biology, En-ronmental effects, Public health.
entifiers: *Mice, *Dose-rate.

adult population of strain RF female mice were nditioned with 13 discrete doses of cobalt-60 mma rays ranging from 457 to 3455 rad given at a se rate of 2.76 rad/h. Median after-survival nes of conditioned groups were compared with ntrol nonconditioned groups to determine life-rtening effects of gamma rays given at a rela-ely low dose rate. No linear dependence of life rtening on dose was observed. The average life rtening for all conditioning doses used was 83 ys (0.04 day/rad). The relatively small life-shor-ing effects observed were attributed to several ctors, including age at exposure and dose rate, d not to dose rate alone. (Houser-ORNL)
75-04398

CIFIC NORTHWEST LABORATORY AN-AL REPORT FOR 1973 TO THE USAEC VISION OF BIOMEDICAL AND ENVIRON-ENTAL RESEARCH PART 4. PHYSICAL AND ALYTICAL SCIENCES,
ttelle-Pacific Northwest Labs., Richland, ash.
M. Nielsen.
ailable from NTIS, Springfield, Va 22161 as pt. No. BNWL-1850 Part 4, $5.45 in paper copy, 25 in microfiche. Report No. BNWL-1850, Part February 1974. 128 p, 46 fig, 6 tab, 59 ref.

Descriptors: *Pollutant identification, *Research and development, *Environment, *Physical properties, *Analytical techniques, Technology, Instrumentation, Physicochemical properties, Physics, Radioisotopes, Radiochemical analysis, Transport, Radioactive tracers, Absorption.
Identifiers: Biophysics, *Population exposure, *Radiation exposure.

Described are programs in instrumentation technology which cover radiological chemical methods and instrument development and studies and the development of nuclear techniques for application to medical studies; programs in radiological and chemical physics which include radiation physics, radiation biophysics and radiation dosimetric research; studies related to the development of nuclear powered prostheses and the medical uses of isotopes; and research on the artificial heart. (See W75-04411 thru W75-04420) (Houser-ORNL)
W75-04410

RADIATION INSTRUMENTATION - RADIOLOGICAL CHEMISTRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-04411

NUCLEAR TECHNIQUES IN MEDICAL SCIENCE,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-04412

RADIATION PHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
L. H. Toburen, W. E. Wilson, L. Porter, S. T. Manson, and H. G. Paretzke.
In: Report BNWL-1850, Part 4, p 41-53, February 1974. 9 fig, 44 ref.

Descriptors: *Research and development, *Radiation, Physics, *Radioactive effects, *Biology, Materials, Ions, Ionization, Biological control, Biochemistry, Transport, Theoretical analysis, Evaluation, Prototype tests, Model studies, Speciation.
Identifiers: *Electrons.

The radiation physics program addresses three major research problems associated with understanding the effects of radiation on materials of biological significance. Electron emission from atoms and molecules bombarded by protons is studied to provide information on the primary collision processes. This information is then used to formulate descriptions of track structure and the interaction of ionizing tracks with volumes of biological and biochemical importance. Finally, the mechanism of energy transport and transformation from the energetic initial processes into chemical species is studied using time resolved luminescence. Electron emission cross sections have been improved for the very important low-energy electrons ejected from several gas targets. Theoretical studies of the angular distribution of ejected electrons have continued with a marked improvement for the lower energy electrons. Monte Carlo calculations of track structure and microdosimetric parameters have been started and the results are proving useful in formulating better initial conditions for the distribution of active species. This will permit development of more realistic models for radioluminescence. (See also W75-04410) (Houser-ORNL)
W75-04413

RADIATION DOSIMETRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
W. C. Roesch, and L. A. Braby.
In: Report No BNWL-1850, Part 4, p 55-69, February 1974. 11 fig, 48 ref.

Descriptors: *Research and development, *Radiation, *Radioactivity, *Measurement, *Assay, Radioactivity effects, Environmental effects, Biology, Theoretical analysis, Statistics, Nuclear energy, Physics, Biology, Biochemistry.
Identifiers: *Dosimetry, Dose rate, Dosimetric parameters.

The development of an understanding of radiation effects on living systems at the cellular level continues to be the objective of the Radiation Dosimetry program. The emphasis is on the theoretical development and experimental realization and measurement of those physical parameters that appear appropriate for describing radiation effects. The major theoretical thrust has been on expanding the statistical theory to (1) more adequately incorporate dose rate and recovery effects, (2) examine the applicability of microdosimetric parameters, and (3) accommodate sublethal effects. This theory is then applied to a variety of published experimental radiobiological data to demonstrate its effectiveness in correlating the data. The microscopic distribution of energy in an irradiated absorber continues as an active topic of theoretical and experimental investigation. The major experimental effort, however, has been directed toward bringing to fruition a wide range of irradiation facilities for use in the Radiation Biophysics program. Facilities now provide the capability of irradiating cell monolayers and tissue culture with pulsed, monoenergetic protons, electrons, and filtered 330 kVp x rays. A wide range of dose rate, LET, and dose fractionation are now available with well-documented dosimetric parameters. (See also W75-04410) (Houser-ORNL)
W75-04414

RADIATION BIOPHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
W. C. Roesch, M. H. Schneiderman, L. A. Brady, and D. S. Nachtwey.
In: Report No BNWL-1850, Part 4, p 71-83, February 1974. 8 fig, 1 tab, 48 ref.

Descriptors: *Research and development, *Radiation, *Radioactivity effects, *Environmental effects, Biology, *Biological control, Biochemistry, Mammals, Nuclear energy, Cytological studies, Theoretical analysis, Mathematics, Model studies, Analytical techniques, Technology.
Identifiers: *Dosimetry, *Mutations.

In an effort to understand the effects of radiation on biological systems at the cellular level, two systems were chosen to study at sublethal radiation levels. The CHO is a mammalian cell line amenable to detailed investigation of radiation-induced division delay and radiosensitivity changes near the end of the cell cycle. Theoretical effort has been on mathematically describing the progression of cultured cells through the division cycle and formulating plausible models to account for the biochemical processes that are perturbed by radiation. The experimental emphasis has been in carefully selecting and characterizing the cell line to be used throughout the course of these collaborative experiments. Tissue culture techniques have also been perfected that will allow irradiation under the physically well-defined beams of monoenergetic protons and electrons. A second biological system, the single celled organism Chlamydomonas reinhardi, is being studied with particular attention being directed to its unique mutagenic behavior. Close coordination of experimental design, including dosimetric and biological considerations, and theoretical interpretation continue to be of central importance in this program. (See also W75-04410) (Houser-ORNL)
W75-04415

NUCLEAR POWERED PROSTHESES - BIOLOGICAL EFFECTS OF INTRA-CORPOREAL RADIOISOTOPE HEAT SOURCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
M. F. Gillis, J. R. Decker, J. M. Creer, R. D. Carmichael, and N. R. Gordon.
In: Report No BNWL-1850, Part 4, p 85-88, February 1974. 2 fig, 5 ref.

Descriptors: *Research and development, *Biology, Mammals, *Hogs, *Nuclear energy, *Heat, *Radioactivity effect, Bioassay, Laboratory animals, Analytical techniques, Bioindicators, Technology, Heat exchanger, Heat transfer, Cytological studies.
Identifiers: Miniature swine.

A 50-watt intrathoracic 238Pul602 heat source in a miniature swine produced no clinical signs of untoward effect over a period of almost 10 months, in spite of aortic occlusion and burnup some time prior to sacrifice. Retroperitoneal abdominal implant experiments indicate surface heat flux tolerance limits of less than 0.01 watts/cm sq immediately postoperatively, increasing to nearly 0.04 watts/cm sq within one month, exploiting surface tissue ingrowth techniques. A miniature swine continues on experiment with a 29-watt 238Pul602 heat source implanted retroperitoneally in a discoid aluminum container with a velour fabric coat. (See also W75-04410) (Houser-ORNL)
W75-04416

MEDICAL USES OF ISOTOPES,
Battelle-Pacific Northwest Labs., Richland, Wash.
F. P. Hungate, D. H. Lester, W. F. Riemath, L. R. Bunnell, and M. F. Gillis.
In: Report No BNWL-1850, Part 4, p 89-96, February 1974. 7 fig, 5 ref.

Descriptors: *Research and development, *Human pathology, *Diseases, *Toxicity, Mammals, Biology, Radioactivity effects, Bioindicators, Radioisotopes, Public health, Thulium, Strontium, Yttrium.
Identifiers: Dogs, *Clinical diagnosis.

An inexpensive portable blood irradiator for clinical use in suppressing circulating lymphocytes and organ graft rejection and a generator for Nitrogen-13 (T 1/2 = 10 min) suitable for clinical diagnosis are two applications for isotopes being investigated under this program. A new approach to blood irradiation has been developed using Thulium-170 cast as an integral part of a vitreous carbon body. Production of the irradiators does not involve personnel exposures since the 169Tm used is neutron activated after manufacture. Reactivation is anticipated as units lose effectiveness with the 125-day half-life of 170Tm. Total weight of units applicable to clinical practice is anticipated to be less than 1 kg. An irradiator using Stronium-90-Yttrium-90 was also constructed and tested in a dog. Alpha irradiation of Boron-10 is the basic route being investigated for the 13N hospital generator. Both 13N2 and 13NH3 have potential value as diagnostic pharmaceuticals. (See also W75-04410) (Houser-ORNL)
W75-04417

MEDICAL GRADE PLUTONIUM-238 FROM AMERICIUM-241,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. W. McKee.
In: Report No BNWL-1850, Part 4, p 97-98, February 1974.

Descriptors: *Research and development, *Radioisotopes, *Public health, *Evaluation, Safety, Plutonium, Americium, Economics, Fuel, Waste treatment, Biology, Bioindicators.
Identifiers: *Dosimetry, Clinical dosimetry, Therapy, Irradiation.

The objective is to compare and evaluate the relative economics and technical practicability of various approaches to producing both high-quality (low Pu-236 content) and high-purity (low dilution from other plutonium isotopes) Pu-238 by irradiating Am-241 recovered from spent power reactor fuel. The scope of the program includes (1) projecting the availability of Am-241, (2) identifying the process facilities required for americium recovery, and (3) identifying the optimum target irradiation and processing cycle. (See also W75-04410) (Houser-ORNL)
W75-04418

RECIPIENT RADIATION EXPOSURE - CIRCULATORY SUPPORT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
F. T. Cross.
In: Report No BNWL-1850, Part 4, p 99, February 1974.

Descriptors: *Research and development, *Model studies, *Radioisotopes, *Heat, Radioactivity effects, Public health, Mammal, Bioindicators, Biology, Heat exchangers, Design criteria.
Identifiers: *Circulatory system, *Heat sources, Dose rates.

The objectives are to determine the dose from radioisotopic heat sources suitable for circulatory support systems and to develop radioisotopic heat source holders and shams for use in an animal study to assess the combined effects of heat and radiation from implanted plutonium heat sources. Improved input data and an ancillary code developed for specification of source strength and spectra have been used in parametric computations of dose rates to organ systems and whole body. Conceptual designs of heat source holders for abdominal implantation of heat sources have been completed. (See also W75-04410) (Houser-ORNL)
W75-04419

POPULATION RADIATION EXPOSURE,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. W. McKee.
In: Report No BNWL-1850, Part 4, p 101-104, February 1974.

Descriptors: *Research and development, *Nuclear energy, *Beneficial use, *Public health, *Human population, Radioisotopes, Radioactivity effects, Bioassay, Evaluation, Safety, Surveys, Biology, Genetics, Data collections, Census.
Identifiers: *Dose, *Artificial heart recipients, Somatic effects.

The objective is to develop reliable estimates of the radiation doses to the population that would result from successful development and routine use of Pu-238 fueled artificial hearts. At the beginning of 1973, preliminary calcualtions indicated the most significant component of dose was that transmitted to spouses. Because the age and sex of persons exposed are critical factors in developing estimates of possible genetic or somatic effects, the objectives of the study were broadened to develop greater definition of the age and sex of persons potentially exposed. An extensive survey to collect required interpersonal distance data was carried out in the Salt Lake City area. To obtain required detailed descriptions of the household characteristics of potential artificial heart recipients, copies of the data tapes from the March 1972 Current Population Survey program were obtained from the Census Bureau, and a special computer program was written to process these tapes. At year end, the principal effort was being devoted to the computer program to carry out the detailed dose calculations and summations. (See also W75-04410) (Houser-ORNL)
W75-04420

BIOLOGIC DETECTION AND CONTROL OF WATER POLLUTION,
Clemson Univ., S. C. Dept. of Microbiology.
R. K. Guthrie, R. N. Ferebee, and D. S. Cherry.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 412, $3.75 paper copy, $2.25 microfiche. South Carolina Water Resources Research Institute, Clemson, Report No 40, April 1974. 39 p, 8 fig, 7 tab, 13 ref. OWRT A-022-SC (8).

Descriptors: Freshwater, *Bacteria, Herbicides, *Biocontrol, *Dissolved oxygen, Water temperature, *South Carolina, *Thermal pollution, Lakes, Water pollution effects, Bioindicators.
Identifiers: Bacterial populations, Thermal loading, Ambient temperatures, Bacterial diversity, Chromagenic bacterial populations, Lake Hartwell(SC), Lake Keowee(SC).

Dissolved oxygen, temperature and natural bacterial populations were determined in four systems at monthly intervals in terms of total plate counts, nutritional types, proportion of chromagenic bacteria, and number of colony types, for a period of one or two years and data were analyzed on a seasonal basis. The effects of thermal addition and chemical addition (herbicide pollution) were studied in various systems. In Lake Hartwell, S. C., total bacterial counts showed that seasonal cycles occur; highest counts were observed in the warmer months. Bacterial diversity and percent chromagens varied with seasonal temperatures. No detectable seasonal cycle in total plate counts was observed in Lake Keowee; high and low counts occurred randomly at various times during the year. In fast flowing aquatic systems at Savannah River Project, seasonal cycles were observed in all systems; highest counts were detected during warmer months. Bacterial diversity and percent chromagens varied with temperatures. Of three herbicides tested, one resulted in increased total populations, one did not significantly alter bacterial populations, and the third resulted in significant decreases in total populations. Effects of thermal addition on bacterial populations varied according to the nature of the aquatic system, the generic composition present, and the degree of thermal addition in relation to ambient temperatures.
W75-04447

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. I. FIELD OBSERVATIONS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
T. Cappenberg.
Antonie van Leeuwenhoek, Vol 40, No 2, p 285-295, 1974. 3 fig, 2 tab, 28 ref.

Descriptors: *Bacteria, *Methane bacteria, *Sulfate-reducing bacteria, Freshwater bacteria, Water pollution sources, Water pollution, Sand pits, Methane, Redox potential.
Identifiers: *Acetate, *Seepage, *Lake Vechten(Netherlands).

Observations on the seasonal periodicity in the bottom deposits of Lake Vechten indicate that an ecological relationship exists between the methane-producing and the sulfate-reducing bacteria. The sulfate-reducing bacteria are most abundant at depths of 0 to 2 cm in the mud at hydrogen sulfide potential values around 11 and redox potential values between 100 and 150 mV. The methane-producing bacteria are most abundant at depths of 3 to 6 cm and at hydrogen sulfide potential values around 14 and redox potential values between 250 and 300 mV. During the summer stratification, the numbers of both groups of bacteria rose but the methane-producers increased much more than the sulfate-reducers. The abundance of the sulfate-reducers is limited by the sulfate concentration in the interstitial water of the mud. Methane-producers are at greater depths in

e mud than the sulfate-reducers and the concen-
ation of hydrogen sulfide is less. It is concluded
at the different locations of the bacterial groups
ay be due to sensitivity of the methane-produ-
rs to hydrogen sulfide. (See also W75-04470)
Orr-FIRL)
75-04469

ITERRELATIONS BETWEEN SULFATE-EDUCING AND METHANE-PRODUCING ACTERIA IN BOTTOM DEPOSITS OF A RESH-WATER LAKE. II. INHIBITION EX-ERIMENTS,
ydrobiologisch Institutt, Nieuwersluis
letherlands).
Cappenberg.
ntonie van Leeuwenhoek, Vol 40, No 2, p 297-
6, 1974. 3 fig, 1 tab, 21 ref.

escriptors: *Bacteria, *Methane bacteria,
ulfate-reducing bacteria, Freshwater bacteria,
quatic bacteria, Aquatic bacteria, Inhibition,
ethane, Water pollution sources, Water pollu-
n effects, Lakes.
entifiers: *Acetate, *Inhibition experiments,
ke Vechten(Netherlands), Methanogenesis,
ctate.

possible substrate interrelationship between
ethane-producing and sulfate-reducing bacteria
s been studied in bottom deposits of Lake
echten. The inhibition of methanogenesis in mud
mples by chlorine-containing analogues of
ethane resulted in an accumulation of acetate.
uoroacetate reduced the concentration of
ethane by about 75 percent. If carbon
rachloride was used, an accumulation of
drogen gas was observed. These results indicate
t acetate is the main precursor of methanogene-
in mud. After addition of beta-fluoroacetate,
cumulated and H2S was no longer produced,
ich indicates that lactate is the main source of
ergy for sulfate reduction in mud. Simultane-
sly, the concentration of methane increased.
is may be due to the lower concentration of
S, which has a toxic effect on methanogenesis.
periments with intact mud cores have provided
dence that the described phenomena occur also
situ. (See also W75-04469) (Orr-FIRL)
75-04470

E EFFECTS OF MERCURIC CHLORIDE ON RESPIRATION IN CONGERIA LEU-PHAETA,
xas A and M Univ., College Station. Dept. of
logy.
Dorn.
lletin of Environmental Contamination and
xicology, Vol 12, No 1, p 86-91, July, 1974. 2
, 2 tab, 10 ref.

scriptors: *Mercury, *Respiration, *Water pol-
on effects, Water pollution sources, Statistical
thods, *Texas.
ntifiers: *Congeria leucophaeta, Mercury pol-
on, Respiration rates, Galveston(Tex).

rcury in the marine environment can alter the
mal life functions of aquatic fauna. Respiration
ne function that can be affected by mercury.
e respiration rates of the bivalve, Congeria leu-
haeata were measured in sublethal concentra-
ns of mercuric chloride. Solutions containing
, 0.1, 0.01, and 0.001 ppm mercury as mercuric
oride were sublethal for 48 hours of exposure.
e respiration rate of C. leucophaeata rose with
reasing mercury concentration. The results
re statistically significant above 0.01 ppm. (Orr-
RL)
5-04472

ODUCTION ECOLOGY OF TWO CARIBEAN RINE ECOSYSTEMS: I. PHYSICAL EN-RONMENT AND FAUNA,
erpool Univ., Port Erin (England). Dept. of
rine Biology.
R. R. C. Edwards.
Estuarine Coastal Mar Sce, Vol 1 , No 4, p 303-318, 1973. Illus.
Identifiers: Avoidance reaction(Fish), *Caribbean Sea, Diet, Econogy, *Ecosystems, Effluents, *Fauna, Fish diets, Marine, Mud, Physical environment, *Production, Sand, Weed, Water pollution effects.

A quantitative study was made of the invertebrate macrofauna and fish fauna of 2 shallow water ecosystems. One was in an inlet on a clean sand bottom (1) while the other was on a muddy bottom (2) near a discharge point for domestic effluent. The largest average biomass of littoral infauna of 2.894 g/m2 dry flesh weighr was found at (2) while the largest average biomass of sublittoral infauna of 5.839 g/m2 found at (1). Fish biomass was 5.048 g/m2 at (1) and 1.200 g/m2 at (2) suggesting an avoidance reaction to the contaminated water at the latter locality. Diets of demersal fish were predominantly benthic infauna at (1) and epifauna at (2), the latter being related to the presence of a prolific week fauna in the sublittoral. (See also W75-04480)==Copyright 1974, Biological Abstracts, Inc.
W75-04479

PRODUCTION ECOLOGY OF TWO CARIBBEAN MARINE ECOSYSTEMS: II. METABOLISM AND ENERGY FLOW,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
R. R. C. Edwards.
Estuarine Coastal Mar Sci, Vol 1, No 4, p 319-333, 1973, Illus.
Identifiers: Aerobic conditions, Algae, Caribbean Sea, *Ecology, *Ecosystems, Effluent, *Energy flow, Fish, Invertebrates, Marine, *Metabolism, Plankton, Primary production, Respiration, Water pollution effects.

Primary production and respiration of 2 marine ecosystems were studied by measuring changes in dissolved O2 levels. In 1 of the ecosystems, on a clean sand bottom, energy input from bethic primary production and planktonic sedimentation was fully utilized by the benthic communities (e.g. fish, invertebrates), the former contributing 62% and the latter 38% of input. In the other ecosystem, which received domestic effluent from a city, total energy input to the bottom was higher due to increased sedimentation and production of benthic macroalgae. About half of the input to this system was utilized in aerobic respiration, while the remainder entered the anaerobic system where deposition occurred. Growth, respiration and turnover rates are discussed together with estimates of ecological efficiencies. (See also W75-04479)--Copyright 1974, Biological Abstracts, Inc.
W75-04480

INTERNAL WAVES AS CAUSATIVE MECHANISMS OF ISLAND MASS EFFECTS,
Bellairs Research Inst., St. James (Barbados).
F. Sander.
Caribb J Sci, Vol 13, No 3/4, p 179-182, 1973. Illus.
Identifiers: Internal waves, *Island mass effects, *Nutrient exchange, Plankton, Productivity, Thermocline, Waves(Water), *Entrophication, *Oligotrophic seas, Water pollution effects.

Enrichment by land drainage and a nutrient exchange between benthos and overlying waters are generally regarded as the major causes of an 'island mass' effect in tropical oligotrophic seas. It is postulated that internal waves, which were shown to oscillate vertically over an island shelf in conjunction with high nutrient concentrations below the upper limit of the shallow water thermocline, may also act as a principal causative mechanism by which inshore island waters are enriched. This source of repeated enrichment operates to support increased plankton populations and productivity inshore indicative of an 'island mass' effect.--Copyright 1974, Biological Abstracts, Inc.
W75-04481

ABUNDANCE, DIVERSITY AND SEASONAL PATTERNS OF ESTUARINE FISH POPULATIONS,
Environmental Protection Agency, Washington, D.C. Office of Technical Analysis.
A. J. McErlean, S. G. O'Connor, J. A. Mihursky, and C. I. Gibson.
Estuarine Coastal Mar Sci Vol 1, No 1, p 19-36, 1973. Illus.
Identifiers: Abundance, Diversity patterns, Energy, *Estuarine environment, *Fish populations, *Maryland(Patuxent estuary), Sampling, *Seasonal patterns, Steam electrical powerplants, *Thermal pollution.

Fish populations of the middle Patuxent Estuary in Maryland were sampled over a 4-yr period with quarterly frequency using 3 sampling gears: haul-seine, beam trawl and otter trawl. Data from each quarterly collection at 50 stations were examined using a 3-dimensional grid to check for possible effect due to a steam electrical generating station (s.e.s.). No marked s.e.s. effect was noted although occasional temporal shifts were noted. Trend analyses were performed for the number of species, number of individuals and several diversity indices. All analyses show strong seasonal cycles that are related to the nursery function of the estuary and to migratory activities. Regression lines fitted to the cyclic-trend patterns all show decreasing functions with time. These patterns suggest that a loss in diversity, as measured by these indices, had occurred. These changes are interpreted as being caused by a true loss of species in some cases and a shift in population structure in others. Possible explanations for the trends are examined and the implication of the trends are discussed. Should these trends continue, structural complexity of an already simple system will be reduced and increased amounts of energy may be diverted to dominant forms. The altered system, because of the loss of buffering capacity provided by alternate food web interconnections, may become subject to crashes and booms.--Copyright 1974, Biological Abstracts, Inc.
W75-04485

LITTORAL FISH POPULATIONS AFTER AN OIL TANKER DISASTER IN THE FINNISH SW ARCHIPELAGO,
Turku Univ. (Finland). Archipelago Research Inst.
J. Mankki, and J. Vauras.
Ann Zool Fenn Vol 11, No 2, p 120-126, 1974. Illus.
Identifiers: Disasters, Emulsifiers, *Finnish archipelago, *Fish populations, Gasterosteus-aculeatus, Growth rates, *Littoral, *Oil spills, Phoxinus-phoxinus, Pungitius-pungitius, Oil pollution.

Littoral fish populations of areas of the Baltic Sea affected by an oil spill from a tanker were examined 2 yr after the disaster occurred. The most frequent species were Phoxinus phoxinus (L.), Gasterosteus aculeatus (L.) and Pungitius pungitius (L.). The aim was to ascertain whether the oil, and the emulsifiers used to repel it, had had long-term effects on these species. The fish were caught with a beach seine in June and July, 1971. Their age, growth, condition factor and regression coefficient of log length on log weight were studied in several populations. No statistically significant differences were found between populations of 3 oil-polluted areas and a control area. The effects of oil and emulsifiers on the fish and the situation after the disaster are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04487

THE EFFECT OF SALINITY AND IONIC EQUILIBRIUM ON CONTAMINATION OF ARENICOLA MARINA L. (ANNELIDA:

POLYCHAETA) BY CESIUM-137, (IN FRENCH),
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Service de Recherches Toxicologiques et Ecologiques.
C. Amiard-Triquet.
J Exp Mar Biol Ecol Vol 15, No 2, p 159-164, 1974.
Identifiers: Annelida, *Arenicola-marine, *Cesium-137, Coelomic, Contamination, Fluid, *Ionic equilibrium, Polychaeta, *Salinity, Sands, Food chains, Water pollution effects.

The fixation of 137Cs on fine sand with Arenicola increases when the salinity or the K content of water is decreased. The contamination of Arenicola by 137Cs was, therefore, higher than in normal sea water. The concentration factors for sea water diluted to 60% or with a K level of 50% were twice those for normal sea water, except for the coelimic fluid, the concentration factor of which remained constant. Several sssumptions can explain the process: a weaker competition between ions at the lower concentrations; substitution of K by Cs; parallel contribution of Cs and K in maintaining the internal environment more hypertonic than the external environment and contamination via the food chain in desalinated sea water.--Copyright 1974, Biological Abstracts, Inc.
W75-04489

INFLUENCE OF HEATED DISCHARGE WATERS FROM THE 'SKAWINA' ELECTRIC POWER STATION ON THE ICHTHYOFAUNA OF THE RIVERS SKAWINKA AND VISTULA,
P. Epler, and K. Bieniarz.
Acta Hydrobiol, Vol 15, No 3, p 331-339, 1973, Illus.
Identifiers: Alburnus-alburnus, Barbus-barbus, Electric powerplants, Fauna, *Heated discharge, Ichthyo, Leuciscus-cephalus, Leuciscus-leuciscus, Rivers, Seasonal, *Poland, Skawinka River, Vistula River, *Thermal pollution, Water pollution effects.

Investigations on the influence of heated waste waters discharged into the Skawinka and Vistula Rivers (Poland) showed that except in the hottest seasons of the year fish gather in the area of heated waters. In high water temperatures (20C and 28C for not heated and heated waters respectively) the total number of fish caught decreased. It was found that such species as Leuciscus cephalus (L.), Alburnus alburnus (L.), Barbus barbus (L.) and L. leuciscus (L.) are highly eurythermic.--Copyright 1974, Biological Abstracts, Inc.
W75-04491

THE EFFECT OF COOLING WATER DISCHARGES ON ZOOPLANKTON IN A BAY OF LAKE MALAREN,
Uppsala Univ. (Sweden). Inst. of Zoology.
M. Lanner, and B. Pejler.
Inst Freshwater Res Drottningholm Rep, 53, p 31-33, 1973, Illus.
Identifiers: Bays, *Cooling water discharges, Lakes, Plankton, *Polyarthra-remata, Sewage, *Sweden(Lake Malaren), Winter, *Zooplankton, *Thermal pollution, Water pollution effects.

A relatively high frequency of species, as well as individuals, was noted in the middle of winter (March 1972) in the inner part of Vasteras Bay (Sweden), which is affected by cooling water discharges from 2 power stations and by municipal sewage from the city of Vasteras. In a strip of open water in the ice just outside one of the power stations, where the temperature at some places exceeded +9C, a warmwater stenothermal rotifer occurred, Polyarthra remata, previously never found in the winter.--Copyright 1974, Biological Abstracts, Inc.
W75-04496

NITROGEN FIXATION (ACETYLENE REDUCTION) BY PHYTOPLANKTON IN GREEN BAY, LAKE MICHIGAN, IN RELATION TO NUTRIENT CONCENTRATIONS,
Illinois Univ., Urbana. Dept. of Botany.
L. N. Vanderhoef, C.-Y. Huang, R. Musil, and J. Williams.
Limnol Oceanogr, Vol 19, No 1, p 119-125, 1974, Illus.
Identifiers: *Acetylene reduction, Aphanizomenon-sp, Bays, Diatoms, Gloeotrichia-sp, *Green Bay(Wis), Growth, *Lake Michigan, Microcystis-sp, *Nitrogen fixation, Nutrients, Phosphates, *Phytoplankton.

N fixation (acetylene reduction) and the growth of blue-green algae (Aphanizomenon sp., Microcytis, sp., Gloeotrichia sp.) were studied in Green Bay (Lake Michigan) during summer 1972. Where concentrations of all nutrients were high Microcystis predominated. As combined N concentrations decreased Aphanizomenon increased. Aphanizomenon showed increasing C2H2-reducing efficiency as the NH4+ + NO3- concentration declined, but its standing crop decreased with declining P concentration. At 40 km from the Fox River diatoms were predominant. Increased algal growth and N fixation in 1972, as compared to 1971, correlated with higher phosphate concentrations. Almost half as much N was added to the bay by fixation as was delivered by the Fox River during the same period.--Copyright 1974, Biological Abstracts, Inc.
W75-04498

A NEW TECHNIQUE FOR THE STUDY OF EPIPHYTIC ALGAE,
Clayton Junior Coll., Morrow, Ga.
H. D. Brown.
Limnol Oceanogr, Vol 19, No 1, p 151-152, 1974.
Identifiers: *Algae, Colonization, *Epiphytic algae, Mayaca-aubleti, Scirpus-confervoides, Sphagnum-macrophyllum, Websteria-submersa, *Analytical techniques, *Macrophytes, Lakes.

Several species of aquatic macrophytes are capable of growing both submerged and as terrestrial plants near the shoreline of lakes (Scirpus confervoides (=Websteria submersa sensu Small), Mayaca aubleti Michx. and Sphagnum macrophyllum Bernh.). Rapid colonization by algal epiphytes follows submergence of the land form of these plants and can then be correlated with a definite period of time, whereas the time of attachment of communities on naturally growing macrophytes is unknown.--Copyright 1974, Biological Abstracts, Inc.
W75-04499

BENTHIC COMMUNITY RESPIRATION NEAR THE WOODS HOLE SEWAGE OUTFALL,
Woods Hole Oceanographic Institution, Mass.
K. L. Smith, Jr., Gilbert T. Rowe, and Jean Ann Nichols.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 65-70, 1973, Illus.
Identifiers: Antibiotics, Bacteria, *Benthic community, Fauna, Flora, Formalin, *Massachusetts(Buzzards Bay), Oxygen, *Respiration, Sediment, *Sewage outfalls, Absorption, *Water pollution effects.

Effects of the Woods Hole, Massachusetts sewage outfall on the surrounding benthic community were examined. In situ O2 uptake measurements of the sediment were made before and after treatment with antibiotics and formalin. Total O2 consumption was 67.8 ml O2 m-2 h-1 of which 15.0 ml O2 m-2 h-1 was attributable to the chemical demand of the sediment. Community respiration was 52.8 ml O2 m-2 h-1 with bacterial respiration representing 34% of the biological demand. Total O2 uptake, chemical demand and bacterial respiration were significantly higher than values obtained in the control area in Buzzards Bay. Macrofaunal and meiofaunal-microfloral-microfaunal respiration were estimated from structural data and the literature. Utilization and accumulation organic enrichment is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04503

ON THE VULNERABILITY OF ECOSYSTEMS DISTURBED BY MAN,
California Univ., Berkeley. Lawrence Berkeley Lab.
J. Harte, and D. Levy.
Technical report, LBL-3214. October 1974. 30 p, 5 fig, 6 ref. (Presented: First International Congress of Ecology, The Hague, Netherlands, September, 1974).

Descriptors: *Ecosystems, *Model studies, Stability, *Environmental effects, Flow, *Energy, *Nutrients, Methodology, Trophic, Equations, Measurement, Optimization, Water quality.
Identifiers: *Liapunov direct method, Environmental quality, Perturbations, Feedback, Sensitivity, Diversity.

The Liapunov stability theory is applied to models of energy and nutrient flow in ecosystems. The domain of stability under non-infinitesimal perturbations is discussed and significant differences are pointed out between models with and without detritus-decomposer feedback loops. Possible practical implications are suggested. Speculations concerning the role of fluctuations in ecosystems and the possibility of determining successional trends from an optimization procedure are also discussed. It is shown that increasing the number of trophic levels generally has no effect on the size of the domain of asymptotic stability; the exception to this occurs if the food web is not pyramidal in shape but rectangular or inverted. The damage to the decomposers or the organic or inorganic nutrient pools in an ecosystem is a potential source of instability--greater perhaps than that arising from tampering with the more visible predator-prey components of the system. (Bell-Cornell)
W75-04521

COMPARATIVE PHOTOSYNTHETIC CAPACITIES OF INTERTIDAL ALGAE UNDER EXPOSED AND SUBMERGED CONDITIONS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
W. S. Johnson, A. Gigon, S. L. Gulmon, and H. A. Mooney.
Ecology. Vol 55, No 2, p 450-453. Illus. 1974.
Identifiers: *Algae(intertidal), *Photosynthesis, Desiccation, Endocladia-Muricata, Fucus-Distichus, Iridaea-Flaccida, Porphyra-Perforata, Prionitis-Lanceolata, Tidal, Ulva-Expansa, *Marine algae.

Photosynthetic rates were measured for 6 spp. of intertidal marine algae, in the air and submerged. Ulva expansa and Prionitis lanceolata, from the lower intertidal, show reduced photosynthetic capacity in air compared to submerged rates. In contrast, species from the middle and upper littoral (Iridaea flaccida, Porphyra perforata, Fucus distichus and Endocladia muricata) reached maximum photosynthesis after some degree of drying. For these latter species, photosynthetic rates can be 1.6-6.6 times greater in air than in water at the same illumination and temperature. Desiccation rates under natural conditions are slow enough that these algae are capable of continuing a high rate of photosynthetic activity for extended periods while exposed and may fix the bulk of their C at this time. The capacity of these algae for sustained photosynthesis in air vary according to their intertidal zonation. These relationships may be partially responsible for the vertical distribution of intertidal marine algae.--Copyright 1974, Biological Abstracts, Inc.
W75-04524

MICROBIOLOGICAL PRODUCTION OF GEOSMIN,
Rutgers - The State Univ., New Brunswick, N.J. Inst. of Microbiology.
For primary bibliographic entry see Field 5D.
W75-04561

ENVIRONMENTAL REQUIREMENTS AND POLLUTION TOLERANCE OF FRESHWATER DIATOMS,
Bowling Green State Univ., Ohio.
R. L. Lowe.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency Cincinnati, Ohio, Report EPA-670/4-74-005, p 334, November 1974. 16 ref, 3 append. 1BA027 ROAP 05AEF; Task 12, R-802495.

Descriptors: Aquatic biology, Plankton, *Diatoms, Ecology, Algae, Water quality, Phytoplankton, *Bioindicators, Periphyton, *Lethal limit, *Water pollution effects.
Identifiers: Pollution tolerance, Algal ecology.

Data on the environmental requirements and pollution tolerance of 300 common species and varieties of fresh water diatoms were compiled from 48 references. The following parameters were considered: pH, nutrients, salinity, organic pollution tolerance (saprobien system), current, general habitat, specific habitat, seasonal distribution, temperature and geographical distribution. A consensus of opinions for each parameter was established for most taxa. It is suggested that this compilation be employed to evaluate data from plankton and periphyton samples collected for the assessment of water quality. (See also W71-04210) (EPA)
W75-04563

MERCURY IN AQUATIC SYSTEMS: METHYLATION, OXIDATION-REDUCTION, AND BIOACCUMULATION,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W75-04570

BACTERIAL ZOOGLOEA FORMATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04572

ACID-IRON WASTE AS A FACTOR AFFECTING THE DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON IN THE NEW YORK BIGHT: II. SPATIAL VARIATIONS IN THE FIELD AND IMPLICATIONS FOR MONITORING STUDIES,
Harvard Univ., Cambridge, Mass. Biological Labs.
For primary bibliographic entry see Field 5B.
W75-04574

SALMONELLA AND NATURAL PURIFICATION OF POLLUTED WATERS, (IN GERMAN),
L. Popp.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 158, No 5, p 432-445. 1974 Illus.
Identifiers: Effluents, Fish, *Germany(Oker River), Infections, Rivers, *Salmonella, *Sewage treatment, Water purification, Water pollution effects, E. coli, *Self purification.

Along the river Oker (West Germany) a chain of control stations for water quality were instituted. All water samples were examined for the presence of salmonellae, for the number of Escherichia coli and for chemical data. An 18 mo. examination period is given, based on investigation of 826 water samples from the control stations and of 86 effluent samples from biological sewage treatment plants discharging into the main river and its tributaries; 55 types of salmonellae were isolated. The effluents of sewage plants contained 36 types of salmonellae, of which 32 also were found in the river. Numbers of isolated types of salmonellae and percentage of Salmonella-containing samples, the number of E. coli, the BOD and the flow volume at the control stations were recorded. Analogous data for effluents of sewage plants were presented. The results demonstrated the seasonal variations of Salmonella pollution. Semiquantitative examination for salmonellae at this control station were recorded. In spite of biological treatment of sewage and a high degree of dilution of effluents from the sewage treatment plants, considerable pollution by salmonellae was established. Effects of self purification were only seen during summer. Increasing flow elevated the percentage of Salmonella-containing samples but decreasing flow did not reduce the percentage. Consequently dilution cannot be considered an influence on Salmonella pollution. No dependence on BOD was observed. The epidemiological consequences of river pollutions by salmonellae were discussed. Attention was called to observations demonstrating that 64% of fishes caught in a polluted river were infected by salmonellae. The necessity of a reform of sewage treatment and sewage disposal was stressed.--Copyright 1974, Biological Abstracts, Inc.
W75-04578

MERCURY IN FOOD: A SCIENTIFIC STATUS SUMMARY BY THE INSTITUTE OF FOOD TECHNOLOGISTS' EXPERT PANEL ON FOOD SAFETY AND NUTRITION,
Institute of Food Technologists, Chicago, Ill. Expert Panel on Food Safety and Nutrition.
J Food Sci. Vol 38, No 4, p 1-6. 1973.
Identifiers: Epidemiology, Fish, Human diseases, Industrial, *Mercury, Microorganism, *Nutrition, Panel, Pollution, Safety, *Food safety.

Since Hg is ubiquitous, everyone consumes trace amounts. It can be found in all food and water, with higher concentrations in foods grown in areas having higher concentrations of Hg in soil. The short-chain alkyl Hg compounds, methyl, dimethyl and ethyl Hg, are more toxic than elemental Hg, inorganic salts of Hg and the aryl Hg compounds. Since Hg is excreted in feces, sweat exhaled breath, and urine, a daily intake of 1.0 mg/day of elemental Hg or inorganic Hg salts appears safe. The USA Department of Labor established an allowable level of 0.1 mg elemental Hg vapor or inorganic salts of Hg and 0.01 mg alkyl Hg per m3 of air for industrial exposures. The average USA diet contains less than 1/50 this amount. Epidemiological studies in several locations of elevated Hg content show no cases of methyl Hg poisoning resulting from fish consumption in the USA. The Food and Drug Administration does not allow the sale of fish containing more than 0.5 ppm (0.5 mg/kg) of Hg, and the canned tuna industry now includes Hg content as 1 of their quality specifications. The naturally occurring element, Hg, does not appear to pose a toxic hazard in the USA food supply; and there is no evidence that alkyl Hg formed by microorganisms in nature has led to methyl Hg poisoning. This does not imply there is no reason to control the release of elemental Hg and inorganic Hg salts into the environment from industrial operations. It does not indicate the problem has been recognized. Steps were taken to reduce discharges of elemental Hg and inorganic salts of Hg and to reduce or eliminate use of mercurials in agriculture providing an increasing margin of safety against the possibility of an excessive amount of Hg in any form finding its way into any portion of the USA food supply.--Copyright 1974, Biological Abstracts, Inc.
W75-04579

NUTRIENT ENRICHMENT OF GROUNDWATER FROM SEPTIC TANK DISPOSAL SYSTEMS,
Wisconsion Univ., Madison. Dept. of Geology and Geophysics.
J. G. Dudley, and D. A. Stephenson.
An Inland Lake Renewal and Shoreland Management Demonstration Project Report. November 1973. 131 p, 22 fig, 8 tab, 42 ref, 2 append.

Descriptors: *Ammonia, Nutrients, *Septic tanks, Water pollution sources, *Eutrophication, *Nitrogen compounds, *Phosphorus, Quality control, *Ground water, Recharge, Lake shores, Effluents, Sewage disposal, Nitrates, Lakes, Soils, Saturated flow.

Results of a literature review and field investigation of eleven septic systems of year-round dwellings near or on lakeshores document nutrient contributions of household septic disposal systems to ground water. Accumulations of nitrogen, ammonia, phosphorus, potassium and chloride were recorded. These varied with type of soils and water tables. Artificial recharge below absorption fields may result in local reversals of water table gradients and alterations in ground water flow patterns. In shoreland environments where under natural conditions lake water recharges the ground water, a local reversal could occur which would result in nutrient enriched ground water discharging to the lake. Large amounts of phosphorus may reach ground water at sites with well-drained, sandy soils where there is as much as 10 to 15 feet of unsaturated soil between the point of effluent release and the water table. Ground water samples taken with a bailer may have significant analytical bias. Proper location of observation wells is essential to ensure efficient monitoring of ground water quality. Additional research is needed to determine soil environmental factors which influence phosphorus migration and what physical and chemical transformations nitrogen species undergo in discharge areas. On lake shores where septic tank effluents may percolate into ground water which discharges to the lake large concentrations of phosphorus and nitrogen in nitrate form will promote large crops of algae and other aquatic plants. (Salzman-North Carolina)
W75-04758

AMELIORATION OF EFFECTS OF OIL SPILLS.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04779

THE EFFECTS OF THE INTERACTION OF OUTBOARD MOTORS WITH THE AQUATIC ENVIRONMENT: A REVIEW,
Southeastern Massachusetts Univ., North Dartmouth. Dept. of Civil Engineering.
T. P. Jackivicz, Jr., and L. N. Kuzminski.
Environ Res. Vol 6 No 4. p 436-454. Illus. 1973.
Identifiers: *Aquatic environment, Bluegill, Fathead minnows, Fish, *Motors(Outboard), Reproduction, *Reviews, Toxicity, *Water pollution effects, Biota.

The effects of the compounds associated with outboard motor subsurface exhausts on water quality and aquatic biota are reviewed. The problems affiliated with water quality may include the formation of undesirable tastes and odors and the appearance of oily substances. Outboard motor exhaust water can exhibit a toxic effect in sufficiently high concentrations to fathead minnows and bluegills, taints the flesh of various fish, and may affect the reproduction of fish. A discussion of the current research related to the effects of outboard motors on the aquatic environment is presented. Recommendations are given for future research to broaden the understanding of the interaction of outboard motors with the aquatic environment.--Copyright 1974, Biological Abstracts, Inc.

W75-04816

EFFECTS OF POLLUTION ON FRESHWATER FISH, (LITERATURE REVIEW),
National Water Quality Lab., Duluth, Minn.
J. M. McKim, G. M. Christensen, J. H. Tucker, D. A. Benoit, and M. J. Lewis.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1540-1590, June, 1974. 399 ref.

Descriptors: *Reviews, *Bibliography, *Biochemistry, *Water pollution effects, *Fish, Thermal pollution, Monitoring, Bioassay, Mercury, Tritium, Aquatic environments, Pesticides, Water quality, Methodology, Salinity, Herbicides, Industrial pollution, Piscicides, Pulp wastes, Domestic pollution.
Identifiers: Enforcement, Organochloride pesticides, Organophosphates, Cholinesterase, Alpha-Beta endosulfan.

Many books dealing with biological indicators, biochemical ecology, water quality, and management were published between 1972 and 1973. One treatise contained articles on thermal pollution, monitoring, and enforcement. Papers on various bioassay methods and water chemistry problems were compiled by Glass. The American Society for Testing and Materials listed 140 new biological and chemical methods. Instrumental analysis, automated chemical analysis, and data analysis were investigated. Mercury contamination of the environment dealing with occurrence, methods of analysis, environmental dynamics, and biological effects was studied by Hartung, Friberg and Vostal. Occurrence, dynamics, methods of minimizing persistent pesticides, and international control of such pesticides was researched by Edwards. The biological and environmental aspects of chlorinated insecticides, dealing with biochemistry and toxicity to nontarget organisms was explored by Brooks. The effects of pesticides on aquatic environments was the subject of several reviews, including those of McCaull, Pimentel, Mawdesley-Thomas and Fraser. (Leibowitz-FIRL)
W75-04848

5D. Waste Treatment Processes

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. G. Wenzel, and B. H. Bradford.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 332, $5.75 in paper copy, $2.25 in microfiche. Metropolitan Water Intelligence Systems Report, July 1974. 138 p, 15 fig, 12 tab, 10 ref, 5 append. OWRT C-4172(No 9028).

Descriptors: *Combined sewers, Simulation analysis, *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization, Water pollution control, Operations research, Storage, Detention, Reservoir operation, Mathematical models, Algorithms, Systems engineering, Automatic contro., Computer programs.
Identifiers: Combined sewer systems, *Mathematical programming.

Using the 1971 San Francisco Master Plan for Wastewater Management as a data source, this report demonstrates the use of simulation and optimization to develop a control strategy for combined sewer detention basins operating under computer based automatic control. Results are presented which can be applied for the implementation of control strategy at the subbasin level. A basin in southwest San Francisco is used to demonstrate the operation of the strategy for real time control. A substantial amount of short term rainfall data as well as several computer programs, are included.

W75-04352

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04397

RETRIEVABLE SURFACE STORAGE FACILITY, ALTERNATIVE CONCEPTS ENGINEERING STUDIES.
Atlantic Richfield Hanford Co., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as Rept. No. ARH-2888, $7.60 in paper copy, $2.25 in microfiche. Report No. ARH-2888 Rev., July 1974. 287 p, 75 fig, 35 tab, append. AEC AT(45-1)-2130.

Descriptors: *Waste storage, *Alternative water use, *Radioactivity, *Radioactive waste disposal, *Air pollution, *Water pollution, Nuclear powerplants, Fuels, Forecast, Prediction, Monitoring, Solid wastes, Heat transfer, Safety, Evaluation, Assessment, Public health, Environmental effects, Design criteria, Cooling, Convection.
Identifiers: *Fuel reprocessing.

The company is performing engineering studies under the Atomic Energy Commission's direction that will lead to the construction of a Retrievable Surface Storage Facility (RSSF), capable of receiving all high-level radioactive wastes generated by the commercial reactor fuel reprocessing plants through the year 2000 and storing these wastes under continued surveillance and maintenance. A period of 100 years is used as a design basis. The RSSF is assumed to be capable of receiving and storing approximately 75,000 canisters (1 foot diameter by 10 feet long) of dry solid waste containing a total of about 200 megawatts of heat. The functional requirements for the RSSF are the storage of these wastes in a safe manner that will (1) protect the health and safety of the public, and (2) have minimum adverse impact on man's environment. General design criteria have been developed and three basic storage concepts studied to provide a basis for choosing a preferred concept for the RSSF. These concepts are (1) storage in water basins, (2) storage in air-cooled vaults, and (3) storage in rugged, thick-wall casks. (Houser-ORNL)
W75-04401

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as BNWL-1900, Vol. 1, 2, 3, and 4, $10.60 in paper copy, $2.25 in microfiche. Report No. BNWL-1900, May 1974. 4 volumes, 1367 p, 275 fig, 165 tab, 826 ref, 40 append. Edited by K. J. Schneider and A. M. Platt.

Descriptors: *Alternative planning, Wastes, *Management, *Radioactive waste disposal, *Waste dilution, *Waste disposal, Waste disposal wells, Waste dumps, Waste identification, Waste storage, *Waste treatment, Regulation, Public health, Research and development, Nuclear energy, Alternative planning, Methodology.
Identifiers: *High-level wastes, Partitioning, Extraterrestrial, *Transmutations.

A comprehensive overview study is presented of potential alternative methods for long-term management of high-level radioactive wastes. The study includes a compilation of information relevant to technical feasibility, safety, cost, environmental considerations, policy conflicts, public response and research and development needs for: (1) Disposal in terrestrial locations -- In geologic settings on land; in the seabed; in ice sheets. (2) Disposal into space. (3) Elimination by transmutation. The study is limited to the management of high-level radioactive waste from nuclear power by variations of these alternatives. Disposal of waste in bedded salt deposits was studied extensively in other AEC programs, and the concept is included here as part of the overall matrix of geologic disposal techniques. To complement these studies, investigations were also conducted on waste partitioning, and systems methodology was developed to assess the effects of radionuclides from waste introduced into man's ecological cycle, assuming some failure of the primary waste containment. (See W75-04403 thru W75-04409) (Houser-ORNL)
W75-04402

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 1-3: SUMMARY, BACKGROUND AND DATA BASE, AND EVALUATION METHODOLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 1, $10.60 in paper copy, $2.25 in microfiche. Report No. BNWL-1900, Vol. 1, May 1974. 441 p, 42 fig, 48 tab, 131 ref, 16 append.

Descriptors: *Alternative planning, *Feasibility studies, *Management, *Wastes, *Administration, *Research and development, Technology, Environment, *Public health, Methodology, *Safety, Evaluation, Economics, Benefits, Cost-benefit theory, Cost-benefit analysis, *Waste treatment.

A summary is presented of a comprehensive overview study potential alternatives for long-term management of high-level radioactive waste. Described are the various waste management alternatives that have been studied and the methods being used for evaluation. The following investigation objectives for each waste management alternative is reported: (1) Technical Feasibility Information. (2) Safety Information and Methodology for Analysis. (3) Policy, Environment, and Public Response Considerations. (4) Advantages and Disadvantages. (5) Needed Research and Development. (6) Research and Development Costs. (7) Schedules and Capital and Operating Costs for Implementation. (See also W75-04402) (Houser-ORNL)
W75-04403

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 4: GEOLOGIC DISPOSAL.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 2, $7.60 in paper copy, $2.25 in microfiche. Report No. BNWL-1900, Vol. 2, May 1974. 231 p, 54 fig, 39 tab, 169 ref, 7 append.

Descriptors: *Alternative planning, *Management, Wastes, *Radioactivity, *Waste

isposal, *Geologic formations, *Waste treatnent, *Waste storage, Transportation, Transport, iquids, Solids, Gases, Environmental effects, nvironmental control, Geology, Rocks, Bedrock, oil, Stratigraphy, Geohydrology, Salts, Mining, odium compounds, Economics, Technology, ublic health.

iscussed are the details of individual disposal oncepts including a description of the concepts; aste management systems requirements eginning with discharge of high-level liquid waste om a plant reprocessing 'spent' nuclear fuel and nding with final waste emplacement in a geologic rmation; concept related geologic considerations; technical feasibility; concept safety; esearch and development needs, including estiated costs; time required to commission, and timated capital and operating costs associated ith a facility for disposal of commercially nerated radioactive waste; and policy, environental, and public response considerations. (See so W75-04402) (Houser-ORNL)
75-04404

IGH-LEVEL RADIOACTIVE WASTE ANAGEMENT ALTERNATIVES - SECTION 5: CE SHEET DISPOSAL,
attelle-Pacific Northwest Labs., Richland, ash.
. D. Tillson, R. W. Wallace, J. R. Divine, and W. Swift.
vailable from NTIS, Springfield, Va 22161 as ept. No. BNWL-1900, Vol. 3, $7.60 in paper opy, $2.25 in microfiche. In: Report No. BNWL-00, Vol. 3, May 1974. 199 p, 83 fig, 7 tab, 186 ref, ppend.

escriptors: *Alternative planning, Wastes, adioactivity, *Management, *Radioactive aste disposal, *Waste storage, *Transportation, ce, Sea ice, Firn, Ice jams, Melt water, Boats, ips, Transfer, *Waste treatment, Sites, echnology, Geology, *Antarctic, Arctic.
entifiers: Antarctica, *Greenland, Waste hanng.

e concept for disposal of high-level radioactive aste in ice sheets, either Antarctica or Greenid, has been described previously in the literare. A copy of one of the latest proposals has en included as Appendix 5A. For this study a neralized schematic of the operations that would required for waste management in ice sheets is own. The basic operations consists of truck, rail barge transport of solidified waste from a fuel rocessing plant or interim retrievable surface rage facility to specialized embarkation ports; rine transport during 1 to 3 months of each year specially designed ship, with ice-breaker corts near the ice sheet; off-loading of the waste nisters at a debarkation facility near the edge of continent; over-ice transport by surface vehis on a year-round basis; and off-loading and placement at the disposal site. Disposal of the gh-level waste would be by one of three conpts described as follows: (1) meltdown or free w; (2) anchored emplacement; and (3) surface rage. (See also W75-04402) (Hourse-ORNL)
75-04405

GH-LEVEL RADIOACTIVE WASTE ANAGEMENT ALTERNATIVES - SECTION 6: ABED DISPOSAL,
ttelle-Pacific Northwest Labs., Richland, sh.
D. Tillson, R. W. Wallace, J. R. Divine, W. H. ift, and H. W. Lee.
ailable from NTIS, Springfield, Va 22161 as pt. No. BNWL-1900, Vol. 3, $7.60 in paper py, $2.25 in microfiche. In: Report BNWL-1900, l. 3, May 1974. 104 p, 20 fig, 5 tab, 122 ref, 2 apnd.

scriptors: *Alternative planning, Waste treatnt, *Radioactive waste disposal, *Oceans, *Management, *Oceanography, *Marine geology, Sites, Sedimentation, Sedimentation rates, Sedimentary rocks, Environment, Safety, Solids, Transportation, Ships, Geology.
Identifiers: Seabed, Burial.

Some high-level radioactive wastes are managed by a system which features disposal in the seabed, generally in the deeper areas of the oceans. The various seabed areas studied were selected as representative of seabed areas which appear to have potential for long-term isolation of wastes. These areas include subduction zones--deep sea trenches, stable deep sea floor areas, and areas of relatively high sedimentation rates. In all cases, the waste is emplaced in the basement rock below the sediments to take advantage of remoteness from man, isolation from man's environment and high ion-exchange capacity of the sediments as backup protection. The management of the waste by these concepts consists of collection of previously solidified and canned wastes at specialized embarkation ports, transport by suitable ships to the seabed site and waste emplacement at the site from either a drilling ship or a semisubmersible drilling platform. Disposal is accomplished by the emplacement within the basement rock, and isolation is maintained by natural behavior within oceanic crustal layers after sealing of access/emplacement drill holes, or, in one concept, by further natural burial as a result of the geologic nature of the site. (See also W75-04402) (Houser-ORNL)
W75-04406

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 7: WASTE PARTITIONING,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. W. Bartlett, R. E. Burns, L. A. Bray, L. L. Burger, and J. L. Ryan.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 4, $10.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 4, May 1974. 37 p, 3 fig, 1 tab, 14 ref.

Descriptors: *Radioactive waste disposal, *Management, *Alternative planning, Research and development, Radioisotopes, Degredation, Toxicity, *Waste storage, *Waste treatment.
Identifiers: *Waste partitioning.

An alternative approach in managing high-level radioactive waste involves separating the total waste into fractions of different half-lives. Short-lived fractions would then decay to become radioactively non-toxic in relatively short-times--times short enough to be within man's ability to control the waste storage. Long-lived fractions--significantly reduced in mass, volume and radioactive decay heat output--could be considered for other treatment, e.g., transmutation to non-radioactive or short-lived nuclides, extraterrestrial disposal, or special terrestrial disposal. (See also W75-04402) (Houser-ORNL)
W75-04407

HIGH-LEVEL RADIOACTIVITY WASTE MANAGEMENT ALTERNATIVES - SECTION 8: EXTRATERRESTRII DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
K. Drumheller, C. L. Brown, B. Griggs, R. E. Hyland, and J. S. Mackay.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 4, $10.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 4, May 1974. 204 p, 51 fig, 30 tab, 126 ref, 6 append.

Descriptors: *Alternative planning, *Radioactive waste disposal, *Waste treatment, *Transportation, Technology, Research and development, Solid wastes, Distance.
Identifiers: High-earth orbit, Spacecraft, *Extraterrestrial, Solar system escape, Encapsulation.

The basic concept of extraterrestrial disposal includes packaging waste materials in a safe manner and transporting the material by rocket or other means to a location off the earth. Several different trajectories have been considered. These include: (1) A high earth orbit on the order of 150,000 kilometers. (2) Transport to the sun. (3) A solar orbit other than that of the earth and planets. (4) Solar system escape. Vehicles used in the analysis as current technology include existing space vehicles and the planned space shuttle and tugs. (See also W75-04402) (Houser-ORNL)
W75-04408

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 9: TRANSMUTATION PROCESSING,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. C. Liikala, J. B. Burnham, B. F. Gore, B. R. Leanord, Jr., and D. L. Lessor.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 4, $10.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 4, May 1974. 151 p, 22 fig, 35 tab, 78 ref, 5 append.

Descriptors: *Alternative planning, *Radioactive waste disposal, *Management, *Waste treatment, *Separation techniques, Radioisotopes, Toxicity, Toxins, Technology, Research and development, Nuclear explosions.
Identifiers: *Transmutation, Stable element, Reactor fission, Photon processes, Reactor fusion.

A possible approach to the management of radioactive waste is the use of nuclear processes themselves to change (transmute) the toxic long-lived radioactive constituents in high-level waste into short-lived radioactive or nonradioactive isotopes. Known processes which could potentially be used for transmuting toxic isotopes into nontoxic isotopes are described. The study is extensive enough to determine which fundamental processes are theoretically not possible in light of current technology. At the same time the study was not exhaustive in that little or no optimization of possible processes was attempted. Thus, initial conclusions of technical and/or economic infeasibility of transmutation should not dismiss future research entirely since it is the only method that has the potential for accelerating natural aging processes of eliminating waste. (See also W75-04402) (Houser-ORNL)
W75-04409

BIODEGRADABILITY OF A CARBOXYMETHYLOXYSUCCINATE DETERGENT BUILDER,
California Univ., Berkeley. Sanitary Engineering Research Lab.
S. A. Klein, and D. Jenkins.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2107-2117, September, 1974. 10 fig, 4 tab, 7 ref.

Descriptors: *Detergents, Degradation(Decomposition), *Septic tanks, *Percolation, *Biological treatment, *Waste water treatment, Oxidation lagoons, *Biodegradation.
Identifiers: *Trisodium carboxymethyloxysuccinate.

Trisodium carboxymethyloxysuccinate (CMOS) is being used as a detergent builder that contains no phosphorus or nitrogen. The fate of CMOS during wastewater treatment by pilot scale septic tank-percolation field systems and oxidation ponds is discussed. Septic tanks with a two-day residence time are ineffective in removing CMOS; 10 percent CMOS removal was achieved by the septic tanks. CMOS degradation was essentially total in

aerobic percolation fields following septic tank treatment. CMOS degradation in excess of 90 percent was obtained in anaerobic percolation fields. The removal of CMOS is virtually complete when the dissolved oxygen of the percolation field effluent is one mg/liter. Algal oxidation ponds required an acclimation period of 150 days (about five times average hydraulic residence times) before significant CMOS removal occurred. The ponds receiving 30 mg/liter CMOS acclimated to CMOS slower and achieved lower levels of CMOS removal than ponds receiving CMOS levels of 15 mg/liter. (Orr-FIRL)
W75-04426

TRICKLING FILTRATION OF A WASTE CONTAINING NTA,
Iowa State Univ., Ames. Dept. of Civil Engineering.
J. L. Cleasby, D. W. Hubly, T. A. Ladd, and E. A. Schon.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1873-1887, August, 1974. 8 fig, 4 tab, 20 ref.

Descriptors: *Trickling filters, *Nitrilotriacetic acid, *Detergents, Biochemical oxygen demand, Chemical oxygen demand, Nitrification, Heavy metals, *Waste water treatment, Filtration.

Interest is being shown in the use of the soidum salt of nitrilotraicetic acid (NTA) as a replacement compound for polyphosphate detergent builders. However, before NTA can be allowed to replace phosphates in the environment its ultimate fate as it goes through the waterways and waste treatment plants must be known. The effect of NTA on a trickling filter and the NTA-removal ability of the trickling filter are discussed. There was no effect on the efficiency of a trickling filter to remove BOD, COD, and TOC at NTA levels of 4, 8, and 16 mg/liter. Two to three weeks were needed at an NTA feed level of 4 mg/liter before substantially complete NTA removal occurred. NTA levels of less than 0.5 mg/liter were consistently reached at dosage levels of 4 and 8 mg/liter Na3NTA during the summer and fall. During cold weather operation, the NTA removal was less complete (less than 2 mg/liter in the effluent when the NTA level was 8 mg/liter). No functional relationships between NTA removal and the removal of other organic substances were observed. The NTA had no effect on nitrification efficiency or on the ability of the trickling filter to remove heavy metals. (Orr-FIRL)
W75-04427

FLUIDIZED-BED SLUDGE INCINERATOR DESIGN,
Kramer, Chin and Mayo, Seattle, Wash.
P. B. Liao.
Journal Water Pollution Control Federation, Vol 4, No 8, p 1895-1913, August, 1974. 6 fig, 3 tab, 22 ref.

Descriptors: *Sludge disposal, *Waste water treatment, *Incineration, Design, Ultimate disposal, Design criteria, *Pilot plants, Burning, Facilities.

Theories of fluidization and sludge combusion, methods for development of design criteria, equations, and procedures for design calculations for a fluidized-bed wastewater sludge incinerator are discussed. The design criteria and equations derived are the result of pilot plant operation. They can be used for prototype incinerator design. A design method is given which ranges from determining the amount and rate of sludge to be incinerated to determining the best air pollution control equipment. An incinerator can be designed by using the equations and the relationships between sludge loadings, air supply, and fuel requirements. Fluidized-bed treatment is a sanitary and efficient method of wastewater sludge disposal and has a minimum of detrimental effects on the environment. (Orr-FIRL)
W75-04428

GRANULAR FILTERS FOR TERTIARY WASTEWATER TREATMENT,
Iowa State Univ., Ames.
E. R. Baumann, and J. Y. C. Huang.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1958-1973, August, 1974. 14 fig, 3 tab, 24 ref.

Descriptors: *Filters, *Filtration, *Tertiary treatment, Design criteria, *Pilot plants, Suspended solids, *Waste water treatment, *Iowa.
Identifiers: Dual-media filter.

A dual-media filter (coarse anthracite over finer sand) overcomes the problems of head loss across the filter and no penetration of the solids into the bed that are present when a normal, graded, single-medium filter is used to filter the suspended solids left after secondary treatment. A pilot plant was constructed and operated at the Ames, Iowa, Pollution Control Plant to test procedures to be used in the design of tertiary wastewater filters and to determine the effectiveness of granular filtration in reducing the pollution potential of the effluent from a water pollution control plant. The results showed that the final effluent from the control plant should be filtered through a dual-media filter with 38.10 cm of uni-sized 1.84 mm anthracite on top of 38.10 cm of uni-sized 0.55 mm sand. The filtrate suspended solids should be about 4 to 5 mg/liter, the filtration rate can be as high as 6 gpm/sq ft, and the influent suspended solids can be as high as 40 mg/liter. The following steps should be included in a design of a pilot plant operation to determine the optimum economic design of a tertiary filter plant: determination of the proper size and depth of anthracite and sand based on the particular type of wastewater; determination of the backwash rate required for the chosen media size and depth combination; development of curves relating the net water production to the filtration rate under different run lengths; and, development of the curves relating run length to the filtration rate at different suspended solids concentration. (Orr-FIRL)
W75-04429

COMPLYING WITH DISCHARGE REGULATIONS,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04431

1971 ANNUAL REVIEW OF LITERATURE. WASTE WATER TREATMENT PHYSICAL AND CHEMICAL METHODS,
National Environmental Research Center, Cincinnati, Ohio.
J. M. Cohen, and I. J. Kugelman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 213 826, $3.25 paper copy, $2.25 microfiche. 1972. 22 p, 90 ref.

Descriptors: *Waste water treatment, *Reviews, Water clarification, Filtration, Phosphorus, Nirtogen, Flocculation, Sedimentation, Coagulation, Adsorption, Demineralization, Chemical control, Physical control, Water reclamation, *Bibliographies.
Identifiers: Physical-Chemical treatment, Phosphorus removal, Nitrogen removal.

A review of the literature of 1971 shows an increasing interest in using physical-chemical methods of wastewater treatment as practical alternatives to conventional biological methods. New views on the topics of water reclamation, phosphorus removal, nitrogen removal, adsorption, coagulation-flocculation-sedimentation, filtration, and demineralization are discussed with specific references to articles dealing with these subjects. (Orr-FIRL)
W75-04437

ELECTROCHEMICAL PROCESS FOR NUTRIENT REMOVAL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
C. P. C. Poon.
Available from the National Technical Information Service., Springfield, Va. 22161, as PB 239 415, $3.75 paper copy, $2.25 microfiche. Completion Report, (1974). 42 p. 10 fig, 7 tab, 8 ref.OWRT A-040-RI(2), 14-31-0001-3840.

Descriptors: *Waste water treatment, *Adsorption, Electrochemistry, *Chlorination, *Phosphates, Kinetics, Stratification, *Nitrogen, *Nutrient removal, Coliforms, Biochemical oxygen demand, Model studies.

A flow-through electrochemical process can be used for municipal or industrial wastewater treatment where seawater is easily accessible and ocean discharge of effluent (better than secondary effluent quality) is permitted. Because of its simplicity in construction and operation, the process is seen as a most promising candidate of future shipboard waste treatment for vessels of various sizes operating on saline water. The primary mechanism for phosphorous removal in the electrochemical process was adsorption onto Mg (OH)2 flocs; the adsorption process followed a Langmuir type isotherm kinetic. Breakpoint chlorination was primarily responsible for nitrogen removal from sewage. If there was a good stratification in a batch process and when the power supply was 4.5 kwh/1000 gallons of sewage, the process could remove in 60 minutes the following: P - 98%, N - 85%, BOD - 85%, SS-87% and Coliform - 100%. Tests using a flow-through model showed that efficiency of nutrients removal was improved significantly by increasing the sewage-seawater ratio.
W75-04446

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.
R. M. Sweazy, S. W. Chapman, Jr., and D. M. Wells.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 406, $4.25 paper copy, $2.25 microfiche. Completion Report, December 1974. 44 p, 5 fig, 13 tab, 17 ref. OWRT A-026-TEX(1).

Descriptors: Texas, *Water reuse, Soils, Irrigation, *Sewage effluent, Nitrates, Nitrification, Nitrogen, Percolation, Groundwater, Water quality, Absorption.
Identifiers: *Nitrogen Mass Balance, Nitrogen Uptake, Sewage Farming, *Lubbock(TEX).

Treated sewage effluent from the City of Lubbock was applied to three soil bins filled with typical West Texas soil. The effluent added and the percolated effluent were analyzed to determine the various forms of nitrogen so that a mass balance could be determined, and the nitrate pollution potential of secondary effluent used for irrigation on the South Plains of Texas could be evaluated. The amount of effluent applied was approximately that applied in normal irrigation projects using secondary wastewaters. Results showed that irrigation with sewage effluent on the High Plains of Texas is a source of groundwater pollution. Selective crop production was determined to be the most effective method of protecting the groundwater from sewage irrigation provided loading rates are such that nitrogen uptake by the crop approximates the nitrogen applied in the sewage effluent.
W75-04449

APPARATUS FOR THE FILTRATION AND BIOLOGICAL PURIFICATION OF CONTAMINATED WATER,
A. Schreiber, E. Schreiber, and B. Schreiber.

U.S. Patent No 3,846,305, 6 p, 13 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 266, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, *Filters, *Filtration, Water quality control, Pollution abatement, *Biological treatment, Water pollution, *Trickling filters.

An apparatus for the filtration and biological purification of contaminated water is disclosed. The apparatus has a trickling filter tank containing a wear-resisting filler material having a specific gravity of not greater than 1. The filler material is filled with flusing water for the purpose of freeing it. The mixture of filler material, sludge, water and additionally supplied flusing water, is displaced by agitation to discharge the greater part of the sludge in the form of a mixture of water and sludge. The flushing water mixed with sludge is thereafter discharged and the trickling filter tank is once again fed with contaminated water to be purified. (Sinha-OEIS)
W75-04454

SEWAGE TREATMENT SYSTEM,
G. A. Milne.
U.S. Patent No 3,859,215, 5 p, 3 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 434, January 7, 1975.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Domestic wastes, *Aeration, Pollution abatement, Water pollution control, Underground structures, Sludge, Equipment.
Identifiers: Clarification, Tertiary treatment.

A sewage aeration tank is constructed as an elongated cylinder with a horizontal axis having a length to diameter ratio of greater than three to one. The large areation tank is completely closed and has openings tightly surrounding sewage inlet and effluent pipes, sludge return pipes, oxygenation pipes and vent pipes. The large aeration tank and its sewage inlet, grease and trash trap, clarifier, sludge return lines from the clarifier to the aeration tank, tertiary treatment tank and outflow apparatus are buried underground. A recreational space is provided on top of the system. An air blower is housed in an equipment room of an adjacent apartment unit which the system serves, and a vent extends upward from a roof of the apartment house. (Sinha-OEIS)
W75-04456

WATER CLARIFICATION WITH NITROGEN-HETEROCYCLIC PHOSPHONIC ACIDS,
Petrolite Corp., Wilmington, Del. (assignee).
D. Redmore.
U. S. Patent No 3,859,211, 15 p, 6 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 432, January 7, 1975.

Descriptors: *Patents, *Waste water treatment, *Flocculation, Suspended solids, Corrosion control, Scaling, Aggregates.
Identifiers: *Chemical treatment, *Water clarification, Nitrogen heterocyclic phosphonic acids.

A process is disclosed for clarification of water by adding to water containing suspended matter, nitrogen heterocyclic phosphonic acids and derivatives. T They are characterized by aminomethyl (Or substituted methyl) phosphonic acids or derivatives thereof bonded directly or indirectly, i.e., through a N-side chain to the nigrogen atom in the heterocyclic ring. The addition of the compounds of this invention to the water suspension should be made in such a fashion that the resulting flocculation and aggregation of the particles takes place uniformly throughout the body of water. (Sinha-OEIS)
W75-04457

RECOVERY OF POTABLE WATER FROM SANITARY WASTE USING SOLID WASTES AND REFUSE AS A HEAT SOURCE,
F. W. Taylor.
U.S. Patent No 3,859,174, 7 p, 4 fig, 15 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 421, January 7, 1975.

Descriptors: *Patents, Solid wastes, *Potable water, *Waste water treatment, *Evaporation, *Condensation, Water supply, Water purification, *Municipal water, Incineration, Heat exchanger, Gases, Water vapor.
Identifiers: *Sanitary wastes.

A process and apparatus for disposing of solid wastes, for disposing of sanitary waste waters, and for producing potable water, are disclosed. The solid wastes are incinerated and the heat generated during incineration is used to evaporate sanitary waste waters. Contaminated waters are first used as cooling water and then atomized into the gas stream coming from the incinerator to cool the combustion gases and evaporate the water in the contaminated water. Solids are removed from the gas stream, which also contains water vapors, and then the gases are cooled to condense the water vapors, which is suitable for use in a city water supply system. (Sinha-OEIS)
W75-04458

VERTICAL, MULTISTAGE-FLASH, FALLING FILM COLUMN FOR DISTILLING BRINE,
Societe General d'Entreprises, Paris (France). (assignee).
For primary bibliographic entry see Field 3A.
W75-04459

SELF-RECONDITIONING FILTER APPARATUS FOR CONTINUOUS REMOVAL OF SOLIDS FROM A STREAM OF LIQUID,
T. Hagihara.
U.S. Patent No3,856,678, 5 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1701, December 24, 1974.

Descriptors: *Patents, *Filters, *Filtration, *Solid wastes, *Waste water treatment, Pollution abatement, Water pollution control, Sea water, Industrial wastes, Equipment.
Identifiers: Self-reconditioning filters, Endless belts.

An imporved filter apparatus is capable of continuously arresting solids of various size and nature contained in a liquid flowing through a channel of given width and depth, carrying the arrested solids away from the flow of liquid and succeedingly casting them off. The filter apparatus includes a pair of toothed wheels mounted adjacent both ends of a shaft which is rotatably supported across the desired liquid channel adjacent its bottom. A second pair of toothed wheels similarly mounted on a second shaft are placed on the downstream side of the first shaft. A third pair of toothed wheels can likewise be mounted on a third shaft further on the downstream side in coplanar relationship to the others. A filter medium in the form of a flexible endless belt operates over the pairs of toothed wheels. As the filter turns over the third pair of toothed wheels, the hook portions of the filter units are caused to swing outwardly thereby casting off the solids which have been caught by the filter medium. (Sinha-OEIS)
W75-04460

CLOSED-LOOP OZONE GENERATING AND CONTACTING SYSTEM,
Grace, W. R. and Co., New York. (assignee).
H. Lee, and H. M. Rosen.
U.S. Patent No 3,856,671, 6 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1699, December 24, 1974.

Descriptors: *Patents, *Water purification, *Ozone, Oxygen, Gases, Nitrogen, Carbon dioxide, Water vapor, Waste water treatment.
Identifiers: *Fractionators, Closed-loop, Ozonator.

Water can be treated with ozone and/or oxygen in a closed-loop cycle, thus conserving the high oxygen content gas. The system comprises as a principal feature a pressure-swing fractionator which removes nitrogen, carbon dioxide and water vapor from a feed gas, producing an oxygen enriched gas which flows to a contactor or an ozonator. The oxygen enriched gas from the ozonator contains from about 1 to 7 percent ozone. This gas mixture, or solely an oxygen stream, is then contacted with water to be treated. Purified water is recovered, and excess oxygen and/or oxygen and enriched in nitrogen, forms a recycle gas which is combined with a charge of air and flowed to the pressure-swing fractionator to begin another cycle. The pressure-swing fractionator serves the dual simultaneous purpose of producing the necessary oxygen enriched gas for subsequent use and maintaining a low nitrogen level throughout the closed-loop. (Sinha-OEIS)
W75-04461

REMOVAL OF BORON FROM WATER,
Occidental Petroleum Corp., Los Angeles, Calif. (assignee).
W. D. Peterson.
*Patents, *Boron, Water treatment, *Ion exchange, Pollution abatement, *Sewage treatment, *Waste water treatment, Water pollution control, Resins, Phenols, Cations, Alkalis(Bases), Nitrogen, Ammonium compounds.
Identifiers: *Chemical treatment, Aldehydes, Alkaline earths.

A process is described for the removal of boron values from aqueous solutions containing borate ions. The aqueous solution is contacted with a water insoluble solid organic ion exchange resin. The resin is produced by the co-condensation of an aromatic ortho hydroxy carboxylic acid, a phenolic compound and an aldehyde to selectively absorb the boron value onto the resin in the presence of at least one cationic species selected from the group consisting of alkali, alkaline earth, nitrogen organic bases and ammonium cations. The cationic species can be incorporated into the resin during resin formation, or they can be incorporated into the resin by contacting the resin with a solution containing the desired species prior to utilizing the resin in the process. (Sinha-OEIS)
W75-04462

METHOD FOR TREATMENT OF COAL WASHERY WATERS,
R. H. Shubert.
U.S. Patent No 3,856,668, 6 p, 2 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1698, December 24, 1974.

Descriptors: *Patents, *Waste water treatment, *Coal mine wastes, *Filtration, *Mine wastes, Pollution abatement, Suspended solids, Clays, Shales.
Identifiers: *Black water, Hydrocarbon oil, Agglomerates.

Waters containing finely divided coal and inorganic matter, such as are produced as a waste in coal washery plants, may be clarified and substantially freed of suspended solids using a two-step process in which coal particles are removed in the first step and inorganic mineral constituents are removed in a second step. Coal is removed in the first step by agglomerating the coal to form relatively large flocs or clumps. The agglomerates float on water in spite of the fact that the specific gravity of coal is substantially greater than that of water. Agglomeration is accomplised by treating the black water waste with a heavy hydrocarbon oil while subjecting the mixture to agitation of suf-

ficient intensity to coat the coal particles and to cause collisions between coated coal particles. Filtration through a relatively coarse medium such as a fine screen retains the coal agglomerates as a cake while passing the water and suspended mineral constituents. The water fraction is further treated preferably by settling, to produce a water stream substantially free of suspended matter. Coal agglomerates removed from the separation zone display a relatively low ash content and high calorific value since they contain essentially all of the hydrocarbons used in theagglomeration. The agglomerates dewater readily and may be dried and used as fuel. (Sinha-OEIS)
W75-04463

METHOD FOR ELECTROSANITIZING WASTE WATER,
Diamond Shamrock Corp., Cleveland, Ohio. (assignee).
D. F. Lieb, and N. W. Stillman.
U.S. Patent No 3,856,642, 4 p, 2 fig, 2 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1690, December 24, 1974.

Descriptors: *Patents, *Waste water treatment, *Disinfection, *Oxidation, *Chlorination, Water pollution treatment, *Sewage treatment, Alkali metals, Equipment, Electrolysis, Suspended solids.
Identifiers: Electrosanitizing, Primary treatment, Secondary treatment.

A process for oxidizing and disinfecting waste water is accomplished by placing waste water containing an alkali metal chloride into a first container. The waste water is agitated and macerated so that any solids are comminuted. While agitating and macerating, the waste water is subjected to electrolysis whereby chlorine is produced. The waste water is then transferred to a second container where it is further agitated and finally removed as purified water. The process is performed in an apparatus which comprises a primary treatment container. The container has a combination agitator and macerator and an electrode pack containing at least one anode and cathode and is connected to a direct current source. A secondary treatment container has an agitator and an outlet for treated water. It may also contain an electrode pack. (Sinha-OEIS)
W75-04464

LIGNIN SEPARATION BY CONTINUOUS ION FLOTATION: INVESTIGATION OF PHYSICAL OPERATIONAL PARAMETERS,
Rutgers - the State Univ., New Brunswick, N.J.
M. H. Wang, M. L. Granstrom, T. E. Wilson, and L. K. Wang.
Water Resources Bulletin, Vol 10, No 2, p 283-294, April, 1974. 3 fig, 9 tab, 11 ref. OWRT A-022 NJ(4).

Descriptors: *Lignins, *Pulp wastes, *Flotation, *Water purification, Waste treatment, Water pollution treatment, *Operations research, Systems analysis, Separation techniques, Model studies, Foaming, *Waste water treatment, Foam separation, Water pollution sources, Ions, Surfactants.
Identifiers: Indulin C, *Ion flotation.

The removal of synthetic kraft lignin (Indulin C) from aqueous solution by a continuous ion flotation system was investigated. A feed solution of lignin (100 mg/liter) was treated with 50 mg of cetyldimethylbenzylammonium chloride/liter and passed downward through a plexiglas column (10.26 cm inside diameter) as air flowed upward. Lignin removal was 95% when the air flow was 2000 cu m/min, the feed rate was 100 cu m/min, and the lignin feed inlet was above the solution/foam interface. (Buchanan-IPC)
W75-04476

NOTES--WORKSHOP ON COMPUTER-AIDED DESIGN AND SIMULATION OF WASTE TREATMENT SYSTEMS,
Silveston (B and P), Kitchener (Ontario).
Training Manual EPS 6-WP-74-1. Water Pollution Control Directorate, Environmental Protection Service, Environment Canada, January 1974. 459 p, 127 fig, 38 tab, 176 ref, 2 append.

Descriptors: Computers, *Design, *Simulation analysis, *Waste water treatment, *Computer programs, *Computer models, *Model studies, Engineering, Management, Waste water (Pollution), Equations, Systems analysis, Optimization, Streams, Activated sludge, Trickling filters, Costs, Risks, Treatment facilities.
Identifiers: Clarifiers.

The potential for computer application to performance, planning and design studies of waste treatment systems is substantial. The rapid advance in software applications makes it possible to handle 'non routine' waste treatment systems almost as easily as 'routine' ones. Computer-aided design makes explicit allowance for uncertainty; design risks can be quantitized. Software packages are presented which overcome many of the problems usually associated with computer application to planning and design situations. These packages have been organized so that the judgement and experience of senior staff can be brought to bear on design or analysis problems almost as easily as they can using conventional engineering procedures. The software has been developed so that its use, and even modification, is not limited to computer specialists. Moreover, computer costs have become surprisingly reasonable. The types of programs discussed will require only 5 to 15 seconds of computing time/run (at a cost of $2 to $6). Considered herein are: the use of computers in process analysis and design; choice of design approach; process systems analysis; stream vectors; developing a model library; clarifier models; activated sludge systems; trickling filter models; digester models; preliminary treatment, chlorination and miscellaneous models; sludge treatment processes; and an executive program, SEPSIM, including its user's manual. Computer-aided procedures do a substantially better job at little extra cost. (Bell-Cornell)
W75-04518

MODELING SEWAGE TREATMENT PLANT INPUT BOD DATA,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
P. M. Berthouex, W. G. Hunter, L. C. Pallesen, and C. Y. Shih.
Journal of the Environmental Engineering Division, American Society of Civil Engineers. Vol 101, No EEI, Proceedings paper No 11132, p 127-138, February 1975. 5 fig, 2 tab, 6 ref.

Descriptors: *Sewage treatment, *Statistical methods, *Environmental engineering, *Biochemical oxygen demand, *Stochastic processes, *Time series analysis, *Input-output analysis, Water quality control, Methodology, Treatment facilities, Design, Forecasting, Mathematical models, Systems analysis, Equations.
Identifiers: System performance, Control methods, First-order autoregressive model, Influent data.

A wastewater treatment plant is a complex stochastic dynamic system. The first step toward the design of a control system is to model the stochastic system inputs and outputs. The basic shortcomings of deterministic models for studying a stochastic process are illustrated. The methodology developed by Box and Jenkins (1970) to model time series is used to characterize the field BOD data for a sewage treatment plant; basic stochastic models are given. A first-order autoregressive model is found to describe influent BOD data fairly well. Model-building is seen as an iterative process that is most efficiently done with simple models; only if the models prove inadequate should further complexities be introduced. Stochastic models often contain relatively few parameters and are simple to interpret and apply. Modeling system inputs and outputs is the first step in deriving stochastic dynamic transfer functions for the system. (Bell-Cornell)
W75-04528

DESIGN, CONSTRUCTION AND LAUNCHING OF A SUBMARINE OUTFALL SEWER AT WHITSTABLE,
Whitstable Urban District Council(England).
B. E. Hardy.
Journal of the Institution of Municipal Engineers, Vol 100, No 7, p 201-207, July 1973. 5 fig, 2 tab, 10 ref.

Descriptors: *Environmental engineering, *Sewage disposal, *Outfall sewers, *Design, *Construction, *Pipelines, *Water pollution control, *Public health, Standards, Technology, Oceans, Coasts, Submarines, Domestic wastes, Industrial wastes, Fisheries, Effluents, Toxicity, Currents(Water), Economic efficiency, Waste treatment, Costs, Hydrographs, Dilution, Diffusion, Equations.
Identifiers: Whitstable(North Kent-England), Tidal estuaries, Launching.

Extremely large amounts of domestic sewage and industrial wastes are discharged daily along the eastern and southern coasts of England. The municipal engineer, who must consider whether to dispose of his town's sewage to sea after only partial treatment, is obliged to investigate public health, amenity, and fishery conditions as well as the strictly technical investigations of currents, the sea bed, flow, and design criteria. Problems of sea outfall design are discussed considering the technical aspects and public health philosophy of disposal of partially treated sewage to the sea by means of a long outfall. Considered also is engineering design in the construction of an outfall. Data are reported, including details referring to the outfall at Whitstable on the North Kent coast, in order to assist those who must solve similar problems in coastal waters and tidal estuaries. Discussed are the contract, the design of the pipeline, four basic methods of laying such pipeline, and the pipe launch itself. Given acceptance of and compliance with the present philosophy of public health and other standards required, then disposal of partially-treated domestic sewage to coastal waters is an economic and satisfactory method of disposal and can produce substantial total annual savings to a local authority. The problem, however, is complicated and opinions may change as fresh scientific data are evaluated. (Bell-Cornell)
W75-04536

A PROTOTYPE SYSTEM TO RENOVATE AND RECYCLE SWINE WASTES HYDRAULICALLY,
Iowa State Univ., Ames.
R. J. Smith.
Ph.D. Dissertation, Department of Agricultural Engineering, Iowa State University, 1971, 176 p, 21 fig, 91 tab, 63 ref.

Descriptors: *Farm wastes, *Hogs, *Recycling, Hydraulics, *Waste water treatment, Lagoons, Anaerobic conditions, *Oxidation lagoons, Sludge, Effluent, Biochemical oxygen demand, Nitrates, Phosphates, Chloride, *Water reuse.
Identifiers: *Oxidation ditch, Flush tank, Settling tank, Land application.

The objective was to determine the parcticality of a recycled effluent system for manure transport in swine finishing buildings. Manure handling was accomplished with a continuous flow gutter and latter with a flushing tank. Better pen cleanliness was accomplished with continuous flow and rapid flushes, but this method led to an increase in the

volume of manure slurry requiring treatment. Three treatment systems were observed: anaerobic lagoon and oxidation ditch, oxidation ditch alone and lagoon alone. The best quality returned effluent came from the anaerobic lagoon and oxidation ditch. It appears that effluent from any of the three treatment systems does not adversely affect pig performance. None of the three systems was capable of producing a final effluent suitable for discharge to a watercourse. Final disposal would ultimately have to be by land application. (Russell-East Central)
W75-04542

ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS IN DAIRY MANURE MANAGEMENT SYSTEMS,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Agricultural Economics.
J. J. Jacobs, and G. L. Casler.
Cornell University Agricultural Experiment Station Report A E Res 72-18, December, 1972, 31 p, 1 fig, 4 tab, 8 ref.

Descriptors: Economics, Environmental control, *Dairy industry, *Farm wastes, *Waste treatment, *Waste storage, *Waste disposal, Lagoons, *Water pollution control, Odor, Costs, Labor, Equipment, Research.
Identifiers: Questionnaires, Flies, Waste management system.

Results of the analysis suggest that almost any realistic alternative to daily spreading will increase the cost of manure handling on dairy farms, but will not necessarily decrease the environmental impacts. Preliminary attempts to measure and aggregate the environmental impact of alternative manure handling systems indicate that the difference among systems is not as great as that implied by those who have suggested that dairymen should be doing something other than daily spreading. Storage of lagoon systems are expensive and eventually result in adverse effects on the environment. This suggests further research must be done on the environmental effects of alternative manure handling systems before making overall recommendations on what is the appropriate system. (Russell-East Central)
W75-04543

COPROLOGY: A POLLUTION SOLUTION,
Ohio State Univ., Columbus.
T. P. Taiganides.
Agricultural Engineering, Vol 55, No 4, p 21, April 1974. 1 fig.

Descriptors: *Recycling, *Farm wastes, Sewage, Municipal wastes, Pollutants, Foods, Ecology, Methane, Gases, *Waste treatment, *Water reuse, Waste water treatment.
Identifiers: Coprology, *Waste management.

Coprology is defined as the science of waste management. The basic premise of coprology is that there is no such thing as waste. Everything is a resource. Research is being conducted to find new ways of recycling wastes. It is estimated that livestock wastes in the United States could be used to produce methane gas in sufficient quantities annually to meet a large part of our natural gas requirements. The potential value of manure-derived methane gas is over one billion dollars. Also, city waste refuse is being made into building blocks or into heat energy. City sewage is being used to increase productivity of land. In the future, the need for more food will drastically increase. With this increase will be a matched increase in waste production. The problems of waste management must be dealt with and controlled and future industrialization must not only be justified on economic and political terms, but also on ecological terms. (Russell-East Central)
W75-04545

FARMS ARE NOT IN THE COUNTRY ANY MORE,
New Jersey Agricultural Experiment Station, New Brunswick.
C. J. Teller.
Compost Science, Vol 11, No 1, p 8-9, January-February, 1970. 2 fig.

Descriptors: *Waste disposal, *Livestock, *Farms, *Farm wastes, Recycling, Aeration, *New Jersey, Research and development, Dairy industry, Hogs, Odor.
Identifiers: *Suburban areas, Land disposal, Composting, Soil conditioner, Plowing.

Dairy farms in New Jersey adjoin industrial parks and only the width of a highway separates a South Jersey hog farm from a new housing development. A series of projects is being carried out at the Rutgers College of Agriculture and Environmental Science concerning the problems of agricultural solid wastes in today's suburban society. A special 'Animal Waste Disposal Task Force' was organized with representatives from 23 local, State, and Federal public and private agencies and organizations interested in animal waste disposal. Environmental scientists, engineers, and soil chemists are studying the feasibility of incorporating manure into the soil. Equipment has been developed for making a furrow, placing manure in it, then covering the manure and opening another furrow all in the same operation. The feasibility of composting manure has also been investigated. The first trial is now under way utilizing a roto-shredder to aerate the windrows. It is not expected that composting will be a profit-making venture. Dairy and hog farmers may have to sell it at about half what it costs to make it in order to dispose of manure. The composition of odors and flavors is being studied and a project that will utilize fungi to convert carbohydrate waste into protein supplement is being considered. Walker-Gordon Farm in Plainsboro has been drying manure, mixing it with cocoa shells to deodorize it, and selling the mixture as a soil conditioner. (East Central State College)
W75-04546

FERTILITY,
Crops and Soils Magazine, Vol 25, No 1, p 28, October, 1972. 1 fig.

Descriptors: *Fertility, *Fertilizers, *Waste disposal, *Farm wastes, Economics, Cattle, Waste storage, Agriculture, Nitrogen, Phosphorus, Potassium, *Waste treatment.
Identifiers: Chemical fertilizers, Spreading.

Manure's cash value as a fertilizer is discussed. One cow will produce about 15 tons of manure per year which contains nitrogen, phosphorus, and potassium. If one purchased this much fertilizer commercially it would cost about $30. However, when manure is spread in the open almost any time of the year it will lose about a third of its original value. Spreading the manure in the winter will increase the losses. The main losses come from spreading, not storing, so it is best to plow the manure down as soon as possible after spreading. Therefore, the best method to use would be to store the manure all year and spread it just before fall plowing. (East Central State College)
W75-04550

INDIANA POULTRYMEN ARE COMPOSTING POULTRY MANURE,
Purdue Univ., Lafayette, Ind.
J. G. Berry.
Compost Science, Vol 12, No 1, p 4-5, January-February, 1971. 3 fig.

Descriptors: *Poultry, *Farm wastes, Costs, *Indiana, *Waste treatment, Odor, Waste storage, Ventilation, Aeration, Waste disposal.
Identifiers: *Composting, Flies, Deep-pit system.

Poultrymen in Indiana have found a method of composting poultry manure that reduces labor costs, and virtually eliminates fly and odor problems. Laying hens are housed in cages or on slats above pits in which the droppings are collected. If the pit is kept dry, there is no odor at all. One pit, in operation for 6 years, had a 34-in. deep compost, which was dry to a depth of 18 in., and moist below. This system is generally successful, and where problems occur, they are not as great as those resulting from handling manure by conventional methods. (East Central State College)
W75-04552

THE SOCIAL REDEMPTION OF PURE GARBAGE,
J. Solomon.
The Sciences, Vol 12, No 6, p 13-15, July-August 1972.

Descriptors: *Reclamation, *Waste treatment, *California, Anaerobic digestion, Methane, Fuels, Gasses, *Recycling.
Identifiers: *Garbage, Chlorine, Sulfur.

Possibilities for converting garbage into fuel are outlined. If garbage were efficiently converted to power, it could furnish up to 6 percent of total U.S. energy needs. Each pound of garbage can supply 3,000 to 6,000 Btu of heat. One company fed pulverized refuse into a power generating station. Waste provides 10 percent of the energy fired. In another process, solid waste is reduced in size and fed to a pressurized, fluidized bed combuster. Hot gasses are cleaned of particulates and passed through a gas turbine to produce electricity. In both cases, however, chlorine produced in the off-gasses is a potential pollutant. A corporation in California is attempting to produce oil, fuel gas, and solid char by exposing solid waste to iron removal processes, air classification, shredding, and pyrolysis. Another firm reacts solid waste with carbon monoxide in the presence of sodium carbonate to yield low-sulfur fuel. If all of the nation's animal waste were treated by anaerobic digestion, half of the current methane consumption would be produced. (East Central State College)
W75-04553

ENERGY NEEDED TO MANAGE ANIMAL WASTE.
Electrical World, Vol 178, No 5, p 70-72, September 1, 1972. 2 fig.

Descriptors: *Energy, *Farm wastes, *Management, *Recycling, *Waste treatment, *Waste disposal, Feed lots, Feeds, Drying, Spreading, Irrigation, Aeration, Oxidation lagoons.
Identifiers: Pyrolysis.

As the demand for some form of animal waste handling system grows, so will the demand for energy necessary to drive these systems. The most popular way of dealing with animal waste today is to incorporate air into liquid wastes. Processes of this type use aeration wheels, discs, or aeration pumps and are generally electrically powered. Floating aerators, sprinkling systems, and oxidation ditches require substantial amounts of energy since they typically use 3-hp motors for each aeration unit. Animal wastes can also be dried and sold; the market at present for dried manure is very good. This process too requires heat energy from some source, as does pyrolysis, a means by which manure has been successfully converted into a range of products including crude oil, natural gas, and treated manure. Recycling of animal wastes as feed for the beasts that produced the manure in the first place probably holds more potential than almost any other recent feeding discovery. The basic requirement for the conversion of manure to feed is heat to promote the thermophilic bacterial reaction involved. Another popular concept--returning the wastes to land--will

necessitate either electrical or internal-combustion power supplies to operate the sprinkler systems and pumps. (East Central State College)
W75-04554

PERPETUAL-MOTION RECYCLING, OR, PIG MANURE INTO FISH FOOD,
M. Franz.
Compost Science, Vol 12, No 5, p 21, September-October 1971. 1 fig.

Descriptors: *Recycling, *Farm wastes, Livestock, Hogs, Feeds, *Fish farming, *Fish diets, *Waste treatment.

A system has been proposed for recycling the 1,000,000,000 tons of animal manures generated in the United States each year. The manures are dumped into ponds where they stimulate the rapid growth of the plant life on which some fish feed. The fish can then be harvested for human consumption. Also, an aquatic plant species, Ipomoca repens, which is a suitable pig feed, can grow rapidly in the manure-fertilized ponds. A pig farm in Malaya flushes the manure from 700 pigs into eight fish ponds, covering 2 1/4 acres, stocked with Siberian white Amur and Tilapia mossambica. About 9,000 lb of fish were produced in the first year, and up to 1,250 lb of Ipomoca repens can be harvested daily in peak seasons. The white Amur, buffalo fishes, and Tilapia have all been successfully farmed using this system, and all are considered highly desirable foods for humans. Several species of shellfish, large fresh-water shrimp, and silver and spotted Amur are also being considered as potentially adaptable to the system. Fish farming gives high investment returns, so that, with this system, both animal waste and idle-land problems can be economically solved. (East Central State College)
W75-04555

RECYCLE ORGANIC WASTES AS FEED FOR MEAT ANIMALS.
Compost Science, Vol 12, No 6, p 19, November-December 1971.

Descriptors: *Waste disposal, *Recycling, *Farm wastes, *Organic wastes, Feeds, Livestock, Nutrients, Sawdust, Fertilizers, *Pennsylvania, Waste treatment.
Identifiers: Meat.

Zoologists at Penn State University have been experimenting with feeding farm animals several forms of organic wastes, most of which are of nutritional value. When adequately supplemented with protein, vitamins and minerals, wastes can serve as excellent animal feeds; in addition disposal problems are reduced in a manner which is more economically feasible than is spreading on fields as a fertilizer. Now that DDT is no longer used on orchard trees, apple pomace should be fed to ruminants, for whom it is a satisfactory energy source. Ground waste paper soaked in blackstrap molasses was readily eaten by ruminants, as was sawdust, a roughage substitute which seems to contribute to lower rates of liver abscesses. Finishing rations containing sterilized poultry wastes had not effect on weight gain, meat, carcass quality, or any other factors under study. None of these feeds produced unacceptable levels of arsenic, chlorinated hydrocarbons, or pesticides in meat, fat, or liver tissue. Although consumer acceptance is one stumbling block to such a feed program the technology for this form of waste utilization is already available. (East Central State College)
W75-04556

SIMULATION AND STATISTICAL QUALITY CONTROL FOR WATER POLLUTION ABATEMENT,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5G.
W75-04557

WASTEWATER CHARACTERIZATION FOR THE SPECIALTY FOOD INDUSTRY,
American Frozen Food Inst., Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-04560

MICROBIOLOGICAL PRODUCTION OF GEOSMIN,
Rutgers - The State Univ., New Brunswick, N.J. Inst. of Microbiology.
N. N. Gerber.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-094, p 8, November 1974. 1 fig, 3 tab, 12 ref. 1CB047; ROAP 21AQB; Task 9, R-801630.

Descriptors: *Odors, Odor control, Microorganisms, Fermentation, Chromatograpy, *Actinomyces, *Waste water treatment, Sampling, Water quality standards.
Identifiers: Methylisoborneol, *Standard samples, *Geosmin production, *Streptomyces.

Geosmin, trans-1, 10-dimethyl-trans-9-decalol, is produced by numerous actinomycetes and some blue-green algae. It has been shown to be responsible for earthy/musty odors in public water supplies. Samples of purified geosmin were needed for use as odor standards and for use in water treatment unit process development studies. This work was carried out to fulfill this need. The microorganism, Streptomyces sp. CWW3, was grown for 5 days at 28 deg with shaking in a broth medium. The mixture was steam distilled and the clear distillate extracted with methylene chloride. The geosmin containing methylene chloride extract was separated and the geosmin purified by column and gas chromatography. Seven hundred nine milligrams of geosmin was prepared. (EPA)
W75-04561

SURGE FACILITY FOR WET AND DRY WEATHER FLOW CONTROL,
Y-T-O and Associates, Walnut Creek, Calif.
H. L. Welborn.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-075, p 86, November 1974. 25 fig, 24 tab. 1BB034; ROAP 21-ASY; Task 140, EPA Demonstration Project S800769.

Descriptors: *Surge tanks, *Storm surges, Flood control, *Flow control, Sewage, Sewage disposal, Flow measurement, Flow distribution, Sewage treatment , *Settling basins, *Storage tanks, Underflow, Sedimentation tanks, Water influx, *Infiltration, Wastewater treatment.
Identifiers: Surge basins. Flow equalization, Sludge removal, Pool sweep, Sedimentation-equalization, Peak storm flow.

A surge facility was tested which provided peak flow equalization and some degree of treatment to all storm flows and rate control of all wet and dry weather wastewater flows. The facility was designed to test a method whereby solids could be prevented from accumulating on the bottom of an inexpensive earthen, lined basin without the use of conventional mechanical sludge collection equipment. The principal features of the surge facility were a 2,841 cubic meter (0.75 million gallon) Sedimentation-Equalization Basin, variable underflow pumps, a surface aerator and Pool Sweeps. The Pool Sweeps were used to continuously 'sweep' the bottom and sides of the earthen, lined basin to move and temporarily resuspend the settled sewage solids and, thereby, maintain the flow of solids in the absence of mechanical collection mechanism, steep bottom slopes, or a completely mixed basin. Under the storm flow conditions, the surge facility removed approximately 45 percent of the influent Suspended Solids and 90 percent of influent Settleable Solids prior to overflow to a storage pond. Although a significant portion of the solids flow through the surge basin could be attributed to the operation of the Pool Sweeps, their overall performance could not justify their use in other similar facilities. (EPA)
W75-04562

DRY CAUSTIC PEELING OF CLINGSTONE PEACHES ON A COMMERCIAL SCALE,
Del Monte Corp., San Francisco, Calif.
H. E. Stone.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-092, December 1974. 61 p, 5 fig, 11 tab, 5 ref, append. 1BB037, EPA Grant. No 12060 HFY.

Descriptors: *Canneries, *Water pollution sources, Peaches, Costs, Liquid wastes, *Waste water treatment, Industrial wastes.
Identifiers: Food processing, Canning, Liquid waste reduction, *Fruit peel removal.

This study evaluates the peel removal ability and rinse water characteristics for the first commercially sized equipment using the principle of rapidly rotating rubber discs to gently wipe softened peel off Clingstone peaches. The conventional process utilizes large volumes of fresh water to remove the softened peel and flush it into the liquid effluent from the plant from where it cannot be easily separated. The dry caustic unit demonstrates that gentle abrasion can remove the softened peel, yield a peach suitable for commercial canning and allow for separation and collection of a major portion of this solid residue; thereby preventing its entry into the liquid waste stream. In addition to an approximately 60% reduction in the BOD loading in the liquid waste stream, an approximately 90% reduction in the fresh water requirement for this phase of the preparation of Cling peaches is demonstrated. These reductions in volume of liquid effluent and in the total pounds of organic matter which must be treated are beneficial to both private and public wastewater treatment facilities. A potential increased operating cost to the canner is indicated to be attributable to slightly increased peel loss and to costs associated with the handling of solid residues separated and collected from the dry caustic peeler. (EPA)
W75-04564

SEPARATION, DEWATERING AND DISPOSAL OF SUGARBEET TRANSPORT WATER SOLIDS, (PHASE I),
American Crystal Sugar Co., Denver, Colo.
I. V. Fordyce, and A. M. Cooley.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-093, p 66, December 1974. 7 fig, 13 tab, 7 ref, 3 append. 1BB037; Task 21 BAB/083, EPA Grant No 12060 ESC.

Descriptors: Separation techniques, *Waste water treatment, Water quality control, Water reuse, Waste treatment, Treatment facilities, Pollution abatement, Industrial wastes, *Sugarbeets, Coagulation, Sludge disposal, Filtration, Dewatering.
Identifiers: pH control.

The objectives were to determine the settling characteristics of solids from sugar beet washing and fluming operations in a clarifier, the filtering characteristics of the underflow slurry from a clarifier and the disposal of the filter cake without subsequent development of objectionable odors. The results were to be used to determine the feasibility of installing full scale filters for filtration of and removal of the suspended solids from the transport water and complete recycling of water.

Buildup of organic matter in the water and consequent bacterial growth necessitated the maintenance of high pH by addition of slacked lime. It was necessary also at intervals to add paraformaldehyde to control bacterial growth. Dosages are given. Best conditions for filtration were obtained when the underflow from the clarifier was heated, the pH was maintained over 10.5 and when the waste lime cake from beet juice purification was added to the feed to the clarifier. The filter cake which was accumulated was disposed of on farm and by three different methods and did not develop objectionable odors in any of the methods used. (EPA)
W75-04565

WATER RECYCLE/REUSE POSSIBILITIES: POWER PLANT BOILER AND COOLING SYSTEMS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $1.15. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-039, p 51, December 1974. 13 fig, 7 tab, 15 ref, 2 append.

Descriptors: Water types, Industrial water, Water costs, *Water demand, *Water reuse, Cooling water, Waste water treatment, Recycling, Boiler feed water.

The methodology to evaluate, in economic terms, potential power plant boiler and cooling system water recycle/reuse programs is presented. Drum type boiler systems and closed cycle cooling systems are used as the basis for the programs' water requirements. The evaluations take into account the variable plant characteristics such as makeup water quality, fuel type, thermal efficiency, capacity factor and fixed charge rate. The evaluation methodology is applicable to existing and proposed power plants, on an individual plant basis—and can be used to determine the over-all economics of potential recycle/reuse programs. (EPA)
W75-04566

EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Arthur D. Little Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04571

BACTERIAL ZOOGLOEA FORMATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
J. F. Unz, and S. R. Farrah.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 235 [illegible] $4.75 paper copy, $2.25 microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-018, April 1974. 86 p, 35 fig, 18 tab, 71 ref. 1BB043/21ASR/003.

Descriptors: *Activated sludge, *Bacteria, Flocculation, Polymers, Scum.
Identifiers: *Zoogloea sp., Zoogloea ramigera, Zoogloeal bacteria, Flourescent antibody.

Activated sludge flocs suspended in wet mounts on microscope slides were observed to sprout, finger-like, bacterial zoogloeae as a consequence of the outgrowth of bacteria from flocs. The rate of extension of finger-like zoogloeae was typically [illegible] to 15.0 micro per hr and mean cell doubling time was estimated to be approximately 2 hrs. Epifluorescent and fluorescent antibody studies revealed that the bacterial zoogloeae consisted of the progeny of specific zoogloea-forming bacteria. Purified exopolymers of Zoogloea strains and domestic activated sludge contained two neutral sugars, one of which was identified as glucosamine. Zoogloea exopolymer was not fibrilar or cellulosic and contained approximately 17 to 19 per cent amino sugar and about one per cent hexoses, uronic acids and ether soluble substances on a dry weight of polymer basis. Amino sugar production was found to parallel zoogloea formation by Zoogloea sp. Calcium ion appeared to augment flocculation of bacterial cells capable of undergoing natural coalescence. Two cell types, described as rough and smooth colony-forming, were found in some strains of Zoogloea. Rough cells readily flocculated in agitated cultures whereas smooth cells produced relatively turbid cultures under similar growth conditions. A predominance of one of the two types could influence the degree of flocculation by Zoogloea cultures. (EPA)
W75-04572

AN ASSESSMENT OF WET SYSTEMS FOR RESIDENTIAL REFUSE COLLECTION: SUMMARY REPORT,
Curran Associates, Inc., Northampton, Mass.
P. M. Meier, J. Kuhner, and R. E. Bolton.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 236 085, $5.25 paper copy, $2.25 microfiche. Environmental Protection Agency, Report EPA-670/2-74-068, August 1974. 92 p, 14 fig, 11 tab, 9 ref. 1DB064/ROAP-09ADA/Task 04 EPA Contract 68-03-0183.

Descriptors: *Wastes, Sewers, Waste disposal, Economics, *Pipelines, Transportation, Mathematical models, Sewage treatment, *Waste water treatment, *Domestic wastes.
Identifiers: *Solid waste collection, Ground refuse transport, Economic feasibility study, *Hydraulic transport, *Combined refuse/sewage treatment, *Grinders(Refuse).

The most promising wet system alternative is identified as a system using individual household grinders in low density areas, vacuum collection and neighborhood grinders in high density areas, dilute slurry transport of ground refuse in the existing sanitary sewer system, and joint treatment of refuse and sewage at an expanded treatment facility that includes anaerobic digestion for methane generation. However, the economic feasibility of even the most promising alternative is doubtful because of the high cost of grinding, and hydraulic transport of ground refuse in existing sewer systems may be feasible only if both metals and glass are excluded. A conventional collection of the nongrindable and bulky constituents of residential refuse will still be needed, albeit of a diminished frequency. The total 1973 cost of such a wet system is estimated at $113-196 per household per year, of which $80-$105 is for grinding. This compares to a total cost for refuse and sewage collection and disposal under existing concepts of up to $115 per household per year. Projections for 1988 indicate that the wet system cost might rise to $130-$228, against a range of $61-$143 under conventional concepts. However, if the cost of the grinder is excluded (on the basis that individuals would purchase grinders for their convenience benefits), the 1973 wet system costs (to the public sector) would be only $33-$91, thus possibly less than existing public sector costs of about $43-$115 per household per year. (EPA)
W75-04577

SALMONELLA AND NATURAL PURIFICATION OF POLLUTED WATERS, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W75-04578

CONTROL OF POLLUTION FROM ANIMAL FEEDLOTS AND REUSE OF ANIMAL WASTES,
Committee on Government Operations (U.S. House).
93rd Congress, 2nd Session, House Report No 93-1012, 1974, 68 p. 1 fig.

Descriptors: *Water pollution, Control, *Feed lots, *Farm wastes, *Livestock, Legal aspects, Permits, Regulation, Fertilizers, Fuels, *Recycling, *Waste treatment, Waste disposal, Cattle.

The Federal Government's efforts to control pollution from animal feedlots by more efficient management of wastes and by encouragement of their reuse as fertilizer and fuel are reviewed. The nature of feedlot pollution from feedlots, and the current EPA policies for control are discussed. Also discussed is the pollution problem versus the administrative problem. Permit requirements for point source pollutors, are described. Appendices the types of animal feedlots, and the EPA's authority to exclude point sources from the permit program. Supplemental views of Hon. John C. Culver and dissenting views of HON. Charles Thone are included. (Russell-East Central)
W75-04615

DEVELOPMENT OF AN ORGANIC WASTE SLURRY INJECTOR,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
R. C. Gold, and J. L. Smith.
Paper No 73-4529, presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 12 p. 6 fig, 15 ref.

Descriptors: *Farm wastes, Organic wastes, *Waste disposal, *Slurries, *Injection, Irrigation, Odor, Aesthetics, Economics, Ground water, Runoff, Soil analysis, Insects, *Waste water treatment, *Water reuse.
Identifiers: *Land spreading, Deep plowing.

Organic waste disposal methods have changed little over the last several decades. However, these usually create aesthetic and pollution problems which have resulted in an attempt to find new and better ways to dispose of organic wastes. The presence of organic matter and some plant nutrients makes the idea of recycling organic wastes to the soil very desirable. The four usual methods for returning materials to the soil are irrigation, surface spreading, deep plowing or burial, and shallow plowing or injection. Since surface application creates problems, experiments were conducted using a slurry injection system. This type of system offers these advantages: (1) it is inexpensive; (2) it is capable of handling large volumes of wastes; (3) it eliminates odors, visibility, and aesthetic pollution problems; (4) it can be used in any part of the country with sufficient storage capacity for cold weather; (5) it can be operated by one person; and (6) the wastes are recycled and their benefits are not lost. (Russell-East Central)
W75-04616

TAILOR MADE CONFINEMENT BARN,
B. Fleming.
Beef, Vol 10, No 7, p 8-9, March, 1974. 4 fig.

Descriptors: *Farm wastes, *Confinement pens, *Management, Fertilizers, Design, Oxidation lagoons, Lagoons, Costs, Ventilation, Insulation, Waste disposal, Waste storage, Odor, *Iowa.
Identifiers: Barns, Land spreading, Slats.

A confinement barn operation should fit a feeder's personal needs. Lee and Roy Stoll had that in mind when they designed their own confinement barn. The barn was 256 ft. long. The south side of the barn was always open. The cattle were fed by a 250 ft. belt feeder which ran down the middle of the building. The manure handling system consisted of an eight ft. deep pit system. The manure was reclaimed as fertilizer at an estimated savings of about $23 per acre. Other unique arrangements in the barn were varied pen size and slats for the background lot. Drafts were eliminated by using wall-like dividers and insulation. The manure pit

was eight ft. deep, but only about two feet of that was below grade. The rest was built above ground and fill dirt was added. The stall operation is a carefully matched setup, and is tailored for their specific operation. (Russell-East Central)
W75-04617

SEWAGE-GROWN ALGAE AS A FEEDSTUFF FOR CHICKS,
Dept. of Poultry Husbandry. California Univ., Davis.
C. R. Grau, and N. W. Klein.
Poultry Science, Vol 36, p 1046-1051, 1957. 6 tab, 8 ref.

Descriptors: *Algae, *Feeds, *Poultry, *Proteins, *Aluminum, Flocculation, Centrifugation, Neutralization, Sewage.
Identifiers: Chicks, Acid extraction, Tolerance.

Sewage-grown algae meals, which contain about 40% crude protein, have been studied as sources of protein and other nutrients for young chicks. All feeding trials were performed with White Leghorn chicks which were fed a stock diet for ten days after hatching, and then were fed the experimental diets for the next eight days. Both alum-flocculated and centrifugated samples were fed. The chicks tolerated diets containing up to 20% aluminum-free algae meal. The presence of significant amounts of aluminum in the meal depressed chick growth. Neutralization and acid extraction have been unsuccessful in removing the harmful effects of the aluminum. The presence of dark, watery droppings was the only observed adverse effect of feeding the algae meals. This condition was found with alum-flocculated and aluminum-free meals. (Cameron-East Central)
W75-04618

NEW AEROBIC PROCESS TURNS WASTE TO NUTRIENTS,
AgChem and Commercial Fertilizer, Vol 27-28, No 12-1, p 24-27, December 1972-January, 1973. 7 fig.

Descriptors: *Farm wastes, *Nutrients, *Fertilizers, Feed lots, Cattle, Feeds, Urine, Aerobic conditions, *Ohio, *Aerobic treatment, *Waste treatment.
Identifiers: *Digestors.

The first animal-waste, large scale sterilized organic fertilizer capability is being developed by the operator's of Ohio Feed Lot-the world's largest pollution-free enclosed cattle feedlot. Cattle manure is collected by front-loading tractors, dumped into large fan ventilated vats and fed to an aerating digestor. Once the manure is sterilized it is bagged and packaged in 5, 10, 25, and 50 pound bags for use as organic fertilizer and sold. Great pains have been taken to make this feedlot operation as self sufficient and environmentally ameliorating as possible. Techniques include utilization of natural air flow (aided by fans), the creation of an impermeable feedlot surface, and the development of a guarded cattle diet using the feedlot's own corn-based feed. (Drewry-East Central)
W75-04619

NUTRIENT RECOVERY: NEW CONCEPT IN WASTE HANDLING,
P. D. Andre.
Beef, Vol 10, No 7, p 74-76. March, 1974, 6 fig, 1 tab.

Descriptors: *Nutrient removal, *Farm wastes, *Waste water treatment, *Recycling, Water purification, *Confinement pens, Model studies, Bacteria, Separation techniques, Irrigation, Fertilization.
Identifiers: *Waste handling, Refeeding.

In the near future, cattle feeders may begin to use a nutrient recovery system as an integral part of a confinement feeding building. Such a system has been developed and is currently undergoing experimentation. This system starts with raw manure and through a series of three stages removes the organic and inorganic nutrients for animals and field crops, ending with clear water. In the first stage, 30% of the total available dry solids can be removed. The second stage, which can involve up to five steps, removes most of the remaining nutrients. The third stage is a water purification stage. The cost of such a system is very high, but experiments indicate that returns from the system can be considerably higher than the cost. The nutrient value of the extracted wastes appears to be very high, and a well balanced high protein feed is the result of the process. Although there are minor problems to overcome, the Corral Nutrient Recovery System's designers are confident that it will offer substantial gains for confinement feeding. (Russell-East Central)
W75-04620

SLATS IN THE SOUTHWEST,
P. D. Andre.
Beef, Vol 10, No 1, p 62, 70, 71, September, 1973. 3 fig.

Descriptors: *Confinement pens, *Performance, Cattle, Costs, Lagoons, Sprinkling, Waste disposal, Southwest U.S., Waste Treatment, *Arizona.
Identifiers: *Slats, Open feed lot.

Operational facilities are described for a confinement facility with a capacity for 10,000 head of cattle. The advantages of the confinement pen versus the open pens are given in detail. Only seven acres are needed for the confinement pen versus 30 for the open pens. Confinement, it is estimated, should save hiring two men, as compared to open lots. Since the feed truck only has to travel over seven acres rather than 30, another savings of $1,800 is listed. Other advantages are: more pleasant working conditions for employees, ease of handling animals, possible improvement in conversion rates and death loss, odor and fly control, pollution prevention, easier management and supervision, more consistent quality of beef, faster turnover of cattle at lighter weights, and longer total life of the facility. Severe performance slumps due to weather can also be avoided; consequently, management can project business more accurately. There is an estimated $100,000 yearly advantage for this Arizona feedlot in choosing confinement rather than open lot. (Cartmell-East Central)
W75-04621

FAST FLUCH SYSTEM,
R. H. Brown.
Feedlot Management, Vol 15, No 11, p 10-12, November, 1973. 4 fig.

Descriptors: *Farm wastes, *Cattle, *Waste water treatment, *Waste disposal, *Feed lots, *Irrigation, Slopes, *South Carolina.
Identifiers: Forage yields.

A southeastern U.S. cattle farm uses fast flushing to remove wastes from concrete floors. Walworth Farms, feeding up to 5,000 head of cattle, flushes the 21/2% sloping floor with up to 9,000 gallons of water. Runoff flows into a catch ditch to an underground pumping station which further liquifies it and then it flows into portable irrigation pipes. The runoff irrigates up to 1,600 acres of grassland and cropland. The farm also has two lagoons to handle excess water when there are heavy rains. (Frantz-East Central)
W75-04622

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTES, VOL. I, CH.1 THRU 3,
Kansas Water Resources Research Inst., Manhattan.
C. E. Burkhead, and M. Trnovsky.
Available from the National Technical Information Service, Springfield, Va., 22161 as PB-239 521 $5.75 in paper copy, $2.25 microfiche. WKRRI Contribution No 132, February 1974. 118 p, 6 fig, 23 tab. OWRT A-042-KAN(1), 14-31-001-3516.

Descriptors: *Soil treatment, *Oxidation lagoons, Hydraulic conductivity, *Biological treatment, *Farm wastes, *Waste water treatment, Feasibility studies, Waste identification, Waste disposal, Water reuse, Soil types, *Kansas, Infiltration, Path of pollutants.
Identifiers: *Swine wastewater, *Land disposal, *Waste characterization, *Holding ponds, *Percolate characteristics, Soil columns, Loading and resting cycles.

Feasibility of treatment and disposal by land application of a holding pond supernatant receiving effluents from oxidation ditches treating swine waste generated in a confined hog growing operation was investigated. The performance of the three oxidation ditches and the holding pond was evaluated. The evaluation was based on statistical analyses of physical and chemical characteristics of the oxidation ditch effluents and the holding pond supernatant. The wastewater was analyzed from data collected from ten random samples for each of the following sampling locations: effluents from the oxidation ditches, the holding pond supernatant, and well water. In addition, data on water consumption, number of hogs in the buildings, and rainfall data were collected. Suitability of five typical Kansas soils for treatment and disposal of the holding pond supernatant was investigated in fifteen indoor soil columns. The columns contained disturbed soil samples representing the following textural classes: sand, sandy loam, silt loam and clay. The wastewater was applied to the column in alternate loading-resting cycles. Infiltration rates and quality changes of the percolate were monitored. Changes in the soil's chemical characteristics as brought about by the application of the supernatant were determined on ten soil columns' increments upon termination of testing. (See also W75-04624)
W75-04623

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTE, VOL II, CH. 4, THRU 7,
Kansas Water Resources Research Inst., Manhattan.
C. E. Burkhead, and M. Trnovsky.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-239 522 $7.25 in paper copy, $2.25 microfiche. KWRRI Contribution No 132, February 1974. 202 p, 76 fig, 23 tab, 183 ref. OWRT A-042-KAN(1) 14-31-0001-3516.

Descriptors: *Soil treatment, *Oxidation lagoons, Hydraulic conductivity, *Biological treatment, *Farm wastes, *Waste water treatment, Feasibility studies, Waste identification, Waste disposal, Water reuse, Soil types, *Kansas, Infiltration, Path of pollutants.
Identifiers: *Swine wastewater, *Land disposal, *Waste characterization, *Holding ponds, *Percolate characteristics, Soil columns, Loading and resting cycles.

Variation among the physical and chemical characteristics of the oxidation ditch effluents and the holding pond supernatant provided evidence of unsatisfactory in-building management, causing overloading of the oxidation ditches and accumulation of biodegradable pollutants in the oxidation ditch mixed liquor as well as in the holding pond supernatant. Application of the supernatant to the selected soils demonstrated that the soil's reten-

on capacity for the supernatant constituents is efinitely limited. The soil's retention capacity increased with the clay content of the soil and ecreased with the wastewater volume applied. In e course of testing, the quantity of the supernant soluble organics, salts, alkalinity, and cations the column's effluents increased appreciably ith an increase in quantity applied. Basic relaonships controlling the transformation of the ajor wastewater constitutents are described. ee also W75-04623)
75-04624

CID MINE WATER, A BIBLIOGRAPHY,
ffice of Water Research and Technology, ashington, D.C.
r primary bibliographic entry see Field 5G.
75-04625

ETHODS OF REMOVING NITRATES FROM ATER,
bert S. Kerr Water Research Center, Ada, la.
P. St. Amant, and L. A. Beck.
rnal of Agriculture and Food Chemistry, Vol No 5, p 785-788, September-October, 1970. 1 , 7 ref.

scriptors: *Waste water treatment, *Nitrates, lgae, *Bacteria, *Denitrification, esalination, *Nitrogen, *Nitrites, Oxidation, sts, Tile drainage, Osmosis, Electrodialysis, teins, *California, Filters.
ntifiers: *Algae stripping, *San Joaquin(Calif).

e to salt accumulation in the water collected by systems in the California San Joaquin Valley, necessary to dispose ultimately of this water. orts show that nitrogen, primarily in the nitrate n, is a serious potential pollutant. Two basic hods of nitrogen removal are being evaluated. se methods are termed bacterial denitrification algae stripping. Two methods of bacterial itrification are being evaluated: pond denitrifion and filter denitrification. Desalination of the drainage is also used. Each method is cribed. Also, the efficiency of each method is ussed. Land requirements for these three ems will vary greatly. Initial cost estimates for ogen removal by these three biological systems nearly the samm-around $25 to $30 per million based on an average influent nitrate-nitrogen centration of 20 mg per 1. (Cameron-East Cen-

5-04626

VATERING BOVINE ANIMAL MANURE,
nsylvania State Univ., University Park. Dept. gricultural Engineering.
. Bartlett, R. E. Bos, and E. C. Wunz.
er No 73-431, presented at 1973 Annual Meetof the American Society of Agricultural Eners, University of Kentucky, Lexington, June 0, 1973, 26 p. 5 fig, 11 tab, 18 ref.

criptors: *Farm wastes, *Dewatering, *Cattle, ste water treatment, *Waste disposal, *Waste ge, Slurries, Irrigation, Nutrients.
tifiers: Fibers.

arch was conducted to develop methods of tering bovine manure and determine the proes of the resulting fibrous and liquid comnts. Methods investigated were: stationary ens (Hydro sieve), vibro-energy rotary screen co), pressure filtration (d'Arcy equation), us belt with press-rolls, perforated-shell cone ifuge, and perforated-shell screw conveyor. lts of the dewatering methods are given and ibrous and liquid components are analyzed. liquid contained most of the nutrient value, nearly half of the nutrients in the particle size smaller than 325 U.S. Mesh. The chemical en demand was approximately the same for ibrous component and for the filtrate. Dewatering of manure would allow the liquid to be stored in earthen ponds for later use for crop irrigation. The fibrous solid could then be stockpiled without seepage, odor, or fly problems. (Frantz-East Central)
W75-04627

SWINE WASTE MANAGEMENT SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
B. Horsfield, J. Gottbrath, and J. Kadlec.
Paper No 73-4517 presented at the 1973 Winter Meeting of the American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 33 p. 9 fig, 10 tab, 15 ref.

Descriptors: *Hogs, *Farm wastes, *Waste treatment, *Management, *Evaluation, Costs, Lagoons, Confinement pens, Economics, Waste storage, Separation techniques, Transfer, Transportation, Waste disposal, Odor, Water pollution, Irrigation, Performance.
Identifiers: Oxidation ditch, Slatted floors, Land disposal.

Five unique waste handling systems for confinement finishing hogs were studied and were compared with two common systems. The five systems were: (1) a deep pit with wood slats and earth bottom; (2) partial wood slats, a shallow pit and a two-stage lagoon; (3) full wood slats with a shallow pit and lagoon; (4) a solid concrete floor with flushing and a two-stage lagoons; and (5) partial slats and air diffusion oxidation. The two common systems were; (A) concrete slats and concrete pit; and (B) concrete slats and pit with oxidation ditch and outside storage. Both cost and noncost factors were taken into consideration. The costs ranged from $.75 to $3.89 per head produced if the nutrient value of the wastes were ignored. (Russel-East Central)
W75-04629

EFFECT OF FEEDLOT LAWS AND CLIMATE ON OPEN FEEDLOT WASTE MANAGEMENT,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker, J. E. Garton, G. W. A. Mahoney, and M. Paine.
Paper No 72-438, presented at 65th Annual Meeting, American Society of Agricultural Engineers, June 27-30, 1972, Hot Springs, Arkansas, 38 p. 12 fig, 6 tab, 16 ref.

Descriptors: *Feedlots, *Regulation, *Legal aspects, *Climates, *Farm wastes, Management, Design, Costs, Precipitation(Atmospheric), Storms, Evaporation, Water pollution, Irrigation, Solid wastes, *Waste treatment.
Identifiers: Storm rainfall, Opean feed lots, Holding ponds.

The effects of climate and the impact of feedlot laws on waste management systems were examined. Analysis of the engineering design requirements for feedlots was made by searching the literature, observing feedlot operations, performing operational analysis of waste handling systems, and from personal conversations. Feedlot laws for regulation runoff control are aimed at reducing the water pollution potential by means of holding ponds. For the waste management systems, the major climatic factors are: annual precipitation, storm rainfall, annual evaporation, and temperature. Analysis of the various alternatives for handling the feedlot waste was done by analyzing the field observations and utilizing the computer to generate design information to perform calculations for comparing the cost of various systems. For a 20,000 head open feedlot with pollution control, the total system costs (Feedlot construction plus waste management systems) are approximately 0.01319 dollars per animal day with an investment cost of approximately $416,000. (Cartmell-East Central)
W75-04630

MANAGEMENT OF SWINE WASTE BY A LAGOON SYSTEM,
Washington State Univ., Pullman. Dept. of Agricultural Engineering.
R. E. Hermanson, and J. L. Koon.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1172-1174, 1178, 1973. 4 fig, 1 tab, 9 ref.

Descriptors: *Management, *Farm wastes, *Hogs, Lagoons, *Waste treatment, Water pollution, Aerobic treatment, Anaerobic conditions, Odor, Effluent, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Phosphorus, Bacteria, Sampling.
Identifiers: *Swine, Land disposal.

A two-stage anaerobic-aerobic lagoon system can provide a significant reduction in pollutional characteristics of swine waste. The addition of an aerated second stage to an anaerobic lagoon resulted in effluent with mean DOD and COD reductions in the aerated lagoon of 72 and 45%, respectively. A detention time of 2 weeks in the aerated lagoon resulted in average BOD and COD reductions almost equal to those obtained in a 4 or 5 week detention time for the anaerobic lagoon. Total nitrogen was reduced an average of 18% for the 2 week detention in the aerated lagoon and 53% for the 9 week detention. Although significant reductions in effluent concentrations were achieved, the end product was still quite polluted. The levels of BOD, COD, N2, and P along with solids and color, in most states, limited the discharge of wastes from this two-stage system into receiving streams. Disposal on land was the only feasible alternative. The primary effect of the aerated lagoon was the reduction of odor and the amount of pollutants that the land was forced to handle. (Russell-East Central)
W75-04632

HE SOLVED HIS MANURE HANDLING PROBLEM,
Wisconsin Univ., Madison.
T. J. Brevik.
Hoard's Dairyman, p 357, March 10, 1973. 1 fig.

Descriptors: *Farm wastes, *Dairy industry, *Waste treatment, *Waste storage, *Feed lots, *Runoff, Water pollution, Design, *Wisconsin.

A Wisconsin farmer developed a waste handling system that prevented barnyard runoff from running down a slope into a nearby stream. The plan included a 50x50x11 ft. concrete storage pit and curbs which diverted runoff from its natural course. A manure thrower was positioned at the end of the barn to sling wastes into the pit. A 40x60x7 ft. detention pond was recently added. (Frantz-East Central)
W75-04634

MANURE HANDLING SYSTEMS FOR THE FUTURE,
B. Eftink, and L. Searle.
Successful Farming, Vol 72, No 1, p 26-29, January, 1974. 11 fig.

Descriptors: *Farm wastes, *Waste treatment, *Waste disposal, *Recycling, Lagoons, Oxidation lagoons, Waste storage, Fish farming, Economics, Costs, *Forecasting.
Identifiers: Composting.

Most current research efforts are attempting to incorporate the use of manure as an asset instead of a liability. The future promises that manure disposal will be designed to make it pay for itself and, in some cases, provide a profit. Methods for manure disposal, are outlined. They are: (1) Composting manure and selling it; (2) Recycling the liquids and treating manure; (3) Using treatment tanks to decompose manure; (4) Using a hog manure supplement; (5) Piping manure underground to a storage tank; (6) Screening out the

solids; (7) Using an oxidation ditch; (8) Storing manure above ground; and (9) Growing fish in manure lagoons. Some of these nine methods of manure handling are now being used, while others are futuristic. Some will be useful and economical, and some will be impractical. (Russell-East Central)
W75-04635

TENTATIVE CRITERIA FOR DESIGN, CONSTRUCTION AND OPERATION OF THE BATCH TYPE PASVEER OXIDATION DITCH SYSTEM FOR THE TREATMENT OF ANIMAL WASTES,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale.
February 15, 1968, 20 p. 30 fig, 2 tab, 20 ref.

Descriptors: *Design, Construction, *Operations, *Oxidation lagoons, *Farm wastes, *Waste treatment, Aeration, Digestion, Aerobic bacteria, Anaerobic bacteria, Oxygen, Odor, Volatility, Biochemical oxygen demand, Nitrates, Nitrites, Temperature, Water pollution.
Identifiers: Batch-type oxidation ditch, Facultative bacteria, Continuous treatment system.

A continuous oxidation ditch was developed by the Research Institute for Public Health Engineering, The Netherlands, as a low-cost method for purifying sewage emanating from small communities. The system is a modified form of activated sludge process and may be classified in the extended aeration group of odorless aerobic treatments. For either batch or continuous oxidation ditches to work satisfactorily, an aerator is used to 'beat' oxygen into the waste to support the growth of bacteria and to hold the solids in suspension. Unlike the continuous system, wastes are dumped into the batch oxidation ditch periodically and the aerator is not run continuously. The batch-type ditches reduce dry matter by about 40 to 50% by converting organic matter into carbon dioxide and water. The ditch releases some nitrogen but converts most of it into nitrites and nitrates. The pit (ditch) storage time may be increased by 80 to 90% provided effluent level can be controlled and oxygen transfer is possible at the greater suspended solids content. The oxidation ditch also concentrates the minerals and salt, by about 70 to 90% in the batch process. The design and operation of the oxidation ditch system are discussed. (Cameron-East Central)
W75-04636

TEST SWINE WASTE DISPOSAL SYSTEMS,
Iowa State Univ., Ames.
T. Hargrove.
Wallace's Farmer, Vol 96, p 30, July 24, 1971. 3 fig.

Descriptors: *Hogs, *Waste disposal, *Farm wastes, Testing, Water pollution, Air pollution, Lagoons, Sprinkler irrigation, Water hyacinth, Nutrients, Effluent, *Iowa.
Identifiers: *Swine, Gutters, Flushing.

Iowa State has installed a gutter system in a hog house with a 100-gallon flush lasting 20 seconds once an hour. The swine cooperate. Flushings may be routed to an anaerobic lagoon, an oxidation ditch, or the lagoon and ditch in turn. The excess is spread on corn and/or grassland. Flushing water is recirculated. Water hyacinths are being tested for removal of nutrients from effluents followed by use as cattle roughage. Iowa winters will keep them from becoming a nuisance. (East Central State College)
W75-04637

IRRIGATION FOR LAND APPLICATION OF ANIMAL WASTE,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
B. C. Horsfield, R. Z. Wheaton, J. C. Nye, and J. V. Mannering.
(1973). 20 p. 7 fig, 7 tab.

Descriptors: *Farm wastes, *Irrigation, *Waste disposal, Livestock, Crops, Soils, Runoff, Costs, Equipment, *Indiana, *Water reuse, Water treatment.
Identifiers: *Land application.

Irrigation may be the best means of putting farm wastes back onto the land. Runoff detention, combination manure-and-runoff, and covered manure facilities are described. Major soil and cropping factors affecting irrigation rate are evaluated. Irrigation equipment and systems' costs are described. Tips are given on waste storage management, irrigation equipment use, soil conditions, and crop utilization practices. Only with proper management can the farmer attain the desired results of irrigation. (Frantz-East Central)
W75-04638

SUBFLOOR MONITORING OF SHADY GROVE DAIRY LIQUID MANURE HOLDING POND,
San Bernadino County Agricultural Extension Service, Calif.
J. C. Oliver, W. C. Fairbank, J. L. Meyer, and J. M. Rible.
California Agriculture, Vol 28, No 4, p 6-7, April, 1974. 1 fig, 6 tab.

Descriptors: *Monitoring, *California, *Dairy industry, *Liquid wastes, *Sealants, *Seepage control, Chemical properties, Farm wastes, Waste treatment, Pollutant identification.
Identifiers: *Subfloor, *Holding ponds.

Subfloor monitoring of the Shady Grove Dairy liquid manure holding pond was begun in June, 1972, with the installation of duplicate tensiometer cups at 2,4,6,8, and 9 ft. below the pond floor. Extracts for analysis were collected weekly from ceramic cups for the first six weeks after the pond was filled with manure water. Results of chemical analyses of soil solution extracts from beneath the pond were given. This subfloor monitoring technique established that the dairy waste pond had become effectively sealed. The soil solution analysis as compared with original soil analysis data, leads to the conclusion that sealing of ponds takes place essentially in the upper 6 ft. of soil in a pond bottom. (Cartmell-East Central)
W75-04640

PNEUMATIC TRANSPORTATION OF MANURE,
All-Union Research Inst. of Cattle-breeding, Podolsk (USSR).
A. N. Shimko.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1170-1171, Nov-Dec, 1973. 1 fig, 3 ref.

Descriptors: *Waste treatment, *Waste storage, Fertilizers, Nutrients, Economics, Organic wastes.
Identifiers: *Pneumatic transportation, Holding tanks, Manure pits, Land spreading.

In Russia, the work involved in loading, unloading, and transporting manure accounts for approximately 40% of all the labor expended on farms. About one-half of this amount is required for handling manure. A pneumatic system was designed to transport and load manure into storage structures on livestock farms of 100 to 2,000 head of cattle. This system eliminated tractors, transport units, and traffic in moving manure from barns to pits. It also provided the means to convey, receive, and store for long periods high quality organic fertilizer without the loss of nutrients. The system involves transportation of manure from barns to the manure tank. When the tank is full, it becomes pressurized to about 6 atmospheres. The manure is then sent through a pipeline and stored at the bottom of a pit. The upper layers of the pi dry and reduce odors. When needed, the top layer are removed and used for fertilizer. (Russell-Eas Central)
W75-04641

CHANGING FROM DUMPING TO RECYCLING. PART 2. ORGANIC WASTES,
California Univ., Berkeley. Sanitary Engineerin Research Lab.
C. G. Golueke.
Compost Science, Vol 13, No 2, p 20-23, March April 1972.

Descriptors: *Recycling, *Organic wastes *Wast treatment, Feeds, Chemicals, Ponding, Anaerobi digestion, Activated sludge, Trickling filters, Sta bilization, Oxidation lagoons, Fermentation.
Identifiers: Pyrolysis.

Methods of recycling the major groups of organi wastes (such as food processing wastes, manure and wood wastes) are discussed. Their recyclin creates three major products: soil, foodstuffs, an useful chemicals. The present treatment method concentrating on elimination of wastes rather tha reclamation, are reviewed. Ponding is accon plished using anaerobic ponds, facultative pond oxidation ditches, and high-rate ponds. The trea ment mechanism in the trickling filter is aerobi biological stabilization of organic waste suspended or dissolved in water. The activate sludge works on the same principle; it differs fro the trickling filter process because no surfaces a provided for the attachment of a microbial layer; is a compact process, subject to fairly close co trol. In the anaerobic digestion process, biologic decomposition takes place in the absence of o ygen. (East Central State College)
W75-04642

IN-THE-BUILDING OXIDATION DITCHES FO LIVESTOCK WASTES,
Illinois Univ., Urbana. Dept. of Agricultural E gineering.
D. L. Day.
Water and Wastes Engineering, Vol 7, No 9, p 23-E-24, September 1970.

Descriptors: *Oxidation lagoons, *Farm waste *Livestock, *Waste treatment, *Aerobic trea ment, Effluents, Nitrates, Biochemical oxygen d mand, Odor, Phosphates, Lagoons, Was storage, Waste disposal.
Identifiers: In-the-building oxidation ditche Biological oxidation, Land disposal.

Aerobic treatment for the removal of biodegrad ble organic matter from liquid wastes is an odo less process consisting of two phases operati simultaneously. One phase is biological oxidati that gives by-products such as carbon dioxide a water, and yields energy. The second phase u izes the energy from the oxidation for synthesis new cells. The in-the-building ditch for livesto wastes is a completely mixed aerobic system ha ing a long detention time. The ditch is locat beneath the self-cleaning slotted floors in a co finement building. The liquid volume is about cu ft/pound of daily BOD5. The liquid depth shallow to keep the solids suspended. The depth kept constant by using an overflow for the mix liquor. After the bioxidation system comes equilibrium, the mixed liquor BOD5 will typica be 3,000 to 5,000 mg/L, resulting in a BOD5 redu tion of about 90 percent. A low-labor waste tre ment system can be formed by allowing the oxi tion ditch liquor to overflow by gravity into a n overflow aerobic lagoon with a fluctuating dep The effluent is not suitable for direct discha into a stream, but may be spread on land in odorless state. Some obvious concerns of t system are: nitrates in the effluent disposed on field; possible consequences of high rates of ap cation to fields; nitrates, phosphates, and color the effluent if stream discharge were to be us and operating costs. (East Central State College

W75-04643

PIERCED STEEL PLANKING SURFACING FOR FEEDLOT RUNOFF CONTROL,
South Dakota State Univ., Brookings. Water Resources Inst.
J. L. Wiersma, C. B. Gilbertson, J. M. Madden, R. E. Larson, and F. L. Schapler.
Paper No 73-4541 presented at 1973 Winter Meeting, American Society of Agricultural Engineers, December 11-14, 1973 Chicago, Illinois, 16 p, 17 fig, 17 ref.

Descriptors: *Feed lots, *Runoff, *Control, Waste water treatment, *Farm wastes, Cattle, Economics, Water pollution, Infiltration rates, Hogs, Design, Costs.
Identifiers: Pierced steel planking.

The concept of using pierced steel planking in a dish shaped feedlot with a porous surface on a sand bed to partially treat the liquids which had been separated from the solids proved unsatisfactory. It was unsatisfactory because the waste material from the cattle combined with hair to form an impermeable layer on the sand and this prevented vertical water movement. However, the pierced steel lot did show certain advantages over concrete lots. Some of these advantages were: the cattle adapted readily to the steel; the surface remained stable; the surface could be cleaned easily; the surface could be cleaned when concrete lots remained frozen; the lots were cooler than concrete lots during the warm months; the lots were dust free during dry seasons; and the lots could be easily remodeled by arranging the sections differently with a tractor. The price of the steel pierced lot varies as do other surfaces with each set of conditions. (Russell-East Central)
W75-04644

SETTLING BASIN DESIGN FOR RACEWAY FISH PRODUCTION SYSTEMS,
Georgia Univ., Athens. Agricultural Engineering Center.
J. L. Chesness, W. H. Poole, and T. K. Hill.
Paper No 74-5005 presented at the 1974 Annual Meeting of American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974, 13 p, 3 fig, 5 tab, 8 ref.

Descriptors: *Settling basins, *Design, *Organic wastes, Fish, *Sedimentation, Recirculated water, Model studies, Effluent, Analysis, *Waste treatment.
Identifiers: *Raceway fish production systems, *Fish wastes.

A new type of fish production system is a flowing water culture of fish in a recirculating earthen raceway. This system produces substantial amounts of fish, but if production in this closed-loop system is to continue, techniques must be found for the removal of waste products. This study was undertaken to: (1) determine the quantity of solids and the settling characteristics of suspended solids; and (2) design and test a settling basin for the removal of these solids. A trapezoidal-shaped settling basin was designed. Field evaluations showed that the basin would remove about 48% of the filterable solids. This was 82% of the predicted removal efficiency, but only 6% of the total organic solids would be removed by sedimentation. This study indicates that effective removal of waste organics in warm water fish culture recirculating raceway systems cannot be attained by physical sedimentation alone. (Russell-East Central)
W75-04646

A BILL TO ASSURE SAFE DRINKING WATER.
For primary bibliographic entry see Field 6E.
W75-04652

LABORATORY STUDIES ON FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
L. R. Christensen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 676, $4.75 in paper copy, $2.25 in microfiche. MS Thesis, April, 1973, 77 p. 16 fig, 15 tab, 40 ref. OWRT A-027-NEB(1). 14-31-0001-3827.

Descriptors: *Farm wastes, Agricultural runoff, *Feedlots, Runoff, *Waste treatment, Coagulation, *Aeration, Chemical oxygen demand, Operations.

Laboratory studies, beginning in mid-September, 1971, and continuing through the summer of 1972, were made to determine the optimum operating conditions for an extended aeration system with air lift solids return. Treatment efficiencies were evaluated at relative equilibria of the monitoring parameters of MLSS, effluent SS, mixed liquor COD, effluent COD, and soluble effluent COD with respect to the influent waste COD and SS. Results showed that aerobic treatment with a forced solids return could operate at greater than 50 percent efficiency for both solids and COD removal at detention times as low as 2 days without additional treatment. It was concluded that feedlot runoff is amenable to aerobic treatment. (Cameron-East Central)
W75-04653

EVALUATION PROBLEM OF STORM WATER ROUTING MATHEMATICAL MODELS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
J. A. Cunge.
Water Research, Vol 8, No 12, p 1083-1087, December 1974. 10 ref.

Descriptors: Evaluation, *Value engineering, *Mathematical models, Analytical techniques, Synthetic hydrology, Drainage systems, *Flood routing, *Storm water, *Sewers systems, *Storm drains.

The flood routing procedure is a key part of any mathematical model of a storm sewer system. Eventually the value of the whole model depends on it. The choice of the flood routing method among the several available should be made taking into account local situations and the ultimate aims of the simulation model. That decision may ultimately influence the sucess or failure of the actual sewer management system. Several alternative models were discussed. Municipal services should take an active part in any evaluation study as well as in the actual model building and calibrating. (Jess-ISWS)
W75-04708

LABORATORY STUDY OF CONTINUOUS ELECTROOXIDATION OF DILUTE CYANIDE WASTES,
Waterloo Univ. (Ontario). Dept. of Chemical Engineering.
J. J. Byerley, and K. Enns.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-235 588, $3.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-059, p 39, October 1974. 5 fig, 27 ref, 3 append. EPA Project 12010 DOT.

Descriptors: *Industrial wastes, *Waste water treatment, *Chemical wastes, Water pollution control, Waste water disposal, Oxidation, Laboratory tests, *Electrochemistry, Water purification, Heavy metals, Water pollution sources.
Identifiers: *Cyanides, Metal finishing wastes, *Electrooxidation, Electroplating.

An experimental study was conducted to determine the feasibility of detoxifying dilute cyanide plating wastes by electrooxidation. Because of the toxicity of cyanide to aquatic and animal life and its detrimental effect on the operation of sewage treatment plants, in-plant treatment of dilute cyanide wastes is essential. Although successful processes have been developed for destroying cyanide in concentrated plating wastes, the economic feasibility of the electrolytic technique for treating dilute wastes has not been established. An electrochemical demonstration unit was developed for the treatment of dilute cyanide plating wastes. The cyanide and plating metal concentrations can be reduced to less than 1 ppm. Energy requirements vary according to the duty and mode of operation ranging from 40 KWhr to 140 KWhr/lbCN(-). (Humphreys-ISWS)
W75-04719

COMPREHENSIVE PLAN FOR WATER, SEWER AND STORM DRAINAGE IN THE LOWER RIO GRANDE VALLEY, (VOLUME II).
Nelson (B.L.) and Associates, Inc., Dallas, Tex.
Prepared for the Lower Rio Grande Valley Development Council, McAllen, Texas, September 1971. 112 p, 10 tab, 6 maps, 16 ref. HUD 701.

Descriptors: Water resources, *Water resources development, Flooding, *Drainage systems, Water management(Applied), *Rio Grande River, *Sewage, Waste water disposal, Channel improvement, *Comprehensive planning, Potential water supply, Regional development water poilcy, *Texas, Planning, Irrigation, *Storm drains.
Identifiers: Lower Rio Grande Valley(Tex), Cameron County(Tex), Hidalgo County(Tex), Willacy County(Tex).

This regional facilities plan has three sections: (1) outlines the existing situation for water, sewer and storm drainage facilities in each county, Cameron, Hidalgo, and Willacy, then describes the situations in individual communities; (2) discusses plans for both short range and long range development programs, including alternate means of financing; (3) suggests creation of a single Regional Authority to provide potable and irrigation water from the Rio Grande and recommends adoption of this plan. Water supply is primarily groundwater of mixed and mostly poor quality plus diversions from the Rio Grande River. Flooding from the Rio Grande combined with control and disposal of surface runoff creates serious problems. Drainage problems are so complex that comprehensive project type action is necessary. Many cities have outdated and inadequate sewage disposal systems with streams and ditches serving as residual waste carriers. For the short range period (5-10 years), increased water demands will necessitate highest priority being given to construction of water components where facilities are lacking or inadequate according to Health Department standards, establishment of regional sewage treatment subsystems, and construction of single-purpose and multi-purpose channels plus land treatment measures to protect and improve agricultural lands. In the long range (to 1990), water supply for domestic and industrial usage is expected to be a working combination of treated river water, treated well water, de-salinized water, re-cycled effluent, and imported water. Continued and systematic review of this Plan should be carried out to solve current problems and provide for future needs. (Hufschmidt-North Carolina)
W75-04759

ARE WE READY FOR A CLOSED SYSTEM OF WATER SUPPLY, TREATMENT, AND REUSE - TECHNOLOGY VS. PSYCHOLOGY,
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.
J. C. Huang, and R. L. Smith, Jr.
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.

Descriptors: Waste water treatment, Water management(Applied), *Potable water, *Psychological aspects, *Reclaimed water, Waste dilution, Attitudes, Water quality, Water utilization, Water consumption, *Water pollution, Recycling, Effluents, Environmental sanitation, Water purification, Water sources, Saline water, Treatment facilities, Domestic water, Public health, Africa, Technology, Water quality standards.
Identifiers: Psychological effects, Drinking water standards, Windhoek(S. Africa), South Africa.

Few totally closed systems of water supply, treatment, and reuse exist; in the United States, the Public Health Service discourages such practices. However, are there scientific reasons to support this disapproval, is psychological immaturity the factor, or are treatment technologies not yet available. In some arid areas or in island countries, direct resue of waste water is economically more attractive than desalination of ocean or brackish water. In Windhoek, South Africa, renovated waste water is used for drinking purposes and comprises 14% of the normal supply and over 40% of the supply in winter months. Technology exists to provide high quality effluent, through the use of lime and chlorine. Understanding of viral survival is still incomplete for some waste water treatment processes. Some scientists are also concerned about existing inadequate drinking water standards. Presently, much renovated waste water is first discharged into a receiving stream before it is withdrawn again for reuse; the stream then acts as a natural barrier. The public's psychological barriers still outweigh the technical credibility of reuse; education and encouragement are needed. (Grden-North Carolina)
W75-04761

COMPREHENSIVE WATER AND SEWER PLAN FOR ALAMANCE COUNTY, NORTH CAROLINA,
Freeman (William F.) Associates, High Point, N.C.
G. E. Freeman, H. B. Stokes, Jr., and C. J. Jones.
Prepared for Alamance County Board of Commissioners and Alamance County Planning Board. May, 1969. 46 p, 36 fig, 21 tab.

Descriptors: *Water supply, *Water sources, *Sewers, *Sewage, *Water supply development, Urbanization, Septic tanks, Combined sewers, Water resources, Water treatment, *North Carolina, Water requirements, Waste water treatment, *Comprehensive planning.
Identifiers: *Alamance County(N.C.), Haw River(N.C.).

Alamance County, in the Piedmont area of North Carolina, should construct an extensive water and sewer system to encourage continued growth. Major urban areas of Burlington, Graham, and their fringes with approximately half of the estimated population of 95,000 are excluded from the study area. Manufacturing in the county accounts for 71.9% of the labor force. Soil surveys show that over half of the county is not well suited for farming, and farming is a decreasing percentage of the county's income as the number of farms decreases. The rapid growth of a rural non-farm population is causing increased densities which are difficult to maintain on private wells and septic tanks, especially since over 50% of the soil in the county is poorly suited for septic tanks. In 1960, 12.8% of the dwelling units in the county had no piped water at all, and nearly 21% of the units were served by pits privys or had no toilet facilities. Existing water and sewer facilities are described for the half dozen area communities, including industrial plant systems which sell water to homes. Capacities and technologies in use are described. Water resources include poor ground water supplies and ample surface water, particularly the Haw River, which, with strict effluent controls, could be an important water source. Population projections indicate a need for an additional 10.4 million gallons per day by 1990. Needs in each community are outlined, and a $2.9 million project is proposed for water and sewer systems as a first phase of a more extensive system. (Herr-North Carolina)
W75-04765

RATIONAL BASIS FOR SEPTIC TANK SYSTEM DESIGN,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
R. Laak, K. A. Healy, and D. M. Hardisty.
Ground Water, Vol 12, No 6, p 348-351, November-December 1974. 2 fig, 17 ref.

Descriptors: *Design, *Septic tanks, *Domestic wastes, *Sewage disposal, *Soil disposal fields, Hydraulic design, Percolation, Leaching, Ion transport, Groundwater, Phosphates, Nitrates, Nutrient removal, Water pollution sources, Water quality.
Identifiers: Biological clogging mat.

About 17 million families in the United States are served by septic tank and subsurface seepage systems. Rational design of these disposal systems includes three aspects. First, the system must be hydraulically sound. The flow regime and the storage and water carrying capacity of the receiving soil should be measured before design. A soil with a coefficient of permeability less than 0.0001 ft/min suggests, for example, that the hydraulic capacity of the system governs the size of the subsurface leaching field. Seasonally high water tables or impervious strata may retard the flow and reduce the quantity of wastewater that can be carried away from the subsurface disposal area. In this case an elevated bed can be designed to increase the potential hydraulic gradient. The second consideration concerns the biological mat in leaching fields. Leaching fields can be designed with higher loadings in soils having a coefficient of permeability greater than 0.0001 ft/min if increased pretreatment is used. A mathematical relationship was developed for reducng the size of leaching fields for effluents with a BOD5 plus suspended solids less than 250 mg/l. Leaching fields were projected to operate indefinitely. Long-term loading rates for different soil permeabilities were plotted on a graph that can be used for sizing fields. The third consideration concerns preservation of the groundwater quality. Concrete sand and silt with an unsaturated thickness of 1.5 feet still removed after 2 years of operation 30% of septic tank effluent phosphate and nitrogen. The effluent from the test soils had a concentration of about 13 mg/l phosphate and 15 mg/l nitrogen mostly in the NO3-N form. (Gibb-ISWS)
W75-04801

SIMPLIFIED APPLICATION OF PALMER-BOWLUS FLOW METERS,
ENCIBRA South America, Sao Paulo (Brazil).
For primary bibliographic entry see Field 8B.
W75-04802

HYDRAULIC ANALYSIS OF WINNIPEG SUMP INLETS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
K. M. Adam, and N. B. Brandson.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2755-2763, December 1974. 7 fig, 4 ref, 1 append.

Descriptors: *Intakes, *Design data, *Discharge coefficient, *Laboratory tests, Discharge(Water), Storm water, Hydraulics, Storm drains, Urban runoff, Measurement, *Canada, Flow, Slopes, Weirs.
Identifiers: *Street drainage, Curb inlets, Gutter inlets, *Winnipeg(Manitoba).

Full-scale tests were run on a model of inlets of the types installed in the city of Winnipeg, Manitoba. The four types of inlets tested were the undepressed curb inlet, the depressed curb inlet, the undepressed gutter inlet, and the undepressed combination inlet. All tests were for the 'sump condition' or inlets located at the low point of a sag vertical curve. Gutter slope was varied for each case. The discharge data for each case was empirically fitted to an equation of the form Q equals C times y to the n power. Values of C and n were presented graphically as functions of the gutter slope for each inlet type. Comparisons with previous studies were also made and discussed. (Adams-ISWS)
W75-04804

SOURCES OF METALS IN NEW YORK CITY WASTEWATER,
New York City Dept. of Water Resources. Industrial Wastes Control Section.
For primary bibliographic entry see Field 5B.
W75-04805

TRACE METALS IN WASTEWATER EFFLUENTS,
University of Southern California, Los Angeles. Environmental Engineerig Program.
For primary bibliographic entry see Field 5B.
W75-04806

UNIFORM DISTRIBUTION IN SOIL ABSORPTION FIELDS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
R. J. Otis, J. Bouma, and W. G. Walker.
Ground Water, Vol 12, No 6, p 409-416, November-December 1974. 7 fig, 1 tab, 11 ref.

Descriptors: *Soil disposal fields, *Domestic wastes, *Septic tanks, Pathogenic bacteria, Water pressure, Infiltration, Absorption, Moisture content, Field capacity, Flow rates, Soil moisture, Soil water, Waste water disposal, Water reuse.
Identifiers: Pressure distribution system.

The function of a septic tank-soil absorption system is to purify the wastewater discharged from the home before reaching the groundwater. However, failure often occurs in the soil absorption field. Failure can originate from two causes: (1) inadequate infiltration of effluent into the soil and (2) inadequate purification in the soil during percolation because of short travel times. Failure of the second type can be prevented through proper design and operation of the soil absorption field. Uniform distribution of the septic tank effluent over the entire soil absorption field is necessary to maintain the soil's efficiency for pathogenic organism removal. (Gibb-ISWS)
W75-04807

SPECIAL METHODS OPEN STORM-BLOCKED PIPELINE.
For primary bibliographic entry see Field 8C.
W75-04808

PRECOAT FILTRATION ON ROTARY VACUUM FILTER (PRECOAT-FILTRATION AUF DEM VAKUUM-TROMMELFILTER),
H. Berndt.
Aufbereitungstechnik, Vol 15, No 3, p 137-140, November 3, 1974. 5 fig, 11 ref. (English Summary).

Descriptors: *Filtration, *Waste water treatment, Separation techniques, *Filters, Water treatment.
Identifiers: *Precoat filters, *Rotary vacuum filter, Filter cake removing device, Stationary filter tanks, Filter drums.

A pre-coat filter, which was developed from the rotary vacuum filter, operates continuously to filter suspensions by utilization of gas pressure. The filter includes the stationary filter tank where

the suspension is introduced, the filter drum, provided with filter cells subdivided by the chamber division strips, the control valve, the swinging agitator, the filter cake removing device, and the driving mechanism. The pre-coat filter may consist of various materials. A detailed description of the pre-coat filtration process is presented. Pre-coat filtration on the rotary vacuum filter permits the separation of suspensions which are unable to be separated into the solid and liquid phase by other conventional continuous filtration processes. (Leibowitz-FIRL)
W75-04810

TERTIARY TREATMENT: THE WRONG SOLUTION TO A NON-PROBLEM,
Las Virgenes Municipal Water District, Calabasas, Calif.
H. W. Stokes, and L. D. Hedenland.
Civil Engineering-ASCE, Vol 44, No 9, p 86-89, September, 1974. 1 fig.

Descriptors: *Waste water treatment, *Activated sludge, *Tertiary treatment, *Design criteria, *Operation and maintenance, Biochemical oxygen demand, Treatment facilities, Suspended solids, Heavy metals, Nutrient removal, Water quality control, Biological treatment, Nitrogen, Phosphorus removal, Bacteria, Viruses.

Design criteria and operating techniques are suggested that allow higher levels of BOD removal than those generally thought to be possible with activated sludge treatment. The Tapia Water Reclamation Plant, California, reliably achieves 98 percent BOD and suspended solids removal by optimizing the secondary treatment. The process design for this plant is given. It covers: primary treatment; aeration system; process air requirements; secondary sedimentation tanks; chlorine contact tanks; reaeration tanks; aerobic digestion; and, designed effluent quality criteria. The most important parameters for precise operation are aeration control through the use of nitrate nitrogen profiles, precise daily solids balance of the aeration system, and constant activated-sludge return rate. A secondary sludge plant that can produce 98 percent BOD removal and nitrify the ammonia, will have an effluent that contains almost no colloidal material, should not need filtering, and will have a turbidity of less than one Jackson Unit. A properly designed and operated secondary treatment (activated sludge) plant can adequately remove suspended solids, BOD, ammonia, coliform, and virus. Tertiary treatment is needed only to remove the heavy metals, phosphorus and nitrate-nitrogen. (Orr-FIRL)
W75-04811

AMMONIA DESORPTION BY DIFFUSED AERATION,
Cornell Univ., Ithaca, N.Y. Agricultural Waste Management Program.
E. G. Srinath, and R. C. Loehr.
Journal Water Pollution Control Federation, Vol. 46, No 8, p 1937-1957, August, 1974. 12 fig, 2 tab, 18 ref.

Descriptors: *Nitrogen, *Aeration, *Waste water treatment, Ammonia, *Waste water(Pollution), Air-water interfaces, Temperature, Viscosity, Mathematical models, Hydrogen ion concentration.
Identifiers: *Ammonia desorption.

The removal of nitrogen from waste water is becoming increasingly important. Since nitrogen in untreated waste water exists as ammonium nitrogen, ammonia desorption is a viable method of nitrogen control. Theoretical considerations to predict ammonia desorption from water and waste water, experiments on removal of ammonia from waste water by diffused aeration, and predictive equations relating ammonia desorption efficiency to environmental and process conditions are discussed. The quantity of ammonia desorbed from a solution depends on the concentration of undissociated ammonia, the gas-liquid surface area, the mass-transfer coefficient, and the partial pressure exerted by ammonia in the gas phase. The rate of diffusion is influenced by pH, temperature, and viscosity. The equations presented allow better estimates of the ammonia loss from artificial and natural aerated systems to be made. Equations were developed to determine the ammonia desorption coefficient under quiescent and aerated conditions and to determine the quantity of ammonia lost under various environmental conditions. (Orr-FIRL)
W75-04812

BUBBLE SIZE AND CONTACT TIME IN DIFFUSED AERATION SYSTEMS,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
D. S. Mavinic, and J. K. Bewtra.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2129-2137, September 1974. 7 fig, 4 ref.

Descriptors: *Aerobic treatment, *Bubbles, *Activated sludge, *Aerated lagoons, *Aeration, Sewage treatment, *Waste water treatment, Flow, Water circulation, Pumping.

One of the most common ways of supplying oxygen to aeration basins is by diffused bubble aeration. The contact time of air bubbles with the liquid is one of the most important parameters influencing the efficiency of diffused bubble aeration. The procedure for determining bubble contact time, ways to increase this time, and the effects of different parameters on this time are discussed. Four systems were observed: a simple column of water; water circulation and an upward cocurrent air-water flow caused by diffused air; water circulation and counter-current air-water flow caused by pumping; and, water circulation and downward cocurrent air-water flow caused by pumping. The unit contact time in each system was dependent on the air flow rate and the unit contact time decreased with an increase in air flow. The unit contact time is independent of the depth for the first three systems. The total contact time will increase almost linearly with the diffuser submergence. System three (water circulation and counter-current air flow caused by pumping) provides the highest unit contact time. This is caused by the slowing of the air bubbles by countercurrent air-water flow. (Orr-FIRL)
W75-04813

WASTEWATER ANALYSIS AND ITS RELATION TO COMPANY PROFITS,
Harnish and Lookup, Associates, Newark, N.Y.
For primary bibliographic entry see Field 5A.
W75-04817

SPHERE METHOD TURBIDIMETER,
Nippon Precision Optical Instrument, Co. Ltd., Tokoyo (Japan).
For primary bibliographic entry see Field 5A.
W75-04819

TURBIDITY REMOVAL USING POLYMERS AND ACTIVATED CARBON,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5F.
W75-04820

APPLICABILITY OF CONTROL STRATEGIES TO THE ACTIVATED SLUDGE WASTEWATER TREATMENT PROCESS,
Purdue Univ., Lafayette, Ind.
R. F. Lech.
PhD Thesis, 1973, 279 p.

Descriptors: *Activated sludge, *Waste water treatment, Evaluation, *Model studies, *Control systems, *Performance, Design criteria.
Identifiers: Feedforward, Feedback.

The potential improvements to be gained by the addition of control systems to the activated sludge waste water treatment process are evaluated. Approximate models for the important transfer functions in the process are developed. The applicability of single and multiple-loop feedback control systems is evaluated on activated sludge plants characterized by two types of final settler behavior. The most significant improvement in performance is achieved by feedforward and combinations of feedforward and feedback control systems among all the control systems considered. The applicability of control strategies is limited by the design of the process. (Sandoski-FIRL)
W75-04822

SEWAGE TREATMENT IN THE POTTERIES,
Taylor (John) and Sons (England).
P. A. Banks.
The Consulting Engineer, Vol 38, No 7, p 41, 44, 45, July 1974. 4 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Water pollution, *Water quality management, *Municipal water, Industrial wastes, Effluent control, Rivers, Coal mine wastes.
Identifiers: *Preliminary treatment, Link sewer, Clay pits, Slag heaps.

At Stoke-on-Trent, Great Britain, a new sewage treatment plant is being completed to help the redevelopment of Stoke into a city with an expanded economy with a larger range of social and municipal services. The reclamation work on derelict clay pits and slag heaps has fostered redevelopment in industrial towns within their boundaries. The Strongford sewage works on the River Trent is an extension of a plant first constructed on the southern city boundary in 1930. A policy of centralization of sewage treatment resulted in the reduction of the number of works maintained in the general area and the transfer of flow to Strongford. The plan to close the Hanley works and three other smaller works necessitated a sewer 2 m in diameter for the transfer of up to six times the dry weather flow 5 miles south. A scheme to route the link sewer was developed according to an assessment of the subsidence risk arising from two active coal mines in that area. The works require a high effluent standard, including preliminary treatment units and primary sedimentation arranged in two inter-connected streams. (Leibowitz-FIRL)
W75-04823

ACTIVATED SLUDGE BULKING (IN JAPANESE),
K. Sona, and S. Kyushin.
Kemikaru Enjiniyaringu, Vol 19, No 7, p 37-41, July 1974. 6 fig, 2 tab, 12 ref.

Descriptors: *Activated sludge, *Bulk density, *Settling basins, Nutrients, Biochemical oxygen demand, Chlorination, Pre-treatment, Temperature, *Waste water treatment.
Identifiers: *Bulking, Mixed liquor suspended solids(MLSS).

The sedimentation ability of activated sludge and bulking, the causes of bulking, the hypothetical mechanism of filamentous bulking, and countermeasures for bulking are discussed. In an operating aeration tank, the maintaining of MLS (mixed liquor suspended solid) concentration at an appropriate level and the BOD load at a relatively low level (usually less than 0.3 kg BOD/kg MLSS/day) is important. The ratio of nutrients in the sludge is important, and if the ratio of carbon/nitrogen increases, the amount of carbohydrates in bacteria will increase; one way of preventing bulking is to add enough nitrogen. Chlorine is deleterious to filamentous fungi rather than to Zoogloea, and the addition of about 0.3-0.6 percent (to dry sludge weight) in the return sludge can improve the settling of bulking sludge greatly. To prevent other deleterious effects, chlorine

must be carefully measured. Intermittent adding of other oxidizing agents such as hydrogen peroxide is reported to be effective; the limits are 20-400 ppm, but less than 20 ppm will be ineffective and over 400 ppm will cause partial deflocculation. Radical changes in the quantity and composition of waste water flow will induce bulking; for this reason, a pre-treatment of water is desirable. The type of pre-treatment will affect the efficiency of activated sludge greatly. The low temperature of aeration tank water can cause bulking both by an increase of carbohydrate at a lower temperature. An intermittent fill and draw method of waste water flow has been successful in preventing bulking. (Seigle-FIRL)
W75-04824

COAGULATION-FILTRATION PRACTICE AS RELATED TO RESEARCH.
American Water Works Association, New York. Committee on Research.
Journal of the American Water Works Association, Vol. 66, No. 8, P 502-503, August 1974. 24 ref.

Descriptors: *Coagulation, *Filtration, *Flocculation, *Sedimentation, Water pollution, *Water treatment, Algae, Activated carbon, Turbidity, Zeta potential, *Waste water treatment.
Identifiers: *Filterability tests, Pilot-filter monitoring, Residual-coagulant analysis, Electrophoretic mobility, Jar test.

In the field of water treatment, clarification generally means the solids-liquid separation process which may include coagulation, flocculation, sedimentation, and filtration. Filtration is merely one step in the total process. The laboratory jar test is the conventional method for determining the optimum coagulent dosage for plant operation. Plants with expert staff may also employ zeta potential measurements, filterability test, pilot-filter monitoring, residual-coagulant analyses, or interfacial-turbidity monitoring. The jar test is limited because of the subjective nature of the floc evaluation and the difficulty of duplicating conditions of water being treated in a plant. The filterability of a floc is a measurable property of the raw water, the equipment, or the floc itself. Iron flocs filter best near the isoelectric point of the floc. The efficiency of removal of negatively charged clay particles was improved by charging the surface of sand columns electropositively. The turbidity removal improves with increased electrophoretic mobility of suspended clay materials; coagulating chemicals are required in the influent to a filter for the removal of algae and particles of activated carbon. (Leibowitz-FIRL)
W75-04825

SOLID ADSORBENTS FOR GAS AND LIQUID TREATMENT,
Grace (W.R.) Australia Ltd., Melbourne. Davidson Chemicals Div.
P. E. Pick.
Process and Chemical Engineering (PACE), Vol 27, No 6, p 23-27, June, 1974. 3 fig, 2 tab.

Descriptors: *Silica gels, Gases, *Liquid wastes, *Separation techniques, Purification, *Dehydration, Ziolites, Water pollution, *Waste water treatment.
Identifiers: *Solid adsorbents, *Gas and liquid treatment, Silicon dioxide, Amorphous polymeric structures, Extrusion process, Molecular sieves.

Solid adsorbents such as silica gel and the synthetic or naturally occurring zeolites called molecular sieves can be utilized in the purification, separation and dehydration of gases and liquids. Davison gel, a pure form of silicon dioxide (99.7 percent SiO_2), which is made under carefully controlled conditions from sulphuric acid and sodium silicate results in an amorphous polymeric structure with the following percentage composition: Si as SiO_2, 99.7; Fe as Fe_2O_3, 0.03; Al as Al_2O_3, 0.10; Ti as TiO_2, 0.09; Ca as CaO, 0.01; Na as Na_2O, 0.02; Zr as ZrO_2, 0.01; trace elements, 0.03. This structure consists of beads with pores with a diameter ranging from 20-40 A. The pore size and particle sizes can be determined by controlling the reaction conditions during their manufacture, with the granules being sieved into particle-size ranges. An extrusion process is used in the formation of bead form silica gel. The result is a pure, chemically inert material which is structurally strong with a high attrition resistance. The total surface area will range around 700-800 sq m/g, depending upon pore size. Silica gel has a great affinity for water, and can hold 40-100 percent of its weight as water. It can adsorb organic molecules, with the selectivity order based on polarisability, degree of unsaturation and volatility. This gel can be utilized in the dehydration of air, carbon dioxide, natural gas, alcohol mixtures, aromatics like benzene, and for chromatographically separating organic fractions. (Leibowitz-FIRL)
W75-04826

ENVIRONMENT, ENERGY COSTS SUGGEST OXYGEN ACTIVATED SLUDGE AS WASTE-WATER TREATMENT APPROACH,
R. J. Kulperger.
Professional Engineer, Vol 44, No 10, p 29-31, October, 1974. 4 fig.

Descriptors: Activated sludge, *Oxygenation, *Aeration, Costs, Energy, Power, Dissolved oxygen, Secondary treatment, *Waste water treatment.
Identifiers: *UNOX System.

The UNOX System technology for an oxygen-activated sludge system for waste water treatment is currently used by 125 treatment plants in several countries. The system consists of a covered, staged aeration or oxygenation basin where oxygen rather than air is used as the aerating gas. Feed oxygen, waste water and return sludge all flow through the basins in the same direction. High dissolved oxygen levels (4 to 8 mg/liter) and high solids levels (4000 to 8000 mg/liter) are maintained in the oxygenation basin. Treatment time is reduced and the system possesses high stability to shock organic loads. The costs of energy and power in recent years have escalated, and the UNOX System has an economic advantage in terms of power usage. Total power to operate an oxygen activated sludge system compared to a diffused air system will be reduced from 30 to 50 percent. For example, in Detroit, Michigan, both types of plants are operated and the relative annual operating costs of the UNOX System showed a savings of $311,500 per year, most of which is the result of reduced power usage. In addition, the ability of a system to turn down in response to organic loads imposed on the plant is an important factor, relative to power usage. The typical UNOX System reduces average consumption by 20 percent, calculated by the early design years of a plant plus diurnal variations at full plant load. At 1.5 cents per KWH, 100 Hp costs over $10,000 per year. The amount of land required for oxygen-activated sludge systems is also less than that of air diffusion systems because of the reduced sewage residence time. The residence time is reduced because of the high mixed liquor concentrations maintained in oxygenation basins. With increases in power costs, and decreases in available land, this method is a viable alternative to traditional air systems for secondary waste water treatment. (Prague-FIRL)
W75-04827

UPDATING AGING SEWERS WITHOUT TRENCHING,
Cliffside Pipelayers, Scarborough (Ontario).
H. S. St. Onge.
Engineering and Contract Record, Vol 87, No 7, p 40-41, 44, July, 1974.

Descriptors: *Sewers, *Plastic pipes, Pipelines, Materials, Construction, Maintenance, *Canada, Waste water treatment.
Identifiers: *Reaming, Pipe repairs.

Technology for sewer renewal without excavation costs less, avoids public nuisance such as construction noise and inconvenience, and prevents problems of damage to gas and water lines. Major causes of trouble in sewers are protruding laterals, calcite buildup, and root infestation obstructions which reduce cross-sectional area and produce turbulent flow, as well as deterioration of the pipe walls. In the city of Toronto, a reaming operation was designed to increase pipe flow capacity by first removing obstructions. Renewal is effected by using inserted close-tolerance polyethylene pipe. A video-reaming technique was successful; the operator of the reamer could observe, on closed circuit television, the size and shape of objects encountered in order to pull and cut with the proper amount of pressure. Once reaming is complete, the length of sewer is cleaned with a high pressure jet spray vehicle; the close fitting pipe is pulled by a vibrating nose cone; and the plastic liner is inserted by means of a hydraulic power winch truck positioned over a manhole. A final process involves remote lateral cutting and grouting to insure leakproof connections. (Prague-FIRL)
W75-04828

MORE THAN A MYRIAD.
Engineers Notebook, No 173, p 355-356, August, 1973.

Descriptors: *Waste water treatment, *Outfall sewers, *Municipal wastes, Waste treatment, Construction, Pipes, Materials, Equipment, Installation, Concrete pipes, *Australia.
Identifiers: Neoprene joint seals, Melbourne(Aust).

The metropolitan sewage system of Melbourne, Australia has been expanded to include a modern waste treatment plant southeast of the city. As part of the pollution controls, an effluent outfall line was constructed to discharge purified effluent from the plant to the ocean. Construction of this line involved 35 miles of trenching, manufacture of an equivalent length of large-diameter concrete pipe sections, installation, backfilling, and landscaping. Joint seals of Neoprene for the 90 to 100 inch diameter outfall pipe sections were chosen because of Neoprene properties of long-term retention of resilience and sealing integrity. Special pipe sections were designed where topography necessitated bends in the line. When the system is fully operable, it will serve 175 square miles and handle 50 million gallons of waste water per day. (Prague-FIRL)
W75-04829

KINETICS IN OZONE TREATMENT OF SECONDARY SEWAGE EFFLUENTS, (IN JAPANESE),
T. Goda, O. Kawahara, and M. Eda.
Gesuido Kyokai-shi, Vol 11, No 123, p 41-49, August, 1974. 20 fig, 3 ref.

Descriptors: *Ozone, *Sewage treatment, Effluents, Models, Biochemical oxygen demand, Chemical oxygen demand, Absorption, Filters, Measurement, *Waste water treatment.
Identifiers: *Japan, COD removal.

The absorption of ozone in water, the autodegradation of ozone, and the oxidation of ozone are some phenomena not yet satisfactorily explained. As a basic study for the ozone treatment of secondary treatment liquid waste, the question of kinetics was examined. The experimental apparatus consisted of a batch bubble tower which was made of an acryl cylinder with a glass filter at the bottom where ozone from the ozone producer was supplied. The liquid an

ozone were contacted there. The emitted ozone was measured between the bubble tower and emission exit. The test liquid sample was taken every hour for 24 hours from the secondary treatment water of a Kyoto sewage treatment plant; from four time belts, equal amounts were taken and a composite test material was prepared. The water was filtered to remove suspended substances before the ozone treatment. The measurements were taken for BOD5, COD(Cr), COD(Cr) removal speed, ozone consumption/COD removal, and BOD5/COD(Cr). The COD(Cr) removal process was satisfactorily explained by a hypothetical model for multiple reactions of different speeds and an equation induced from COD removal speed data. The relationship between ozone consumption and COD removal was experimentally confirmed to be about 2, and the ratio increase with the progress of treatment was theretically clarified. The initial five minutes of BOD5 increase had a correlation with COD(Cr) removal. (Seigle-FIRL)
W75-04831

SYMPOSIUM ON ANIMAL WASTE MANAGEMENT.
Held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973. 50 p, (1973), 11 fig, 8 tab, 21 ref.

Descriptors: *Farm wastes, *Waste water treatment, *Waste disposal, Recycling, Feed lots, Cattle, Nutrients, Nitrogen, Salts.
Identifiers: *Land spreading.

This symposium was held to consider the problems of animal waste management, particularly in relation to beef cattle. Animal waste treatment and disposal were discussed in terms of recycling and land disposal. Various forms of recycling, i.e., refeeding, creating fuels, etc., are still largely experimental and in most cases are not yet feasible. While land spreading offers a much used means of waste disposal, over-supply of nutrients in the soil is a possible hazard. Research is still needed for development of non-polluting feasible means of disposing of animal wastes. (See W75-04833 thru W75-04836) (Merryman-East Central)
W75-04832

EFFECTS OF CATTLE FEEDLOT MANURE ON CROP YIELDS AND SOIL CONDITIONS,
Southwestern Great Plains Research Center, Bushland, Tex.
A. C. Mathers, B. A. Stewart, J. D. Thomas, and B. J. Blair.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 1-13, (1973). 6 fig, 1 tab.

Descriptors: *Feed lots, *Cattle, *Farm wastes, *Waste disposal, *Crops, Nitrogen, Salts, Rates of application, Soil profile.
Identifiers: *Soil conditions, Land spreading.

One to three years data suggest that manuare applications of ten tons per acre furnish adequate nitrogen for most crops without creating high salt buildup in the soil. Also, applications of ten tons per acre do not affect organic levels of the soil. Higher rates of manure can be added to soil without lowering yields, but nitrate and salts accumulate, eventually hampering crop yields. This problem can usually be alleviated by deeper plowing depths. At just ten tons per acre, land area in even the most concentrated feeding areas is adequate to dispose of manure. In fact, only one-fourth of the grain sorghum cropland in Texas long would have to be treated to dispose of the manure. The challenge is to develop distributing and handling systems to spread the manure on croplands most beneficially. (See also W75-04832) (Russel-East Central)
W75-04833

EFFECT OF RATION ON MANURE SALT CONTENT,
Texas Tech Univ. Center at Amarillo, Pantex.
R. H. Klett.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 26-31, (1973). 2 tab, 8 ref.

Descriptors: *Diet, *Salts, *Farm wastes, Cattle, Livestock, Feed lots, Performance, Waste treatment, Water pollution sources.
Identifiers: Ration, *Waste management, Sodium levels, Excretion.

Experimental data illustrate that excessive levels of salt obtained from the diet are excreted and tend to serve no useful purpose for the nutrition of feedlot steers. Data also suggest that levels of sodium in the form of NaCL could be reduced below those normally recommended for feedlot rations without effect on annual performance. In other words, the correct amount of salt is the amount that is utilized by the animal. The excess salt serves no useful function. Also, reducing feeding levels of salt will result in lower levels of salt in solid-waste and will allow higher incorporation of manure into the soil as fertilizing material. (See also W75-04832) (Russel-East Central)
W75-04834

AMOUNTS, COMPOSITION, AND MANAGEMENT OF FEEDLOT RUNOFF,
Southwestern Great Plains Research Center, Bushland, Tex.
R. N. Clark, and B. A. Stewart.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 32-42, (1973). 3 fig, 2 tab, 6 ref.

Descriptors: *Runoff, *Feed lots, Chemical composition, Sampling, Seepage, Evaporation, Stocking, Moisture content, Playas, Salinity, Irrigation, *Management, Waste treatment.
Identifiers: *Waste management.

Runoff amounts and concentrations were measured from a Texas High Plains cattle feedlot at Bushland. The graphic relationship between rainfall and runoff for runoff-producing storms was linear with about one-third of the rainfall ending up as runoff. Concentrations of runoff constituents were higher than those found for cattle feedlots elsewhere. This was probably due to high evaporation and high stocking rates which result in lots containing more salt. Soil moisture samples indicated that there was no significant seepage which would pollute ground water from playas or lots. Before runoff could be used for irrigation there would have to be a dilution of about four parts well water to one part feedlot runoff. This dilution would reduce salinity below levels hazardous to crops. Any use of feedlot runoff for irrigation required a close watch on salts in the water and soil. (See also W75-04832) (Russel-East Central)
W75-04835

FUTURE DEVELOPMENTS IN FEEDLOT WASTE MANAGEMENT,
Texas Agricultural Extension Service, College Station.
J. M. Sweeten.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 43-50, (1973). 7 ref.

Descriptors: *Feed lots, *Farm wastes, Water pollution, Recycling, Fuels, Oxidation, Odor, Runoff, Air pollution, Design, Slurries, Legal aspects, Waste treatment.
Identifiers: *Waste management, Land disposal, Refeeding, Pyrolysis, Composting, Soil conditioners.

With rapid progress being made toward abating water pollution and with the benefits and safety of land disposal of feedlot manure, remaining problems of feedlot waste management will primarily entail developing more efficient and odor-free methods of managing solid manure and polluted runoff. Recycling waste as feed offers one method, but the Food and Drug Administration has banned this method for lack of research. Many other recycling methods such as developing manure into fuel oil have been suggested. But, at the present, these methods are economically unfeasible. Perhaps one of the most restricting problems of waste management is odor. This problem has a variety of possible solutions, but most incorporate improved feedlot design. Once the problems have been satisfactorily solved or bypassed, feedlot waste management will no longer be a pollution control issue but an economic one. (See also W75-04832) (Russel-East Central)
W75-04836

MECHANICAL AERATION OF A WASTE DISPOSAL MANURE PIT,
L. V. Ellis, and R. M. George.
Paper No 73-5545 presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 6 p. 2 fig, 4 ref.

Descriptors: *Aeration, *Waste treatment, *Waste disposal, Mechanical equipment, Liquid wastes, Odor, Costs, Waste storage.
Identifiers: *Milking machine compressor.

A swine producer in Johnson County, Missouri uses a milking machine compressor unit to bubble air through the liquid manure holding pits. Complete design for the system is given. The final results of this experiment are not known at this time, but the producer wants to continue with this system of aerating his manure pits. Offensive odors have been greatly reduced in the pits, the building, and from the effluent when it is spread on fields. The solids in the pits are broken up and held in suspension. Good response in the form of plant growth, was obtained when the manure was spread on fields. Operating costs are small; electricity costs about 3 cents an hour. If the unit operates for 16 hours in 24 hours, the cost is about 48 cents per day. (Cartmell-East Central)
W75-04841

UNIVERSAL DESIGN OF A 2.5 MGD UNIVERSAL DESALTING PLANT, REVISED: VOLUME 1.
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 3A.
W75-04850

5E. Ultimate Disposal Of Wastes

RETRIEVABLE SURFACE STORAGE FACILITY, ALTERNATIVE CONCEPTS ENGINEERING STUDIES.
Atlantic Richfield Hanford Co., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04401

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04402

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 1-3: SUMMARY, BACKGROUND AND DATA BASE, AND EVALUATION METHODOLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.

W75-04403

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 4: GEOLOGIC DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04404

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 5: ICE SHEET DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04405

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 6: SEABED DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04406

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 7: WASTE PARTITIONING,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04407

HIGH-LEVEL RADIOACTIVITY WASTE MANAGEMENT ALTERNATIVES - SECTION 8: EXTRATERRESTRII DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04408

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 9: TRANSMUTATION PROCESSING,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04409

A BALANCED APPROACH TO RESOURCE EXTRACTION AND CREATIVE LAND DEVELOPMENT ASSOCIATED WITH OPEN-PIT COPPER MINING IN SOUTHERN ARIZONA,
For primary bibliographic entry see Field 5G.
W75-04510

DESIGN, CONSTRUCTION AND LAUNCHING OF A SUBMARINE OUTFALL SEWER AT WHITSTABLE,
Whitstable Urban District Council(England).
For primary bibliographic entry see Field 5D.
W75-04536

A PROTOTYPE SYSTEM TO RENOVATE AND RECYCLE SWINE WASTES HYDRAULICALLY,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5D.
W75-04542

COPROLOGY: A POLLUTION SOLUTION,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 5D.
W75-04545

FERTILITY,
For primary bibliographic entry see Field 5D.
W75-04550

INDIANA POULTRYMEN ARE COMPOSTING POULTRY MANURE,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5D.
W75-04552

THE SOCIAL REDEMPTION OF PURE GARBAGE,
For primary bibliographic entry see Field 5D.
W75-04553

ENERGY NEEDED TO MANAGE ANIMAL WASTE.
For primary bibliographic entry see Field 5D.
W75-04554

PERPETUAL-MOTION RECYCLING, OR, PIG MANURE INTO FISH FOOD,
For primary bibliographic entry see Field 5D.
W75-04555

RECYCLE ORGANIC WASTES AS FEED FOR MEAT ANIMALS.
For primary bibliographic entry see Field 5D.
W75-04556

COMPARATIVE CHANGES IN SOIL-PHYSICAL PROPERTIES INDUCED BY ADMIXTURES OF MANURES FROM VARIOUS DOMESTIC ANIMALS,
California Univ., Davis.
For primary bibliographic entry see Field 2G.
W75-04602

CONTROL OF POLLUTION FROM ANIMAL FEEDLOTS AND REUSE OF ANIMAL WASTES,
Committee on Government Operations (U.S. House).
For primary bibliographic entry see Field 5D.
W75-04615

DEVELOPMENT OF AN ORGANIC WASTE SLURRY INJECTOR,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-04616

TAILOR MADE CONFINEMENT BARN,
For primary bibliographic entry see Field 5D.
W75-04617

NEW AEROBIC PROCESS TURNS WASTE TO NUTRIENTS,
For primary bibliographic entry see Field 5D.
W75-04619

NUTRIENT RECOVERY: NEW CONCEPT IN WASTE HANDLING,
For primary bibliographic entry see Field 5D.
W75-04620

TEST SWINE WASTE DISPOSAL SYSTEMS,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5D.
W75-04637

PNEUMATIC TRANSPORTATION OF MANURE,
All-Union Research Inst. of Cattle-breeding, Podolsk (USSR).
For primary bibliographic entry see Field 5D.
W75-04641

CHANGING FROM DUMPING TO RECYCLING. PART 2. ORGANIC WASTES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5D.
W75-04642

THE DISPOSAL OF RADIOACTIVE WASTES INTO THE SEA: SOME INTERNATIONAL LEGAL CONSIDERATIONS,
For primary bibliographic entry see Field 6E.
W75-04769

WILL CURRENT RESEARCH ANSWER TODAY'S PROBLEMS AT THE SANITARY LANDFILL.,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-04800

MORE THAN A MYRIAD.
For primary bibliographic entry see Field 5D.
W75-04829

SYMPOSIUM ON ANIMAL WASTE MANAGEMENT.
For primary bibliographic entry see Field 5D.
W75-04832

FUTURE DEVELOPMENTS IN FEEDLOT WASTE MANAGEMENT,
Texas Agricultural Extension Service, College Station.
For primary bibliographic entry see Field 5D.
W75-04836

MECHANICAL AERATION OF A WASTE DISPOSAL MANURE PIT,
For primary bibliographic entry see Field 5D.
W75-04841

5F. Water Treatment and Quality Alteration

INSTRUMENTATION IMPROVES WATER TREATMENT PLANT OPERATION,
Water and Sewage Works, Vol 121, No 6, p 96-99, June, 1974. 1 fig, 4 tab.

Descriptors: *Instrumentation, *Water analysis, *Optimization, *Operations, *Costs, Performance, Testing, Turbidity, Color, Hydrogen ion concentration, Spectrophotometry, Colorado.
Identifiers: Jar tests, Loveland(Colo).

Water analysis at the Loveland, Colorado water plant used jar tests in conjunction with a laboratory turbidimeter and a very sensitive spectrophotometer to indicate optimum operation and lowest overall costs. Clarification equipment, load conditions, and key water quality tests, such as turbidity, color, and pH, were studied most. The data were then examined for cause and effect relationships which suggested optimum feed rates or equipment changes. (Sandoski-FIRL)
W75-04434

CLOSED-LOOP OZONE GENERATING AND CONTACTING SYSTEM,
Grace, W. R. and Co., New York. (assignee).
For primary bibliographic entry see Field 5D.
W75-04461

METHOD AND APPARATUS FOR PRODUCING A DISTILLATE,
Fried-Krupp G.m.b.H., Essen (West Germany) (assignee)
For primary bibliographic entry see Field 3A.

W75-04465

DESIGN AND APPLICATION OF A MULTIPURPOSE MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY ASSESSMENT IN DISTRIBUTION SYSTEMS,
Drexel Univ., Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W75-04505

COMPUTER CONTROL OF CHEMICAL ADDITION AT A WATER-TREATMENT PLANT,
Autocon Industries, St. Paul, Minn.
A. W. Manning.
Journal of the American Water Works Association, Vol 65, No 7, p 498-503, July 1973. 12 fig.

Descriptors: *Water treatment, *Automation, *Control, Digital computers, *Chemicals, Flow rates, Statistical methods, Algorithms, Regression analysis, Computer models, Iowa, Rivers, *Water quality control, Turbidity, Water temperature, Costs, Alkalinity, Variability, Mathematical models, Systems analysis, *Treatment facilities.
Identifiers: Sensors, Chemical feed, Water intake, Historical data, Raw water, Volumetric feeder.

In today's semiautomated water treatment plants, chemical feed is based primarily on one variable-flow rate. This method usually proves inaccurate and wasteful of expensive chemicals. The more desirable solution to this problem is complete automation of the dose rate based upon accurate information provided by on-line sensors that measure varying chemical constituents of water. A computer controlled system developed for such a facility at an Iowa City water treatment plant is described. The lack of adequate sensors has up to now delayed the use of computers for process control in water treatment. Iowa City has chosen a medium-scale digital computer which, through input-output multiplexing, automatically processes sensor inputs of varying water quality at the central processor unit. The Iowa City treatment system, which consists of two separate plants and a third under construction to contain the computerized control system, is described. Pertinent chemicals, sensors and control concepts are considered. A mathematical modeling approach based on multiple linear regression analysis of all available data is described. This method, combined with a manual input approach, offers the most flexibility. (Bell-Cornell)
W75-04535

A BILL TO ASSURE SAFE DRINKING WATER.
For primary bibliographic entry see Field 6E.
W75-04652

ASBESTIFORM AMPHIBOLE MINERALS: DETECTION AND MEASUREMENT OF HIGH CONCENTRATIONS IN MUNICIPAL WATER SUPPLIES,
Duluth, Minn. National Water Quality Lab.
For primary bibliographic entry see Field 5A.
W75-04818

TURBIDITY REMOVAL USING POLYMERS AND ACTIVATED CARBON,
Purdue Univ., Lafayette, Ind.
R. D. Miller.
PhD Thesis, 1973, 163 p.

Descriptors: Turbidity, *Polymers, *Coagulation, *Adsorption, *Activated carbon, Waste water treatment, *Water treatment.
Identifiers: *Turbidity removal, Coagulation-adsorption processes.

A possible coagulation-adsorption process for turbidity removal has been investigated. For clay destabilization using only polycations, optimum clarity was achieved over a narrow range of polymer dosages. Residual polymer concentrations below one mg/liter were determined for polycations using clay coagulation tests and for polyanions and nonionic polymers using a filtering technique. Combined use of carbon and polycations for clay removal was inferior to the use of polycations alone. Use of carbon and polyanions or nonionic polymers for clay removal produced some clarity at relatively low carbon dosages and nearly complete clarity at carbon dosages of 5.0 g/liter or higher with a mixing time of thirty minutes and settling time of ten minutes. (Sandoski-FIRL)
W75-04820

VIROLOGICAL STUDIES IN WATER SYSTEMS: NATURAL OCCURRENCE OF REOVIRUSES AND THEIR INACTIVATION BY PHYSICAL AND CHEMICAL AGENTS,
Iowa Univ., Iowa City.
S. C. Mehta.
PhD Thesis, 1973, 105 p.

Descriptors: *On-site investigations, *Viruses, Water samples, Evaluation, *Iowa, *Water treatment, Waste water treatment, Pollutant identification.
Identifiers: *Reoviruses, Viral resistance, Coralville Reservoir(Iowa), Iowa River(Iowa), Cedar River(Iowa).

Field investigations of two water systems were undertaken to evaluate the detection of reoviruses in water samples collected from the Coralville Reservoir, Iowa River, and the Cedar River. A two-phase separation method was used to concentrate the viruses from the water samples. L cells and KB cells were used to propagate the virus. Immunofluosrescent staining was employed to identify the viruses. Reovirus was resistant to heat, less resistant to ultraviolet, and least resistant to chlorine and ozone. A comparison of resistance to inactivation between reoviruses and polio and coxsackie viruses exposed to various physical and chemical agents also is presented. (Sandoski-FIRL)
W75-04821

SEWAGE TREATMENT IN THE POTTERIES,
Taylor (John) and Sons (England).
For primary bibliographic entry see Field 5D.
W75-04823

COAGULATION-FILTRATION PRACTICE AS RELATED TO RESEARCH.
American Water Works Association, New York. Committee on Research.
For primary bibliographic entry see Field 5D.
W75-04825

UNIVERSAL DESIGN OF A 2.5 MGD UNIVERSAL DESALTING PLANT, REVISED: VOLUME 1.
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 3A.
W75-04850

5G. Water Quality Control

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04352

WATER: CANADIAN NEEDS AND RESOURCES,
For primary bibliographic entry see Field 6B.
W75-04359

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04360

DELAWARE RIVER BASIN COMPACT: A REVIEW WITH RESPECT TO ENVIRONMENTAL QUALITY,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6E.
W75-04361

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4D.
W75-04362

THE EFFECT OF LARGE APPLICATIONS OF MANURE ON MOVEMENT OF NITRATE AND CARBON IN AN IRRIGATED DESERT SOIL,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
B. D. Meek, A. J. MacKenzie, T. J. Donovan, and W. F. Spencer.
Journal of Environmental Quality, Vol 3, No 3, p 253-258, July-September, 1974. 3 tab, 9 fig, 8 refs.

Descriptors: *Nitrates, *Irrigated land, *Soil profile, *Groundwater, *Water pollution, *Leaching, *Denitrification, Feed lots, Deserts, Irrigation, Carbon, Manganese, Soils, Infiltration, Soil water.
Identifiers: Manure, Irrigation schedule.

As a practical solution for disposing of large quantities of manure from feedlots, the manure is being applied at high rates on agricultural lands as an inexpensive means of disposal. In areas where there is sufficient water for leaching there is a high potential for large amounts of nitrate to reach the groundwater of the area. Results indicate that it is possible to adjust manure application rates and irrigation schedules for fine textured desert soils so that very little nitrate will be leached below the root zone. To accomplish this and achieve good crop production it is necessary to adjust the two factors to insure that the surface soil is aerobic while a reducing zone is maintained in the subsoil. Movement of soluble organic carbon into the lower soil profile is an important factor in devloping reducing zones. Manganese in the soil solution is a useful parameter for defining zones where denitrification may occur in this soil type. (Mastic-Arizona)
W75-04370

THE USE OF CHIRONOMID PUPAL EXUVIAE FOR CHARACTERIZING STREAMS,
Bristol Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-04371

STUDIES ON THE EFFECTIVENESS OF THE GUPPY POECILIA RETICULATA IN CONTROLLING CULEX PIPIENS S.L.:I. LABORATORY EXPERIMENTS ON PREDATION BEHAVIOR, (IN JAPANESE),
Tokyo Univ. (Japan). Dept. of Parasitology.
T. Kurihara.
Jap J Sanit Zool. Vol 24, No 1, p 73-77. 1973 Illus.
Identifiers: Fish behavior, Culex-pipiens, Food, Guppy, Laboratory, *Poecilia-reticulata, *Predation, *Mosquito larvae, Water pollution control, Fish foods.

The guppy P. reticulata is an effective predator of mosquito larvae. Predation efficiency was studied under laboratory conditions. Observations were made on the predatory activity of guppies on

pupae are larvae. These studies were carried out to develop more effective utilization of the guppy for C. pipiens control. Two guppies were placed in each aquarium containing 2 l of water and maintained at constant laboratory temperature of 26C and 600 lx illumination. Known numbers of larvae were introduced into each aquarium at 10:00 am every morning. The number of larvae eaten within a 2-h period increased when the prey population increased from 50-100. However, the number of larvae eaten was more or less constant when the prey was more than 100. Similar results were obtained when 0.7 g of powdered laboratory animal food was introduced into each container along with the mosquito larvae. The number of larvae eaten by the guppies under condition of high larval population plus the powdered food did not show any significant difference as compared with the number of larvae consumed at high larval density and without the powdered laboratory food. When the guppy population was increased and the larvae supplied were at the ratio of 50 larvae/guppy, there were more larvae consumed/guppy under high guppy population than under lower guppy population. Guppy attack mosquito pupae actively when the guppy population is high. Many pupae were killed during a 24-h period when both guppies and pupae were in contact in a container, although any external injury was not found on pupal skin.--Copyright 1974, Biological Abstracts, Inc.
W75-04382

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Report No. Dockets 50461-93 and 50462-91, October 1974. 309 p, 48 fig, 44 tab, 178 ref, 7 append.

Descriptors: *Salt Creek, *Nuclear powerplants, *Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Lake, *Illinois.
Identifiers: *Environmental impact statements, *Boiling water reactors.

The proposed Clinton Power Station, Units 1 and 2 will be located in DeWitt County, Illinois, and will employ two identical boiling water reactors cooled by a once-through flow of water from a lake and Salt Creek. It is concluded to issue construction permits for the facilities subject to the following conditions: (1) avoid unnecessary environmental impacts during construction; (2) limit discharge water to 96 F, (3) define land use plan for recreation and conservation at the site; (4) do preoperational monitoring as specified; (5) provide a periodic review of construction activities for conformity as specified; (6) provide written notification of construction activities which may result in adverse impacts; and (7) provide a plan of action to eliminate harmful effects or damage. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. (Houser-ORNL)
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Report No. Dockets 50458-70 and 50459-67, Sept. 1974. 204 p, 30 fig, 53 tab, 99 ref, 5 append, 1 biblio.

Descriptors: *Mississippi River, *Nuclear powerplants, *Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Louisiana.
Identifiers: *Environmental impact statements, *Boiling-water reactors.

The proposed River Bend Station, Units 1 and 2 will be located on the Mississippi River in Louisiana and will employ two identical boiling-water reactors. The exhaust steam will be cooled by mechanical cooling towers using make-up water obtained from and discharged to the Mississippi River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded to issue construction permits for the facility subject to the following conditions: (1) perform certain delineated work to avoid adverse environmental impacts during construction; (2) install gaseous waste treatment equipment to meet stipulated guidelines; (3) perform preoperational monitoring as specified; (4) provide a periodic review of construction activities as set forth in the construction permit; (5) notify director of licensing of any unexpected adverse effects and suggest a plan of action to eliminate such impacts. (Houser-ORNL)
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Report No. Docket 50471-65, Sept. 1974. 314 p, 29 fig, 38 tab, 123 ref, 3 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Massachusetts.
Identifiers: *Pressurized water reactors, *Cape Cod Bay(Mass), *Environmental impact statements.

The proposed Pilgrim Nuclear Power Station, Unit 2 is located in Massachusetts near the town of Plymouth and will employ a pressurized water reactor cooled by water from and discharged to Cape Cod Bay. The conclusion is to issue a construction permit subject to the following conditions: (1) avoid unnecessary impacts during construction; (2) perform preoperational monitoring as specified; (3) perform periodic reviews of construction activities for conformity to conditions in the permit; (4) provide written notification of unexpected adverse impacts and provide a plan of action to eliminate/reduce the harmful effects or damage. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. (Houser-ORNL)
W75-04397

EFFECTIVENESS OF TWO NITRIFICATION INHIBITORS FOR ANHYDROUS AMMONIA UNDER IRRIGATED AND DRYLAND CONDITIONS,
Agricultural Research Service, Pullman, Wash.
V. L. Cochran, R. I. Papendick, and W. M. Woody.
Agron J. Vol 65, No 4, p 649-653. 1973, Illus.
Identifiers: *Ammonia(Anhydrous), Azide, Chloro-6-Trichloromethyl, *Dryland conditions, Inhibitors, *Irrigated land, Leaching, *Nitrification, Nitrogen, Potassium, Pyridine, Retention, Triticum-Aestivum, Zones, *Washington, Absorption.

Potassium azide (KN3) and 2-chloro-6-(trichloromethyl) pyridine (N-Serve) were evaluated as nitrification inhibitors for anhydrous NH3 field applied on irrigated and nonirrigated Ritzville silt loam and on nonirrigated Naff silt loam in eastern Washington. Formulations of KN3, N-Serve in liquid NH3, or Nh3 alone were applied to follow soil in midsummer at a rate of 90 kg N/ha. Irrigations were 15 cm of water sprinkler applied 1 day or 2 wk after fertilizer application, and 10-15 cm of water each time at 4,8 and 13 wk after NH3 application. The NH3 retention zone was sampled for NH+4 and NO-3 periodically through Dec. for the Naff soil and through Feb. for the Ritzville soil. Both KN3 and N-Serve effectively inhibited nitrification of the applied NH3 on nonirrigated Ritzville soil when temperature and soil moisture were favorable for rapid nitrification. However, KN3 was completely ineffective following irrigation or, for the Naff soil, after rainwater penetrated below the retention zone 2 wk after N application. Where irrigated 1 day or 2 wk after fertillization application, all of the applied N had disappeared from the initial NH3 retention zone in the Ritzville soil in 8-13 wk for both NH3 alone and NH3 + KN3. Results with the Naff soil for these applications were similar to results with the irrigated Ritzville soil. By contrast, N-Serve effectively suppressed nitrification under leaching and nonleaching conditions. For the Ritzville soil, total N uptake by the wheat (Triticum aestivum L.) crop for different rates of fertilizer application followed the order of NH3 + KN3 greater than NH3 + N-Serve greater than NH3 alone, but grain yields with NH3 + inhibitor were not different from yields with NH3 alone. For the Naff soil there was no N-uptake or grain-yield response to N rates, and thus no response to the inhibitors.--Copyright 1974, Biological Abstracts, Inc.
W75-04425

UTILIZATION OF THE EARTH'S NATURAL HEATING SYSTEM TO DESALT GEOTHERMAL BRINES FOR AUGMENTATION OF THE COLORADO RIVER SYSTEM,
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 3A.
W75-04430

COMPLYING WITH DISCHARGE REGULATIONS,
Environmental Protection Agency, Washington, D. C.
C. J. Schafer, and N. Lailas.
Environmental Science and Technology, Vol 8, No 10, p 903-906, October 1974. 1 fig, 2 tab.

Descriptors: *Discharge(water), *Federal Water Pollution Control Act, *Effluents, *Legislation, Planning, Analysis, Monitoring, *Water permits, *Water pollution control.

Under the new national permit system for pollutant discharge, the National Pollutant Discharge

Elimination System, all industries and municipalities must limit their point source effluent discharges into navigable waters. The permit to be issued has a compliance schedule and monitoring requirements. Target dates are July, 1977 for 'best practicable control technology currently available', and July, 1983 for 'best available treatment economically achievable', as part of the Federal Water Pollution Control Act Amendments (PL 92-500). The legislation gives Environmental Protection Agency administrators the responsibility of publishing regulations with guidelines for effluent limitations. Compliance schedules contain dates for the preparation of engineering reports, planning and completion of construction, and the operation of wastewater treatment facilities. Permits will be issued for fixed terms, the maximum duration being five years. The permits must specify self-monitoring requirements for a facility including sample type, frequency of analysis, and frequency of reporting to the regulatory agency. Discharges will be reported by each municipality of industrial facility on a 'Monitoring Discharge Form', recording minimum, average, and maximum values in terms of quantity and concentration, representing a 24-hour day, as obtained from the analysis performed. It will be the responsibility of the permittee to notify the EPA regional administrator if he cannot comply with effluent limitations at any time. (Prague-FIRL)
W75-04431

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4A.
W75-04440

METHODS FOR ELIMINATION OF OIL SLICKS,
Grace W. R. and Co., New York, (assignee).
E. W. McKinney, A. L. Dixon, Jr., and R. L. Jordan.
U.S. Patent No 3,843,517, 5 p, 6 tab, 9 ref; Official Gazette of the United Stated Patent Office, Vol 927, No 4, p 1636, October 22, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Water pollution control, *Water quality control, Pollution abatement, Freeze drying, Microorganisms, Nutrients.

Substances and methods are described for removing oils and other hydrocarbons from surfaces such as shorelines and those of fresh and salt water, whether contained or essentially open. The substances comprise freeze-drying, (1) microorganisms along with nutrients, or (2) microorganisms within a carrier material, or (3) microorganisms within a carrier also containing nutrients. Alternatively, freeze-dried microorganisms may be admixed with a carrier material which may or may not contain nutrients. For removal of a hydrocarbon or oil, any of these compositions, or a mixture, is placed on the hydrocarbon or oil deposit to be removed. The oil or hydrocarbon is then digested by the microorganisms. The carrier adsorbs and concentrates the oil in the presence of the microorganisms and the microorganisms consume the oil. The microorganisms remain viable in these compositions even after long storage periods. In an alternative composition, the microorganisms may be freeze-dried and then admixed with a carrier such as clays, vermiculites, perlites, silica gels or so on. (Sinha-OEIS)
W75-04455

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
For primary bibliographic entry see Field 6G.
W75-04468

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp., South Charleston, W. Va.
D. C. Macauley.
Journal of the Water Pollution Control Federation, Vol 46, No 6, p 1337-1341, June, 1974. 36 ref.

Descriptors: *Chemicals, *Nitrogen, *Water pollution sources, Plastics, Adsorption, Waste water treatment, Biological treatment, Recycling, Federal Water Pollution Act, *Reviews, *Bibliographies.
Identifiers: *In-unit control, Synthetic resins, Nitrogenous fertilizer.

The organic chemical industry along with the synthetic resins segment of the plastics and synthetics industry, has set up guidelines for the implementation of the 1972 Federal Water Pollution Control Act. The degree to which water can be made pollution-free by the best technology available which is economically feasible was determined. Water pollution in the nitrogen industry, including nitrogenous chemicals used for chemical processing and nitrogenous fertilizer, was examined. (Leibowitz-FIRL)
W75-04474

DESIGN AND APPLICATION OF A MULTIPURPOSE MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY ASSESSMENT IN DISTRIBUTION SYSTEMS,
Drexel Univ., Philadelphia, Pa.
S. Kovacs.
Available from Xerox University Microfilms, Ann Arbor, Mich, 48106, Order No. 74-20,716. Ph.D. Thesis, 1974. 314 p.

Descriptors: *Computer models, *Water quality control, *Domestic water, *Water management(Applied), Public health, Operations, Management, Mathematical models, Water supply, *Design, Potable water, *Water distribution(Applied).
Identifiers: Multipurpose management information system(MMIS).

A computer based multipurpose management information system, MMIS, for drinking water quality data has been designed. The City of Philadelphia, Pennsylvania was used as a prototype model. Degradation of water quality can be a public health hazard and cause aesthetic problems of discoloration, taste, and odor. An MMIS is necessary to provide correct and available information on water quality indicators in distribution systems. The MMIS can be utilized in the research of cause and effect relationships of water quality deterioration and also for managerial and operational decision-making. Statistical techniques which are appropriate for the study of water quality deterioration and for the empirical definition of water quality are presented. The MMIS can be adapted by a municipal water utility to meet its specific information requirements. The MMIS can also be used as a modular subsystem of an overall water utility management information system. (Orr-FIRL)
W75-04505

A BALANCED APPROACH TO RESOURCE EXTRACTION AND CREATIVE LAND DEVELOPMENT ASSOCIATED WITH OPEN-PIT COPPER MINING IN SOUTHERN ARIZONA,
F. S. Matter, K. N. Clark, J. A. Hann, S. P. Schuman, and B. J. Blanchard.
University of Arizona, Tucson College of Architecture and the College of Mines, 1974. 85 p. Drawings (w/overlays), photographs, maps, 6 ref.

Descriptors: *Mine wastes, *Comprehensive planning, *Environmental effects, *Land use, *Model studies, *Landscaping, *Terracing, Mining, Waste disposal, Water pollution sources, Water demand, Multiple-purpose projects, Area development, Cost-benefit analysis, Arizona, Alternative planning, Aesthetics.

The problem areas associated with the 6 open-pit copper mining operations in a 21-mile stretch along the Sierita foothills on the western side of the Santa Cruz Fiver Valley, Pima County, Southern Arizona were disposal of overburden, trailing ponds and water demand, all characteristics of environmental problems generally associated with this method of extraction. In the proposed solutions, an attempt has been made to balance possible new uses for areas now considered environmental liabilities with the operational constraints that created them. Factors taken into account in considering tradeoffs are the presence of agricultural activities, ranching, residential settlements, Papago Indian reservation, state-owned land, proximity to Tucson, dependent on the river basin affected for one-third of its groundwater needs. Ideas presented are conceptual models designed to illustrate possible land use patterns, both short-term implications for two sites, and long-term implications as built into a comprehensive plan for the Santa Cruz Valley. Some of these ideas project new methods for waste and tailings disposal, use of terraces to create mines-residential interfaces through man-made landscapes, increased efficiency in water recycling. The schematic description of satellite city developments includes attention to economic, environmental, and aesthetic considerations. (Paylore-Arizona)
W75-04510

A SYSTEMS ANALYSIS OF WATER QUALITY SURVEY DESIGN,
Clemson Univ., S. C.
For primary bibliographic entry see Field 5B.
W75-04522

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
J. J. Jacobs, and J. F. Timmons.
American Journal of Agricultural Economics, Vol 56, No 4, p 791-798, November 1974. 2 tab, 10 ref.

Descriptors: *Water quality control, Agriculture, *Land use, *Phosphorus, *Sediment, *Linear programming, *Cost-benefit analysis, Estimating, Streams, Constraints, Crops, River basins, Methodology, Surface waters, Watersheds(Basins), Abatement, Costs, Mathematical Models, Computers, Systems analysis.
Identifiers: *Economic analysis, Cost minimization, Distribution of costs.

Sediment and phosphorus losses to streams from crop and pasture land can be reduced through production practices. Costs (measured in terms of reductions in farm income) of changes in agricultural practices necessary to achieve various levels of soil and phosphorus in surface water leaving a watershed are analyzed. The data requirement for selecting and analyzing alternative levels of water quality is outlined, the least-cost means of achieving particular quality levels via agricultural production practices is estimated, and the benefits needed to offset costs of achieving a particular level of water quality are determined. A combination of cost minimization and incremental cost-benefit analysis is used. A linear programming model is formulated to estimate the cost of reducing soil and phosphorus entering the stream from agricultural lands. Then an attempt is made to estimate the benefit of reduced soil losses to a municipal water supply and to recreational uses. The framework is applied to the Nishnabotna River Basin in southwestern Iowa. Results show that the associated abatement costs to farmers are substantial and increase rapidly as the sediment and phosphorus constraints become more stringent. Distribution of these costs is determined by the type of regulation established. (Bell-Cornell)
W75-04526

ENVIRONMENTAL VALUES AND WATER QUALITY PLANNING,
California Univ., Davis. Div. of Environmental Studies.
P. Richerson, and R. Johnston.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings paper No 11136, p 259-276, February 1975. 2 fig, 59 ref.

Descriptors: *Human resources, Hydraulics, *Project feasibility, *Water quality, Natural resources, *Recreation, Value, Mathematical models, *Planning, Esthetics.
Identifiers: *Environmental quality, Economic analysis, Government agencies, Uncertainty principle.

Two fundamental types of problems affect the incorporation of wilderness, scenic, and recreation values into water quality planning: (1) problems of incommensurable values; and (2) problems of incomplete information. The nature of these problems is reviewed in the context of rational planning models. Criticized is the rational goal-oriented benefit maximizing model of planning that ignores the problems of value and knowledge. State-of-the-art methods for coping with value and information difficulties, including NEPA, the Water Resources Council Principles and Standards, and contingency planning techniques, are described. An empirical research strategy for investigating planning behavior is proposed and preliminary results for three agencies, the United States Army Corps of Engineers, the Federal Bureau of Land Management, and the California State Water Resources Control Board, are reported. In order to incorporate environmental and recreation interests successfully into decision making, water quality planners must be prepared to actively experiment with the quasipolitical techniques that public participation implies. They must candidly evaluate the quality and comprehensiveness of their information and knowledge and be prepared to make more extensive use of flexible short-range and contingency-oriented approaches than of long-range comprehensive planning and its ideals. (Bell-Cornell)
W75-04530

COMPUTER CONTROL OF CHEMICAL ADDITION AT A WATER-TREATMENT PLANT,
Autocon Industries, St. Paul, Minn.
For primary bibliographic entry see Field 5F.
W75-04535

ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS IN DAIRY MANURE MANAGEMENT SYSTEMS,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5D.
W75-04543

AN IN-DEPTH LOOK AT FEDERAL POLLUTION CONTROLS,
Wisconsin Univ., Madison.
R. E. Graves.
Hoard's Dairyman, Vol 119, No 9, p 614, 653, May 10, 1974. 1 fig.

Descriptors: *Regulation, *Environmental control, *Feed lots, Livestock, Poultry, Agricultural runoff, Permits, Waste treatment, Waste disposal, Federal Water Pollution Control Act, *Water pollution control, *Farm wastes.
Identifiers: Federal pollution controls, *Zero discharge.

New EPA guidelines for feedlots were published in February and were met with tremendous reaction. One reason for the strong reaction was that they seemed to include livestock under every conceivable system of management. No distinction was made based on numbers of animals, concentration of animals, or location with respect to streams or lakes. EPA considers any confined group of beef, dairy cattle, swine, sheep, horses, chickens, turkeys, or ducks a potential feedlot. The most drastic change found in the guidelines and standards recently issued was the exclusion of smaller livestock farms. Exclusion from these regulations does not mean that smaller livestock farms can forget about pollution control. Any person or firm is still responsible for water pollution resulting from its actions or inactions. The most outstanding conclusion and recommendation of this report deals with 'zero discharge'. Without establishing a meaningful definition of zero discharge or even feedlot pollution, it was concluded that practicable available technology is available to achieve zero discharge from all feedlots by July 1, 1977. (Carmell-East Central)
W75-04544

FARMS ARE NOT IN THE COUNTRY ANY MORE,
New Jersey Agricultural Experiment Station, New Brunswick.
For primary bibliographic entry see Field 5D.
W75-04546

REDUCING FEEDLOT NITRATES IN YOUR GROUND WATER,
For primary bibliographic entry see Field 5B.
W75-04547

SIMULATION AND STATISTICAL QUALITY CONTROL FOR WATER POLLUTION ABATEMENT,
Texas A and M Univ., College Station.
D. Phantumvanit.
Available from Xerox University Micro-films, Ann Arbor, Mich, 48106, Order No. 74-21, 214. Ph D Thesis, p 172, 1974.

Descriptors: *Pollution abatement, *Water quality control, *Waste water treatment, *Management, Operation, Planning, Model studies, Theoretical analysis.

The increases in water pollution problems and in the public demands for high quality water necessitate the proper management of regional water quality systems. To assist in the management of the stochastic nature of a regional water quality system the following were developed: a model of the reliability associated with the system goals; programs describing the system management strategies; and a sensitivity analysis to provide planners with alternative solutions subjected to changes in water quality requirements. Operating characteristics curves were formulated for mjaor waste water treatment plants. These curves illustrated the relationships between the quality of treated waste effluent quality and regional water system reliability and also the impact of each waste water treatment plant on regional water quality. The overall process efficiency distributions for major waste water treatment plants were discussed and described by some standard distributions. (Orr-FIRL)
W75-04557

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6A.
W75-04558

MANUAL FOR DEICING CHEMICALS: APPLICATION PRACTICES,
Little (Arthur D.), Inc., Cambridge, Mass.
D. L. Richardson, R. C. Terry, J. B. Metzger, and R. J. Carroll.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-045, p 152, December 1974. 55 fig, 8 tab, 10 ref, 1 append. 1BB034; ROAP-ATB; TASK-036, EPA Contract No 68-03-0154.

Descriptors: Sodium chloride, Calcium chlorides, Sands, Snow, Ice, Supervision, *Deicers, *Snow removal *Maintenance, Salts.
Identifiers: Deicing chemical spreaders, *Deicing chemicals, Deicing chemical usage, Snow and ice control management, Citizen participation, Winter road maintenance.

Results are presented of a study to minimize the loss to the environment of chemicals used in controlling snow and ice on highways. Based on the best current practices for highway maintenance as observed during two years of study, practical guidelines are presented for the use of deicing chemicals. (1) Supervisory aspects of proper chemical usage are defined, including organization and personnel training. (2) Efficient snow and ice control requires good judgment and appropriate action. Elements of proper decision-making are discussed, including weather forecasting, setting chemical application rates, and accounting for chemical usage. (3) The backbone of winter road maintenance is equipment. General requirements and major equipment classes are described, including recent improvements and advantages or disadvantages. Methods are given for accurate spreader calibrations. (4) Means are described for developing and enlisting the support of citizens and drivers for winter road maintenance policies. (5) Legal requirements for and constraints on snow and ice control are described. (See also W75-04568) (EPA)
W75-04567

MANUAL FOR DEICING CHEMICALS: STORAGE AND HANDLING,
Little (Arthur D.), Inc., Cambridge, Mass.
D. L. Richardson, C. P. Campbell, R. J. Carroll, D. I. Hellstrom, and J. B. Metzger.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-236 152, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-033, p 88, July 1974. 33 fig, 8 tab, 6 ref. 1BB034/ROAP 21ASZ/TASK AE, EPA Contract No 68-03-0154.

Descriptors: *Calcium chloride, *Deicers, *Ice, *Snow removal, *Sands, Highways, *Salts.
Identifiers: Deicing chemical storage, Deicing chemical handling, Highway deicing chemicals, Bulk storage, Bulk handling.

Results are presented of a study to minimize the loss to the environment of chemicals used in controlling snow and ice on highways. Based on the best current practices for highway maintenance as observed during two years of study, practical guidelines are presented for good practice in the storage and handling of deicing chemicals. (1) Covered storage of salt and other deicing chemicals is strongly recommended; permanent structures for this purpose are preferable. Guidelines are given for site selection and for design foundations, paved working area, and site drainage. Existing storage facilities are presented that represent a range of costs, designs, construction materials and storage capacities. (2) For the handling of salt and other deicing chemicals, general precautions and good housekeeping practices are defined. (3) Environmental responsibilities are discussed for personnel who administer and supervise highway maintenance. (See also W75-04567) (EPA)
W75-04568

ENFORCEMENT ECONOMICS IN AIR POLLUTION CONTROL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Economics.
P. B. Downing, and W. D. Watson, Jr.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $1.50. Environmental Protection Agency, Report EPA-600/5-73-014, p 104, December 1974. 17 fig, 17 tab, 15 ref, append. 1HA094.

Descriptors: Economics, *Air pollution, *Cost analysis, *Alternative costs, Monte Carlo method, Simulation analysis.
Identifiers: *Air pollution control.

The effects of alternative enforcement strategies on the pollution control activities of the generalized model of a firm are investigated. There are a number of tradeoffs available to a firm including delay and non-compliance which allow it to minimize expected pollution control costs. These are identified within the context of a generalized behavioral model for the firm and an empirical study is undertaken to determine their importance. In a simulation of current enforcement of the federal new source particulate matter discharge standard for coal-fired power plants it is found that cost-minimizing power plants will install relatively costly pollution control technology and frequently violate federal fly ash standards. Two alternative enforcement strategies for overcoming these shortcomings, namely compliance tests in combination with emission taxes and emission taxes alone, are analyzed. In the case of the federal fly ash discharge standard for coal-fired power plants it is tentatively concluded that emission tax enforcement would probably result in an approximate minimization of the sum of firm and enforcement agency resource costs. The general applicability of this result to other enforcement problems is discussed. (EPA)
W75-04569

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
R. J. deLucia.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Price $4.15. Environmental Protection Agency report number, EPA-600/5-74-030, September 1974. 333 p, 4 fig, 14 tab, 2 append. IBA 030, ROAP 21AXN06. EPA Contract 68-01-1882.

Descriptors: *Permits, *Model studies, *Water pollution control, Water permits, Regulation, *Simulation analysis, Administration, Legal aspects, River basins, *Pollution charges(Taxes), *New York, Costs.
Identifiers: *Marketable effluent permits, *Mohawk River(NY).

The practical problems and prospects of using marketable effluent permits (MEP) as a water pollution control tool are studied. Under such a system, pollution rights are contingent upon possession of permits; the permits are acquired and/or traded through an auction or market. This study details the requirements of MEP systems, discusses their theoretical advantages, and examines them through the use of industrial organization theory, comparisons with analogous markets, and a simulation model. The simulation model employs Mohawk River data to determine the effect of different system parameters on the operation of a MEP system. The legal and administrative aspects of the marketable permit system are also dealt with. The conclusion is that marketable permits are a promising control tool for many river basins. (EPA)
W75-04571

USED OIL LAW IN THE UNITED STATES AND EUROPE,
Environmental Law Inst., Washington, D. C.
W. A. Irwin, and R. A. Liroff.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Price $3.65. Environmental Protection Agency, Report EPA-600/5-74-025, July 1974. 289 p, 6 tab, 9 append. 1D1315-24ACN-04 1B1030-51AQK-03, 68-01-2203.

Descriptors: Environment, Air environment, Aquatic environment, Air pollution, Oil, Oil pollution, *Oil wastes, *Waste disposal, *Regulation, *Legal aspects, Jurisdiction, Vegetation, Water law, *Water pollution control, United States, Europe.

Existing information is reviewed on the collection and disposal of used automotive and industrial oils and on the potential health risks of improper disposal of such oils. Provisions of federal law governing disposal of used oils are analyzed. The history of federal taxation of lubricating oils is recounted, as is that of federal requirements for labeling products made from used oils. State laws regulating used oil disposal and reprocessed oil labeling are analyzed and the laws (and/or proposed laws) of several other industrialized nations governing used oil collection and disposal are described. The elements of a comprehensive program for regulating used oil collection and disposal and alternative means for implementing and funding such a program are discussed. Recent Congressional bills relating to used oils are examined. (EPA)
W75-04575

ECONOMIC DISINCENTIVES FOR POLLUTION CONTROL: LEGAL, POLITICAL, AND ADMINISTRATIVE DISINCENTIVES,
Environmental Law Inst., Washington, D. C.
W. A. Irwin, and R. A. Liroff.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Price $3.35. Environmental Protection Agency, Report EPA-600/5-74-026, July 1974. 257 p, 16 append. 1D1315-24ACN-04, 1B1030-51AQK-03, 68-01-2203.

Descriptors: Environment, Air environment, Aquatic environment, Air pollution, *Legal aspects, Jurisdiction, Regulation, *Pollution charges(Taxes), *Economics, Taxes, Water pollution control, *Constitutional law, Legislation.
Identifiers: *Disincentives(Economic).

An economic disincentive is defined as a monetary charge levied by government on conduct which is not illegal but which does impose social costs, for the principal purpose of discouraging the conduct. Disincentives are distinguished from other legal mechanisms which may have incidental economic disincentive effects, e.g., fines, user charges, and license fees. The constitutionality of federal or state imposition of disincentives is examined and the authority of the U.S. Environmental Protection Agency and the States to utilize disincentives under selected federal environmental statutes is analyzed. The legality of some disincentives adopted by states is discussed. The charges imposed by several European countries are described and distinguished from disincentives. The history of some previous proposals for federal disincentives is reviewed and suggestions for additional disincentives which might be feasible are offered. (EPA)
W75-04576

AN ASSESSMENT OF WET SYSTEMS FOR RESIDENTIAL REFUSE COLLECTION: SUMMARY REPORT,
Curran Associates, Inc., Northampton, Mass.
For primary bibliographic entry see Field 5D.
W75-04577

MERCURY IN FOOD: A SCIENTIFIC STATUS SUMMARY BY THE INSTITUTE OF FOOD TECHNOLOGISTS' EXPERT PANEL ON FOOD SAFETY AND NUTRITION,
Institute of Food Technologists, Chicago, Ill. Expert Panel on Food Safety and Nutrition.
For primary bibliographic entry see Field 5C.
W75-04579

ENVIRONMENTAL LAND AND WATER MANAGEMENT ACT--AMENDMENTS,
Florida Sess. Laws, Vol 4, Ch. 74-326, p 782-784, approved June 26, 1974, effective July 1, 1974 (1974). 3 p.

Descriptors: *Land resources, *Water resources development, *Land management, *Water management (Applied), Land development, Land use, Natural resources, Water resources, Enforcement, Legislation, adoption of practices, Regional analysis, Regional development, Economic aspects, Social aspects, Regions, Comprehensive planning, *Florida.
Identifiers: State policy, *Environmental policy.

Amendments to the Florida Environmental Land and Water Management Act provide for the procedure involved in obtaining a permit for a development of regional impact (DRI). Hearings by local governments for applications on DRI's are provided only after the regional planning agency certifies that the application contains sufficient information or written notice is received that the requested information will not be supplied. Notice of such hearings shall be given sixty days in advance. A decision will be made on each application within thirty days, unless an extension is requested by the developer. The act also provides for joint public hearings on DRI's. Where two or more developments of regional impact are being jointly undertaken a joint review of applications is available. Enforcement procedures are also included. (Proctor-Florida)
W75-04581

COASTAL RESOURCES MANAGEMENT AND CONSERVATION REPORT PUBLISHED,
For primary bibliographic entry see Field 2L.
W75-04583

WATER QUALITY MANAGEMENT BASIN PLANS REGULATIONS ADOPTED,
Pollution Control Guide, Vol 3, paragraph 19738, p 19277, 1974. 1 p.

Descriptors: Basins, *River basin development, *Water quality, Groundwater basins, Watersheds(Basins), Demonstration watersheds, Water law, Regions, *Watershed management, Water resources development, Data collections, Data processing, *Regulation, Law enforcement, Administrative agencies, Administrative decisions, Inter-agency cooperation, Water quality control, Planning, Water management(Applied).
Identifiers: *Administrative regulations, *Environmental policy.

Requirements for preparation of water quality management basin plans and the procedures governing basin plan adoption, submission, revision, and Environmental Protection Agency approval are described. Basin plans must be coordinated with any discharge permits for sources located in the planning area. The basin plans are to be generally designed to accommodate water quality management both in areas having complex water quality problems and in less complicated situations. Written comments on the proposed regulations were received from interested parties and incorporated into the regulations where appropriate. As a result, the requirement that basin plans be coordinated with water quality standards implementation plans has been deleted. Each basin plan must be revised within five years of the last approval date. Specific considerations in the revision process are listed. An effective date is provided. (Sperling-Florida)
W75-04584

EPA EFFORTS TO END FEEDLOT MANURE POLLUTION CRITICIZED,
Pollution Control Guide, Vol 3, paragraph 19784, p 19371-19374, 1974. 4 p.

Descriptors: *Feedlots, *Management, *Farm wastes, *Farm management, Economics, Cattle, Livestock, Fertilizers, Waste disposal, Water quality, Water law, Water policy, Water quality control, Water quality standards, Resources development, Pollution abatement, Water pollution control, Alternative planning, Administration, Administrative decisions, Federal government.
Identifiers: *Administrative regulations, Congressional hearings, Environmental policy.

The House Committee on Government Operations criticized the Environmental Protection Agency and the Department of Agriculture for inadequate efforts to control feedlot manure pollution and for failing to encourage use of manure for fertilizer. Today, food animals and some racehorses are raised in small, concentrated areas, called feedlots, some of which are within metropolitan areas. About 2 billion tons of animal wastes are produced annually in the United States. When used properly in agriculture, animal wastes are a valuable resource. When such wastes, however, are discharged into a navigable waterway, they often cause severe oxygen depletion for miles downstream which results in fish kills. The Refuse Act of 1899 has been used to require all feedlot owners and operators to obtain permits before discharging the manure into navigable waterways. This attempts to control the pollution at its source. The increasing shortage of chemical fertilizers is causing a renewed interest by farmers in animal wastes as a fertilizer. The Bureau of Mines has also initiated research into the conversion of organic wastes, including animal manure, into fuels. (Sperling-Florida)
W75-04585

EPA TO ISSUE IMPACT STATEMENTS ON SOME REGULATORY ACTIONS,
Pollution Control Guide, Vol 3, paragraph 19760, p 19307-19308, 1974. 2 p.

Descriptors: *Environmental Effects, *Water resources development, *Administrative decisions, Water quality, Legislation, Jurisdiction, Government, Regulation, Permits, Administration, Federal government, Water quality control, Pollution abatement, Water pollution control, Air pollution.
Identifiers: *Environmental impact statement, *National Environmental Policy Act, *Administrative regulations, Environmental policy.

The National Environmental Policy Act of 1969 requires that federal agencies prepare detailed environmental statements on proposals for legislation and other federal actions significantly affecting the quality of the human environment. The objectives of NEPA are to compel an agency's decision-making process to include an appropriate and careful consideration of all environmental aspects of proposed actions. The Federal Courts of Appeals have held that federal agencies need not prepare environmental impact statements for environmentally protective activities. In recognition of statutory and court-ordered deadlines, and the need for prompt pollution abatement, impact statements must be prepared in connection with all ocean dumping site designations. The Environmental Protection Agency, while not required to file an impact statement for its actions, is presently informing the public of the environmental effects of its major regulatory actions. (Sperling-Florida)
W75-04586

PERMIT PROVISIONS ADOPTED FOR OCEAN WATER ACTIVITY,
Pollution Control Guide, Vol 3, paragraph 19810, p 19432-19436, 1974. 5 p.

Descriptors: *Oceans, *Navigable waters, *Regulation, *Dredging, Construction, Water pollution, Water pollution sources, Bodies of water, Water resources development, Water quality, Federal Water Pollution Control Act, Rivers and Harbors Act, Legislation, Judicial decisions, Jurisdiction, Permits, Waste disposal, Disposal, Administrative agencies, Federal government.
Identifiers: *Administrative regulations, Environmental policy, Fill permits, National Environmental Policy Act, FWPCA Amendments of 1972.

Proposed regulations prescribe the policy, practice and procedure to be followed by all Army Corps of Engineers installations and activities in connection with applications for permits authorizing structures and work affecting navigable waters. The regulations are set forth pursuant to the Rivers and Harbors Act of 1899, the Federal Water Pollution Control Act and the Marine Protection, Research and Sanctuaries Act. Provisions related to the discharge of dredged or fill material into navigable waters and the transportation of dredged material for the purpose of dumping it into ocean waters. The Department of the Army publishes the final regulations which prescribe the policies, practice and procedures to be followed in processing Army permits. The regulations have been revised and compiled based on comments received from the general public, other federal agencies, and Corps field offices as well as interpretive guidance received from recent judicial decisions. The analysis of the provisions summarizes comments of particular significance and discusses the basis for the decisions which were made. (Sperling-Florida)
W75-04587

ZAHN, ET AL. V. INTERNATIONAL PAPER CO. (CLASS ACTION SEEKING DAMAGES FROM DISCHARGES),
For primary bibliographic entry see Field 6E.
W75-04588

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 4, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-MS-73-1651-F-4, $10.60 paper copy, $2.25 microfiche. October 17, 1973. 335 p, 2 map, 6 graph, 6 tab.

Descriptors: *Environmental effects, *Leases, *Oil wells, *Continental shelf, *Gulf of Mexico, Offshore platforms, Gulf coastal plain, Mississippi, Alabama, Florida, Federal government, Federal jurisdiction, Mineral industry, Administrative agencies, Oil pollution, Oil industry, Exploitation, Exploration, Oil, Administration, Contracts, Water law, Legal aspects, Oil spills, Oil fields.
Identifiers: *Environmental impact statements, Offshore mineral leases, Territorial seas(Jurisdiction), Liability(Legal aspects), Energy crisis.

This volume is one of five volumes which comprise the Final Environmental Statement for the Outer Continental Shelf (OCS). This section presents an account of the consultation and coordination processes involved in the preparation of the draft and final statements. All federal and state agency review comments are included, and where appropriate, the disposition of pertinent comments leading to preparation of the final statement are indicated. Also included are public hearing testimony and records, and written comments from private organizations. The major areas of concern expressed by the public were: the veracity of the 'energy crisis'; compatibility of offshore mineral operations with defense activities; the degree of state participation in OCS operations; liability in the event of pollution incidents; the adequacy of operating regulations and enforcement procedures; the need for consideration of alternatives to the proposed action unique to Florida; the need for preparation of cost benefit analyses; and the need for a public referendum concerning whether or not to proceed with the proposal. (See also W75-04590) (Deckert-Florida)
W75-04589

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE, OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 5, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-MS-73-1651-F-5, $8.50 paper copy, $2.25 microfiche. October 17, 1973. 262 p, 22 tab, 4 diagram, 12 graph, 6 map.

Descriptors: *Environmental effects, *Continental shelf, *Gulf of Mexico, *Oil, *Leases, Coasts, Federal government, Legal aspects, Exploitation, Exploration, Oceans, Oil industry, Offshore platforms, Oil wells, Resources development, Resources, Administration, Adoption of practices.
Identifiers: *Environmental impact statements, Offshore oil leases, Public trust doctrine, Administrative regulations.

Volume five of five volumes comprising the Final Environmental Statement for this proposal contains the following attachments to the statement: (A) outer continental shelf operating orders number 1 through 12, Gulf of Mexico; (B) proposed schedule--provisional outer continental shelf leasing; (C) description of blocks by water depth, distance from shore, acreage; (D) report of the work group on outer continental shelf safety and pollution control, U.S. geological survey; (E) geological time chart and cross sections through the sale area; (F) windroses portraying monthly wind patterns over the Gulf of Mexico; (G) common names and scientific names for marine benthic animals; (H) population, employment, personal income, and earnings by industry, historical and projected; (I) (Department of Defense) fact sheet summarizing potential impact of possible leasing; (J) matrix appendix; (K) geological survey, outer continental shelf oil and gas operations lease and management program; (L) equipment available for emergency oil spill control and cleanup in the Gulf of Mexico; (M) sample outer continental shelf lease form; (N) list of persons who submitted oral and/or written testimony for public hearing record; Plat--depiction of blocks proposed for leasing. (See also W75-04589) (Deckert-Florida)
W75-04590

MONTGOMERY ENVIRONMENTAL COALITION, ET AL. V. FRI, ET AL. (SEEKING DECLARATORY RELIEF FROM FURTHER SEWER HOOKUPS ON POTOMAC).
1 Pollution Control Guide (Vol. 3), paragraph 15017, p 15167-15171, 1973, 5 p.

Descriptors: *Judicial decisions, *District of Columbia, *Federal jurisdiction, *Federal Water Pollution Control Act, *Law enforcement, Water Quality Act, Jurisdiction, Discharge(Water), Water pollution, Water pollution control, Water quality control, Non-structural alternatives, Local governments, State governments, Federal government, Legal aspects, Legal review, Water law, Administration, Governmental interrelations, Legislation, Permits, Adjudication procedure, Adoption of practices, Water quality standards, Water pollution effects.
Identifiers: *FWPCA Amendments of 1972, Standing(Legal), Effluent limitations, Declaratory judgements, Injunctive relief.

Two community groups and the District of Columbia brought suit against eight named government officials and agencies pursuant to the 'Citizen Suits' provision of the Federal Water Pollution Control Act Amendments of 1972. The plaintiffs sought declaratory and injunctive relief ordering the defendants to refrain from approving, authorizing, or permitting further sewer hookup permits which would result in sewage discharges affecting the water quality of the Potomac River. Seven of the eight defendants filed motions to dismiss against the two community groups. The defendants argued that the plaintiff community groups lacked standing to sue and jurisdiction, and that the plaintiff community groups failed to state a claim upon which relief may be granted. The United States District Court ruled that the plaintiff community groups had standing under the provisions of the 1972 Act, and that alleged violations of effluent standards established under the 1965 Water Quality Act satisfied the jurisdictional requirements of the 'Citizen Suits' provision of the 1972 Act. The court granted the motions of three of the defendants, ruling that the allegations in the complaint evidenced acts or powers too indirectly related to control of the pollution to state a cause of action. The court denied the other four motions and ordered the action to proceed against the remaining defendants. (Deckert-Florida)
W75-04591

EPA POLICY ON INJECTION WELLS.
Pollution Control Guide, Vol. 1, paragraph 2416, p 2246-2249, 1973, 4 p.

Descriptors: *Injection wells, *Waste disposal wells, *Environmental effects, *Well permits, *Regulation, Legal aspects, Drilling, Subsurface waters, Water pollution, Water pollution sources, Water law, Environmental control, Water quality control, Federal government, Local governments, Deep-well pumping, Well data, Waste disposal.
Identifiers: *Environmental policy, Administrative regulations.

The Environmental Protection Agency (EPA) policy on subsurface emplacement of fluids by well injection is to protect the subsurface from pollution, ensure that engineering and geological safeguards are adhered to, and encourage alternative means of disposal. The emplacement of fluids by subsurface injection often is considered by government and private agencies as an attractive mechanism for final disposal. Improper injection of municipal or industrial wastes or injection of other fluids for storage or disposal to the subsurface environment could result in serious pollution of water supplies. The effects of these injections could result in environmental damage requiring complex and costly solutions on a long-term basis. The EPA will oppose emplacement of materials by subsurface injection without strict controls and a clear demonstration that such emplacement will not interfere with present or potential use of the subsurface environment. Before using subsurface injection, all reasonable alternative measures must have been explored and found environmentally less satisfactory. Included are parameters to provide regulatory agencies with sufficient information to evaluate the environmental acceptability of any proposed well injection. (Proctor-Florida)
W75-04592

E.P.A. POLICY TO PROTECT THE NATION'S WETLANDS.
Pollution Control Guide, Vol. 1, paragraph 2415, p 2244-2245, 1973, 2 p.

Descriptors: *Water policy, *Wetlands, *Environmental control, *Waste water(Pollution), *Waste water treatment, Water pollution effects, Marshes, Swamps, Aquatic habitats, Aquatic environment, Waste water disposal, Water resources development, Water law, Water pollution, Water management(Applied), Water allocation(Policy), Wildlife conservation, Resource allocation, Conservation, Federal government, Administrative agencies.
Identifiers: Administrative regulations, Environmental policy.

The Environmental Protection Agency (EPA) has espoused a policy to preserve wetland ecosystems and to protect them from destruction through wastewater pollution or nonpoint source discharges. The EPA advocates the development and construction of waste water treatment facilities, because the Nation's wetlands are an irreplaceable water resource that must be preserved. The EPA's policy is to minimize alterations in the quantity or quality of the natural flow of water that nourishes the wetlands. The policy also calls for protection from environmentally unsound dredging and filling, and solid waste management. Through its education and enforcement programs EPA hopes to prevent violation of applicable water quality standards. In compliance with the National Environmental Policy Act of 1969, the EPA will not grant federal funds for the construction of municipal waste water treatment facilities except where no other alternative is feasible. The Department of the Interior will be consulted to determine the impact of treatment programs on fish and wildlife. (Proctor-Florida)
W75-04593

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES--ENVIRONMENTAL LEGISLATION--NORTH AMERICA.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04594

WATER QUALITY STANDARDS: THE FEDERAL PERSPECTIVE--PROGRESS TOWARD OBJECTIVES,
A. Hirsch, J. L. Agee, and R. S. Burd.
Journal Water Pollution Control Federation, Vol 40, No 9, p 1601-1606, Sept 1968, 6 p.

Descriptors: *Water quality control, *Water quality standards, *Water Quality Act, *Water quality, *Federal Water Pollution Control Act, Waste disposal, Water pollution, Water pollution sources, Water pollution treatment, Water treatment, Sewage treatment, Waste water treatment, Legislation, Local governments, State governments, Federal government, Governmental interrelations, Administrative decisions, Environmental control.
Identifiers: Administrative regulations, *FWPCA Amendments of 1972, Environmental policy.

The Water Quality Act of 1965 was enacted to provide for the establishment of water quality standards. The standards contemplated by the Act involve the specification of the uses of a given body of water, determination of criteria to maintain the water quality necessary to support those uses, and development of a compliance plan to achieve and maintain these criteria. The Department of the Interior will approve standards submitted by the states only if the states provide for upgrading waters now polluted and protecting waters already clean. The intent of the Act is to get ahead of the pollution problem. The Federal Water Pollution Control Act's objective has been to jointly establish these standards, which would spearhead an accelerated pollution control effort. The FWPCA makes the establishment of a joint state-federal effort its top priority assignment. A significant aspect of the new water standards is that the implementation plans call for secondary treatment of both municipal and industrial wastes. (Proctor-Florida)
W75-04595

WATER QUALITY CONTROL--THE ROLE OF THE INTERSTATE AGENCY,
Delaware River Basin Commission, Trenton, N.J.
J. F. Wright.
Journal Water Pollution Control Federation, Vol 40, No 8, Part 1, p 1403-1407, August 1968, 5 p.

Descriptors: *Interstate commissions, *Administrative agencies, *Delaware River Basin Commission, *Water quality control, *Watershed management, Water pollution, Political aspects, State governments, Water policy, Water resources development, Water law, Regional development, Planning, Resources allocation, Social aspects, Administrative decisions, Governmental interrelations, Comprehensive planning, Pollution abatement, Water pollution control, Environmental control, Water policy.
Identifiers: Administrative regulations, Environmental policy, Effluent limitations.

The role of the interstate agency in water pollution control is to formulate a comprehensive regional water quality plan. Agencies must work out cooperative programs to implement regional plans. Plan development and application includes the establishment of a division of labor among federal, interstate, state and local authorities. The agency must insure the feedback to the plan of modifications from research and operational experience. All agencies must be prepared to use police powers to insure compliance. One of the most important features in a successful water quality management plan is the sustained interest in competent operation and maintenance of treatment plants. Plants must be well constructed and operated by qualified personnel in order to be effective. The Delaware River Basin Commission is an example of a successful agency's formulation of water quality standards and effective implementation of them. The Commission also illustrates the flexibility and adaptability of an administrative agency to the changing purposes and techniques of a pollution control program. (Proctor-Florida)
W75-04596

AQUATIC PLANT CONTROL PROGRAM, STATE OF FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
Available from National Technical Information Service, Springfield, Va 22161, U.S. Dept. Commerce, as EIS-FL-73-1488-F, $7.60 in paper copy, $2.25 in microfiche. September 11, 1973. 201 p, 1 map, 5 photo, 11 graph, 22 tab, 12 diagram.

Descriptors: *Environmental effects, *Water hyacinth, *Florida, *Aquatic weed control, *2,4-D, Aquatic plants, Aquatic environment, Aquatic habitat, Federal government, Clogging, Open channels, Surface waters, Rivers, Streams, Lakes, Herbicides, Water pollution, Flood control, Water quality control, Navigable waters, Chemical properties, Legislation, Aquatic animals, Aquatic weeds.
Identifiers: *Environmental Impact Statements.

Efforts to control the growth and dispersal of water hyacinths in the waters of Florida include the use of the chemical 2,4-D (2,4-dichlorophenoxyacetic acid) in dimethylamine salt formulation and use of biological control agents or other methods in an integrated program when they are feasibile. The explosive growth rate of these exotic plants results in dense clogging of Florida's waterways, restricting navigation and streamflow and adversely affecting the aquatic environment. Removal of these plants will improve navigability and the aquatic habitat. The principal adverse effects will be temporary depletion of dissolved oxygen and increase in the buildup of organic bottom sediment, as well as the possibility of other unforeseen effects due to the incomplete understanding of the long-term effects of repeated 2,4-D applications. Biological and mechanical control methods were considered, but the proposed method is presently the most effective and feasible method available. Although there is little question as to the need to remove the hyacinths, some environmentalists expressed concern over the exten-

sive use of 2,4-D while there remains some uncertainty regarding possible adverse effects. (Deckert-Florida)
W75-04598

AQUATIC PLANT CONTROL.
For primary bibliographic entry see Field 6E.
W75-04599

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-239 523 $13.00 paper copy, $2.25 microfiche. Water Resources Scientific Information Center, Report WRSIC 75-202, February 1975, 564 p.

Descriptors: *Acid mine water, *Bibliographies, Abstracts, *Coal mine wastes, Industrial wastes, *Mine drainage, *Strip mines, Waste water treatment, Water pollution control.

This report, containing 365 abstracts, is another in a series of planned bibliographies, in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 77,890 abstracts covering SWRA through November 15, 1974 (Volume 7, Number 22). Author and subject indexes are included.
W75-04625

MANURE APPLICATION GUIDELINES FOR THE PACIFIC NORTHWEST,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
T. L. Willrich, D. O. Turner, and V. V. Volk.
Paper No 74-4061 presented at the 1974 Annual Meeting, American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974, 12 p. 5 tab, 2 ref.

Descriptors: *Pacific Northwest U.S., *Farm wastes, *Waste disposal, *Equations, Nitrates, Fertilizers, Nitrogen, Leaching, Livestock, Waste storage, Lagoons, Irrigation, Volatility.
Identifiers: *Application rates, *Land spreading.

Most farmers who apply manure to land know very little about how much to apply. Research must supply the answers before ground water supplies are polluted. Generally nitrogen is the limiting factor in manure application because it readily moves in the soil whereas phosphorus and potassium are more static. Accurate rational equations must be developed to estimate: (1) the amount of nitrogen which should be added to the soil to maximize crop yields and to satisfy the normal losses of nitrogen from the soil and the losses that occur when manure nitrogen is substituted for synthetic nitrogen, and (2) the amount of residual manure nitrogen which remains for soil incorporation after subtracting all losses which occur before soil incorporation. Equations are presented, but future modifications and refinements are essential to correct weaknesses and errors which currently exist. (Russell-East Central)
W75-04631

EPA PREPARING TO 'RAILROAD' THROUGH NEW POLLUTION RULES COVERING CATTLE FEEDLOTS,
Beef, Vol 9, No 12, p 4-5, August, 1973.

Descriptors: *Feed lots, *Cattle, *Farm wastes, Effluents, *Water pollution control, *Regulation, Livestock, Runoff.
Identifiers: *Zero discharge.

The U. S. Environmental Protection Agency, under a court order, is attempting to write regulating guidelines for effluent limitations on all industries. The proposed regulations do not allow any effluent discharge, regardless of weather conditions. Industry leaders are puzzled about the regulations and are hoping to have some influence on them when they appear in the Federal Register. The regulations must be put into effect by October 18, 1973--the court-imposed deadline. (Frantz-East Central)
W75-04639

PIERCED STEEL PLANKING SURFACING FOR FEEDLOT RUNOFF CONTROL,
South Dakota State Univ., Brookings. Water Resources Inst.
For primary bibliographic entry see Field 5D.
W75-04644

AUTHORIZATION FOR SECRETARY OF INTERIOR TO ACQUIRE ADDITIONAL WETLANDS.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W75-04651

CONTROLS ON THE QUALITY VARIATIONS OF SOME CARBONATE SPRING WATERS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
For primary bibliographic entry see Field 2F.
W75-04710

AN EXAMINATION OF ALTERNATIVE METHODS FOR EMPLOYING BOOMS TO CONTAIN OIL SPILLS IN NAVY HARBORS,
Naval Postgraduate School, Monterey, Calif.
J. J. Larson.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-783 790, $5.25 in paper copy, $2.25 in microfiche. Ms Thesis, p 101, June 1974. 13 fig, 35 ref, 5 append.

Descriptors: *Oil spills, *Water pollution control, Decision making, Evaluation, Oil pollution, Cost-benefit analysis, Harbors, *Alternative planning, *Pollution abatement.
Identifiers: *Floating barriers, *Containment booms, Alternative methods.

One portion of the pollution problem was addressed, that is, methods of employing booms to contain oil spills in harbors controlled by the U.S. Navy. Containment of a spill is an essential step in the process of cleaning up a spill and reducing pollution. A plan was formulated which will enable a decision maker to evaluate and rank three difined methods for deploying oil spill containment boom. The plan is based on a utility analysis of each method, with a decision analysis technique to determine the relative importance of various parameters effecting the utility of each method. Although these parameters are related, they are independent and can be considered individually. The plan identifies the data that must be otained and demonstrates a method for organizing and manipulating the data. This plan can be of assistance to the decision maker in determining an optimum method for boom employment at each naval activity and then determining containment device procurement requirements. (Sims-ISWS)
W75-04720

ENGINEERING A VICTORY FOR THE ENVIRONMENT: A CITIZEN'S GUIDE TO THE U.S. ARMY CORPS OF ENGINEERS,
Institute for the Study of Health and Society, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04755

PLANNING FOR WATER QUALITY IN THE BEAR RIVER SYSTEM IN THE STATE OF UTAH.
Utah Water Research Lab., Logan.
PRWG-142-1, prepared for State of Utah Department of Social Services, Division of Health, Bureau of Environmental Health. March 1974. 95 p, 12 fig, 7 tab, 19 ref.

Descriptors: *Water quality, *Planning, *Management, *Water pollution control, *River basins, *Data collections, Data processing, Federal Water Pollution Control Act, Baseline studies, Analytical techniques, Hydrologic data, *Utah, Political aspects.
Identifiers: *Bear River(Utah), Effluent limitations, Demographic activities.

A functional planning program is presented to aid in the development of comprehensive water quality management plans for the Bear River system pursuant to the objectives of the Federal Water Pollution Control Act, including 1972 amendments. The objectives will be reached using a two stage process: (1) point sources will be required to meet effluent limitations based on current water pollution control technology, and (2) higher prescribed control levels are to be achieved to meet the 1983 requirements of water quality suitable for fishing and swimming. A program design, an initial analysis of available data, and a priority listing of water pollution necessary for developing a Section 303 (e) basin plan are provided. Physical, chemical, economic, political, and demographic activities which have an impact upon a river basin are described. In the compilation and analysis of the baseline information within the scope of this preliminary study, the following specific objectives were achieved: (1) determination of availability of hydrological and water quality data, (2) assessment of water quality problems in the basin; (3) collection of data according to sources which are local or basin wide, statewide, regional, or federal, (4) presentation of the collected data in a form useful to planners and government officials, (5) preliminary analysis of data problems and gaps and requirements for obtaining additional data, and (6) development of a preliminary basin analysis methodology and data retrieval and updating through use of computer systems. (Diefendorf-North Carolina)
W75-04757

LIVING CITY, (MELBOURNE, AUSTRALIA, REVIEW OF OPERATIONS, 1972-73).
Melbourne and Metropolitan Board of Works, (Australia).
For primary bibliographic entry see Field 3D.
W75-04762

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York, Research Committee on Distribution Systems.
For primary bibliographic entry see Field 6B.
W75-04763

THE MARINE ENVIRONMENT AND TOXIC SUBSTANCES (WHEN WAS THE LAST TIME YOU HAD A GOOD SWORDFISH STEAK),
For primary bibliographic entry see Field 6E.
W75-04768

THE LAW OF MARITIME OIL SPILLS,
For primary bibliographic entry see Field 6E.
W75-04770

BILL TO ESTABLISH THE POTOMAC NATIONAL RIVER IN THE STATES OF MARYLAND, VIRGINIA, WEST VIRGINIA, AND THE DISTRICT OF COLUMBIA AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W75-04772

WATERWORKS DEPARTMENT IN CERTAIN CITIES.
For primary bibliographic entry see Field 6E.
W75-04774

UNION OF CONCERNED SCIENTISTS V. ATOMIC ENERGY COMM'N. (REVIEW OF ORDERS OF AEC LICENSING NUCLEAR POWERPLANT).
For primary bibliographic entry see Field 6E.
W75-04775

IN RE HIGHWAY US-24, IN BLOOMFIELD TOWNSHIP, OAKLAND COUNTY (HIGHWAY CONDEMNATION PROCEEDING).
For primary bibliographic entry see Field 6E.
W75-04776

WATER POLLUTION--LIQUID WASTES (AS AMENDED).
Michigan Legislative Service, Vol 2, Public Act No 86, H.B. No 5367, p 177-181, approved April 18, 1974, (1974). 5 p.

Descriptors: *Michigan, *Legislation, *Waste water disposal, *Liquid wastes, Water pollution sources, Treatment facilities, Government finance, Economic aspects, Local governments, Administration, Adoption of practices, Construction, Administrative agencies, Jurisdiction, Planning, Sludge, Sludge disposal, Resources development.
Identifiers: *Administrative regulations, *Effluent charges, State policy, Licenses.

Michigan legislation prevents the discharge of untreated or inadequately treated sewage or other liquid wastes into any waters of the state. The act also provides financial assistance to local agencies for the construction of treatment works to prevent such discharge. A fund is created known as the state water pollution control fund to provide that financial assistance. A grant will not be made for the building and erection of a treatment works until the local agency's governing body has adopted and submitted to the water resources commission a comprehensive long range plan for the control of pollution in the area within its jurisdiction. The commission will promulgate procedures for establishing the priority of eligible projects and for certifying projects for an allocation of grants for treatment works construction. Projects entitled to construction grants will be certified to the administering federal agency from the project list established by the water resources commission and approved by the legislature. (Sperling-Florida)
W75-04777

AMELIORATION OF EFFECTS OF OIL SPILLS.
Council on Environmental Quality, Washington, D.C.
Federal Register, Vol 37, No 176, p 18411-18412, September 9, 1972.

Descriptors: *Regulation, *Oil spills, *Legislation, *Federal Water Pollution Control Act, *Water pollution sources, Water pollution, Water pollution control, Pollution abatement, Oil, Oily water, Water pollution effects, Administrative agencies, Interagency cooperation, Water resources, Oil industry, Environmental effects, Federal government, Investigations.
Identifiers: *Administrative regulation, Hazardous substances(pollution).

In 1971, the Council on Environmental Quality promulgated the National Oil and Hazardous Substances Contingency Plan, pursuant to the provisions of the Federal Water Pollution Control Act, as amended. Experience with that plan has demonstrated to the National Response Team, which is responsible for planning and coordination of spill response activities, that an amendment should be made. The section of the plan to be amended currently provides for notice to a ship or facility operator of an indication of federal interest and potential action in a spill. The purpose of such a notice is to implement that portion of the FWPCA which authorizes the President to remove a spill unless he determines such removal will be done properly by the operator of the vessel or facility from which the discharge occurs. The NRT advised that this purpose could better be served by clarifying the role of the On-Scene Coordinator in making determinations respecting actions to be taken to ameliorate the effects of a spill and that clarification is the purpose of this amendment. (Ritchie-Florida)
W75-04779

BERGEN COUNTY SEWER AUTHORITY V. HACKENSACK MEADOWLANDS DEVELOPMENT COMMISSION (SEEKING DECLARATORY JUDGMENT THAT PLAINTIFF NOT SUBJECT TO LAND USE REGULATIONS OF DEFENDANT IN CONSTRUCTING ADDITION TO SEWAGE PLANT).
For primary bibliographic entry see Field 6E.
W75-04780

OFFSHORE OIL DRILLING AT SANTA BARBARA, PART 1,
For primary bibliographic entry see Field 6E.
W75-04784

INTERIM NUCLEAR LICENSING.
Committee on Merchant Marine and Fisheries (U. S. House).
For primary bibliographic entry see Field 6E.
W75-04788

ROUTINE SURVEILLANCE ALTERNATIVES FOR WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-04803

TV INSPECTIONS SLASH SEWER COSTS $300 PER REPAIR,
St. Louis Metropolitan Sewer District, Mo.
S. J. McLaughlin.
The American City, Vol 89, No 9, p 51-52, September, 1974.

Descriptors: *Maintenance, Sewer systems, Pipes, Equipment, Construction, Flow, Planning, Costs.
Identifiers: *Sewer repair, *Television inspection, Preventive maintenance.

A preventive maintenance program at the Metropolitan St. Louis Sewer District was found to reduce costs of sewer repair drastically. In the last year, 2.1 million feet of sewer lines were inspected by closed-circuit television cameras in order to find the causes of failures such as caveins and backups. The previous cost of digging up a trouble area was about $400; each television inspection costs $33, with average repairs costing $40. This saves over $300 per problem. In addition, some critical areas for regular line cleaning operations were identified and computerized. For example, a leaf burning ban is a major cause of expected sewer blockage in the fall when leaves are swept into gutters. Preliminary inspections are also made of each sector of pipe to be cleaned. Wet weather information is obtained from measuring devices placed through manholes. Sewers are cleaned by rodding equipment or bucket machines. By the combination of preventive maintenance, flow surveillance, and equipment improvement, costs of repairs have been cut by about $150,000 per year. (Prague-FIRL)
W75-04830

PHILOSOPHY ON LIVESTOCK WASTE REGULATION,
Missouri Univ., Columbia.
D. R. Levi.
Paper No. 71-918, presented at 1971 Winter Meeting of the American Society of Agricultural Engineers, Chicago, Illinois, December 7-10, 1971. 10 p.

Descriptors: *Farm wastes, *Livestock, *Regulation, *Legal aspects, Feed lots, Agriculture, Biochemical oxygen demand, Effluent, Water pollution control, Odor, Zoning, Waste treatment, Damages.
Identifiers: Nuisances, Site selection.

There are two types of regulations under which a livestock farmer can be prosecuted or fined for environmental damage. The first are public regulations, such as the States and Federal Government have promulgated in the Water Quality Act of 1965 and comparable State bills. These laws usually provide objective criteria for matter discharged into water or air, for example, maximal BOD levels for effluents discharged into streams. Private regulation usually takes the form of nuisance laws, where the more objective human tolerance for noise, odor, or water pollution is given a legal form. A farmer who endangers his neighbors' health, well-being, or livelihood by polluting their water supplies, or making their air foul-smelling is subject to damage suits, injunctions, fines, or a combination of these. Zoning helps to minimize suits since it insures that the land use is not unreasonable in itself. However, a farmer in a zoned agricultural area may still produce a nuisance and be taken to court. Selecting a site for livestock pens as far as possible from homes and complying with all existing State laws and codes cannot only abate the pollution generated by a farm creating a hazard but indeed has done what the law requires. Waste treatment facilities are the single best insurance against legal action, and farmers and agricultural engineers should cooperate to draft realistic and practical laws in agricultural waste control. (East Central State College)
W75-04838

MANURE PROMOTED FOR CROPLAND.
Calf News, Vol 10, p 18, December, 1972.

Descriptors: *Farm wastes, *Crops, *Fertilizers, Rates of application, Salts, Nitrates, Irrigation, Costs, Nebraska, Nutrients, Feed lots, Soil contamination, Water pollution, Soils, Slopes.
Identifiers: Soil conditioners.

Manure acts as a fertilizer, buffers alkaline soils, and improves such soil characteristics as porosity, granulation, water infiltration rate, and moisture retention. Residual effects may result in a profit even where handling costs exceed one-year value. Salt accumulation should be checked. Maximum application rates recommended are 10-15 tons/acre depending on precipitation and irrigation practices. (East Central State College)
W75-04839

THE RELATIONSHIP BETWEEN ANIMAL WASTES AND WATER QUALITY.
President's Water Pollution Control Advisory Board, Washington, D.C.
Report of Recent Meetings, October, 1971 and January, 1972. 33 p.

Descriptors: *Farm wastes, *Water quality, Recycling, Waste disposal, Lagoons, Basins, Fuels, Oil, Gases, Fertilizers, Feeds, Research and development, Feed lots, Water pollution, Runoff, Colorado, Nebraska, Kansas, Illinois, Indiana, Public health, Monitorings, Strip mines.
Identifiers: Land disposal, Refeeding, Site selection.

The President's Water Pollution Control Advisory Board held meetings in Colorado 26-29 Oct 71 and

in Illinois and Indiana 24-28 Jan 72 to heat testimony on the animal waste pollution problem. Field trips were combined with both meetings. The paper summarizes the hearings. As a consequence of the meetings, the Board presented ten recommendations to EPA. That on uses of animal wastes is: 'The Board believes that recycling animal wastes back onto the land is the best practical approach in most situations, particularly for smaller operators, through the use of catchment basins, lagooning systems, and/or solid waste handling techniques. There are also other possible uses which should be given full consideration. Testimony presented to the Board indicates that promising possibilities exist in converting animal wastes into fuels such as oil or back into animal feeds. It is recommended that the Environmental Protection Agency give high priority to funding for research and development projects which may develop practicable and safe alternate uses for animal wastes.' (East Central State College)
W75-04840

ARKANSAS STATE GAME AND FISH COMM'N. V. EUBANK (SUIT ENJOIN PROPOSED PARTIAL FISH KILL).
For primary bibliographic entry see Field 6E.
W75-04844

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
For primary bibliographic entry see Field 6G.
W75-04845

ECONOMICS, (LITERATURE REVIEW),
Georgia Inst. of Tech., Atlanta, Ga. Envrionmental Resources Center.
L. D. James.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1611-1618, June, 1974. 77 ref.

Descriptors: *Costs, Water resources, *Water resources development, Water pollution, *Reviews, Legislation, *Planning, Management, *Bibliographies.

Two important government documents on water resources planning procedure were published in 1973. New standards for federal water planning in the U.S. were released by the U.S. Water Resources Council. The new approach is that enhancement of environmental quality is included with economic efficiency as planning objectives, and measurement is made of both environmental and economic effects. An increase in planning discount rate to 6.875 percent and a new emphasis that benefits be paid for by the beneficiaries are radical changes from past practice. A five year study by the National Water Commission was completed dealing with water management. 'Zero discharge' was rejected as a goal by the Commission, recommending that the cost of pollution be paid by those who produce it. The evaluation of the causes of conflict between environmental quality and water resources for economic gain was discussed in an assemblage of 28 papers by Goldman for the National Water Commission. (Leibowitz-FIRL)
W75-04846

EFFECTS OF POLLUTION ON FRESHWATER FISH, (LITERATURE REVIEW),
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5C.
W75-04848

OXYGEN SAG AND STREAM PURIFICATION, (LITERATURE REVIEW),
Georgia Dept. of Natural Resources, Atlanta.
For primary bibliographic entry see Field 5B.
W75-04849

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04352

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4A.
W75-04440

NUMERICAL SIMULATION OF UNSTEADY FLOW HYDRAULICS OF TRUCKEE RIVER,
Desert Research Inst., Nevada Univ., Reno.
V. L. Gupta.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 414, $4.25 paper copy, $2.25 microfiche. Completion Report, Technical Report Series H-W, Publication No 21, July 1974. 69 p, 21 fig, 8 tab, 31 ref, 2 append. OWRT A-057-NEV (1), 14-31-0001-4028.

Descriptors: River flow, Numerical analysis, *Unsteady flow, *Nevada, *California, Methodology, *Simulation analysis, Model studies, *Flood routing, *Hydrograph analysis.
Identifiers: *Truckee River(Nev-Calif), Implicits method, Sensitivity analysis.

Modelling methodology using finite difference calculus is presented to investigate the simulation capability of the unsteady flow regime in a mountainous stream. A case study of Truckee River is presented where field survey information was utilized in describing the geometric and hydraulic elements of the river at twenty-five reaches. Modelling exercises included were (a) reproducing observed flood hydrographs of 1963 event, (b) bihourly streamflow hydrographs, (c) flood routing of U.S. Army Corps of Engineer's 'Intermediate Regional' and 'Standard Project Flood' events and (d) routing studies of hydraulic surge propogation. Sensitivity analysis indicates that the agreement between observed and computed hydrographs is largely dependent upon the lateral flow regime.
W75-04444

A REGIONAL MODEL OF THE FUTURE DEMAND FOR TRANSPORTATION: THE CASE OF BARGE TRANSPORTATION,
Institute for Water Resources (Army), Alexandria, Va.
B. R. Sasaki.
IWR Paper 74-P3. October 1974. 149 p, 12 fig, 30 tab, 71 ref, append.

Descriptors: *Methodology, *Demand, *Barges, *Transportation, *Economics, *Ohio River, Regions, Coals, Supply, Linear programming, Projections, Technology, *Model studies, Industries, Estimating, Equations, Operations research, Regional analysis.
Identifiers: Commodities, Cost minimization, Discriminant analysis.

Reported is a study which developed a methodology for projecting the future demand for barges in the transport of bituminous coal to selected economic centers. The methodology is based on a general equilibrium model of the supply and demand for specific commodities and then an analysis of the model share consequences of the spatial alignment of supply and demand centers. Demand for transportation is assumed to be derived from the demand for commodities over space. Division of traffic between transport modes is assumed to be a function of the rate and service characteristic of competing modes. Empirical estimates are made of the demand for barge transportation of coal to three functional economic areas of the Ohio River Region--Pittsburgh, Cincinnati, and Evansville. The comprehensive model consists of three interrelated economic models. Demand functions for coal in each area are projected, supply functions for coal production areas competing for these markets are projected, and an equlibrium allocation of trade flows is estimated by linear programming, utilizing minimum average transport cost from each originating region to each destination region. Choice of transport mode is estimated by utilizing discriminant functions based on current (1970) rate and service characterstics for competing modes. (Bell-Cornell)
W75-04520

ON THE VULNERABILITY OF ECOSYSTEMS DISTURBED BY MAN,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5C.
W75-04521

A TWO-DIMENSIONAL MULTI-STAGE PROGRAMMING MODEL: WITH APPLICATION TO RESERVOIR SYSTEMS,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 4A.
W75-04523

EXPECTATION AND DISPERSION MATRICES FOR THE ESTIMATION OF DISTRIBUTIONS ASSOCIATED WITH DISCRETE RESERVOIRS,
Natal Univ., Durban(South Africa).
For primary bibliographic entry see Field 4A.
W75-04525

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5G.
W75-04526

THE DESIGN OF A LIVESTOCK WATER DISTRIBUTION SYSTEM--LARGE SCALE,
Nebraska Univ., Lincoln. Agricultural Experment Station.
For primary bibliographic entry see Field 3F.
W75-04527

MODELING SEWAGE TREATMENT PLANT INPUT BOD DATA,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04528

DEMAND FOR IRRIGATION: A CASE STUDY OF GOVERNMENT TUBE-WELLS IN UTTAR PRADESH,
Institute of Economic Growth, Delhi (India).
For primary bibliographic entry see Field 6D.
W75-04529

ENVIRONMENTAL VALUES AND WATER QUALITY PLANNING,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 5G.
W75-04530

OMPUTER USE FOR RIVER REGULATION,
orps of Engineers, Portland, Oreg. North Pacific iv.
or primary bibliographic entry see Field 4A.
75-04531

PTIMAL OPERATION OF MULTIPLE ESERVOIR SYSTEM,
tate Univ. of New York, Buffalo. Dept. of Civil ngineering.
or primary bibliographic entry see Field 4A.
75-04532

DOPTION OF NETWORK TECHNIQUES IN HE PLANNING AND EXECUTION OF IR-IGATION AND POWER PROJECTS,
industan Construction Col. Ltd., Bombay ndia).
or primary bibliographic entry see Field 3F.
75-04533

ATER MANAGEMENT SYSTEMS,
echnion--Israel Inst. of Tech., Haifa.
or primary bibliographic entry see Field 3F.
75-04538

OLUTION OF SIMULTANEOUS PARTIAL IFFERENTIAL EQUATIONS: AN EXTENSION F PDEL,
alifornia Univ., Los Angeles.
S-h. Choi.
vailable from the National Technical Informa-on Service, Springfield, Va. 22161, as PB-239 2, $5.75 in paper copy, $2.25 in microfiche. Msc, hesis. 1973. 122 p, 7 fig, 2 tab, 37 ref, 2 append. WRT B-150-CAL(6).

escriptors: *Simulation analysis, *Equations, Algorithms, Digital computers, *Computer pro-ams, Numerical analysis, Environmental en-neering, *Air pollution, Pollutants, Costs, Time, athematical models, Systems analysis, Distribution systems.
dentifiers: *Simulation languages, *Simultaneous rtial differential equation.

he capability of PDEL (Partial Differential Equa-on Language) is extended to solve simultaneous rtial differential equations. Specifically, a new ortion of the PDEL translator is designed to han-e simultaneous 1-, 2-, and 3-dimensional elliptic, rabolic and hyperbolic equations and to actually nplement the model for solving simultaneous 2-mensional parabolic equations. The extension is ccomplished by modifying the existing partial dif-rential equation solution algorithm to allow for corporation of an ordinary differential equation olution module rather than by implementing en-rely new and lengthy algorithms to PDEL. A sur-ey of several existing methods for solving simul-neous partial differential equations and a survey ordinary differential equation algorithms are resented. The Fourth-order Range-Kutta method chosen to be implemented in this extension of DEL. The newly implemented ordinary dif-rential equation solution module is tested and ound to be reasonably accurate. When incor-orated into the partial differential equation solu-on scheme for solving simultaneous partial dif-rential equations, the overall performance is tisfactory. For solving several partial dif-rential equations simultaneously, there is only a ight increase in computer time and cost over ose required for solving one such equation. The DEL translator is modified so that only a few ew statements need to be added to a PDEL pro-am in order to handle simultaneous partial dif-rential equations. (Bell-Cornell)
75-04539

ARAMETER IDENTIFICATION IN DIS-RIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
C. M. Lam.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 431, $4.75 in paper copy, $2.25 in microfiche. MSc Thesis. 1972. 84 p, 4 fig, 19 tab, 15 ref. OWRT B-150-CAL(5).

Descriptors: *Simulation analysis, *Computer programs, Digital computers, Algorithms, Model studies, Data collections, Equations, *Aquifers, *Optimization, Withdrawal, Heat, Diffusion, Systems analysis, Thermal pollution.
Identifiers: Parameter identification, Simulation languages, *Fletcher-Powell method, Partial differential equation, Inverse problems, Convergence, *Heat diffusion.

The capability of PDEL (Partial Differential Equation Language) is extended to handle the parameter identification problem. The following goals are accomplished: (1) a comparison of the existing parameter identification algorithms and the choosing of the most suitable one to be implemented into the existing PDEL system; and (2) the design and construction of a new portion of the parameter identification problems for those equations that can be solved by the existing PDEL system. The comparison study shows that the Fletcher-Powell method is the most suitable algorithm to be used because: its coverge rate is reasonably fast; a large set of problems can be handled; and only minor changes to the existing PDEL system are required. The translator is designed in such a way that, besides specifying the necessary details required for solving the partial differential equation in PDEL, the user has only to add several statements to achieve the parameter identification goal. In practically all presently available languages, including PDEL, parameter identification problems have to be treated by the user on a trial and error basis. The main goal of the extension of PDEL is to ease and speed up parameter identification for a user of PDEL by avoiding such a trial and error process. Two example problems, optimal control of an aquifer, and heat diffusion, are given. (Bell-Cornell)
W75-04540

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6D.
W75-04541

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 519, $8.75 in paper copy, $2.25 in microfiche. Completion Report, p 274, January 1975. 13 fig, 8 tab, 5 append. OWRT C-5208(No 4211)(1).

Descriptors: Management, Planning, Coasts, *Connecticut, *Model studies, Organizations, Political aspects, Institutional constraints, Programs, Urbanization, Legislation, Environment, *Optimization, *Governmental interrelations, *Algorithms, *Water demands, *Decision making.
Identifiers: Long Island Sound(Conn), *Coastal zone management, *Multi-level programming.

Since the decisionmaking and planning powers in coastal regions are different over a wide range of governmental bodies, a conceptual framework for coastal zone management is needed in order to simplify the process. Such a framework has been developed which attempts to distinguish clearly where in the coastal zone management process the different decisions need be made. Three sets of formal models have been constructed to aid planning. The first set of models checks for consistency between the overall demands placed upon the coastal zone and the environmental carrying capacity of the zone. The second set of models deals with identifying the appropriate goals to be used at the various levels in the planning hierarchy. The third set of models develops a multi-level planning algorithm to provide for efficient transfer of information between the levels of government involved in the coastal zone management process. The models have been tested on the coastal zone of the state of Connecticut.
W75-04558

OPTIMAL WEIGHTING FUNCTION IN WATER QUALITY MODELING,
University of Southern California, Los Angeles. Dept. of Electrical Engineering, and Materials Science.
For primary bibliographic entry see Field 5B.
W75-04614

EVALUATION PROBLEM OF STORM WATER ROUTING MATHEMATICAL MODELS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
For primary bibliographic entry see Field 5D.
W75-04708

6B. Evaluation Process

WATER: CANADIAN NEEDS AND RESOURCES,
J. S. Cram.
Harvest House, Ltd., Montreal, Quebec. 3rd ed. July 1973. 206 p.

Descriptors: *Water resources development, *Water management(Applied), *Water allocation(Policy), Distribution systems, Water control, *Water law, *Water pollution control, Diversion, *Regional development, *Planning, *Canada, Water conservation, *Water demand, Water quality, Nonstructural alternatives, Potential water supply, Priorities.
Identifiers: Water information systems, Great Lakes Water Quality Agreement, Canada-Ontario Agreement, St. Lawrence River.

Attention to Canadian water resource management was precipitated by the pressure of United States demand for Canadian water resources and the public awareness of pollution dangers. The development of Canada's water resources and subsequent management are discussed. Factors such as conflicting demands, industrial and urban generated problems, disproportionate regional supplies and needs, absence of criteria and standards, and overlapping governmental jurisdictions, have necessitated the formulation of national policy and standards as well as activated citizen participation. Aspects and components of water development discussed include general characteristics of water, location of existing and potential supply sources, pollution problems (costs and forms), relationship with agriculture, and present inter-governmental control and efforts. The American and Canadian water issue is examined. Benefits from and objections to proposed water diversion schemes to export water to the U.S. and the Grand Canal plan to raise the level of the Great Lakes are presented. Improved and more responsible programs are suggested. Water resource planning is outlined in context of an economic, jurisdictional and institutional framework. Following a brief resume of past water conferences, an outline of regional priorities in water resource planning is presented. (Salzman-North Carolina)
W75-04359

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
J. Benedict, and C. Wasserman.

February 1972. 102 p, 2 fig, 40 tab. EPA 16110EDC.

Descriptors: Ecology, *Urbanization, *Water management(Applied), *Watersheds(Basins), Water resources, *Water conservation, *Attitudes, *Land use, *Pennsylvania, Management, Alternative water use, Planning, Water quality, Water quality control, Water rights, Water utilization, Competing uses, Regulation, Natural resources, Water pollution, Watersheds(Basins), Land development, Habitat improvement, Water zoning.
Identifiers: Land use controls, *Brandywine watershed(Pa), Chester Co.(Pa), Brandywine Creek(Pa), Pollution, Development corporation.

The original Brandywine Creek Plan (Pennsylvania) would have used legal controls to regulate effects of spreading urbanization on the natural environment. However, citizens' disapproval precluded plan implementation. This report surveys residents' attitudes and changes in the Upper East Branch community, a prototype of a semirural area on the urban fringe, during the five years since the Plan's introduction. Three variables were studied: residents' perception of the area's growth, degree of community identification, and residents' perception of change in the natural environment. Many interviewees did not feel the natural environment changed over five years, and while most prefer the watershed to remain in its present state, a majority will accept some development, feeling that more residential growth is inevitable with older persons and farmers being replaced by younger people from urban areas. Residents were divided on whether mechanisms should be set up to handle problems before they arise or after problems occur. Residents were 2:1 against the Plan; those who believe their property will be directly involved were 3:1 against it. There is no relation between understanding of the plan and acceptance of it, and no social or demographic characteristics could be associated with acceptance of the plan. An increased awareness of the environment and the importance of protecting it seems to be the greatest long term impact of the Plan upon residents. A development corporation of local landowners could be considered for possible future use of the concepts of the Brandywine Plan. This would give landowners direct control over method, time, and place of development and control profits from sale of the corporation's holdings. (Grden-North Carolina)
W75-04360

EFFECTS OF AGRICULTURAL ACREAGE REDUCTION ON WATER AVAILABILITY AND SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado Univ., Boulder. Dept. of Economics.
C. W. Howe, and D. V. Orr.
Water Resources Research, Vol 10, No 5, p 893-897, October, 1974. 4 tab, 2 fig, 8 ref.

Descriptors: *Colorado River, *Water policy, *Water rights, *Water management(Applied), *Salinity, *Desalination, Water supply development, Water quality, Irrigated land, Cost analysis, Costs, Economics, Economic impact, Water demand, Water yield improvement, Return flow, Model studies, Hydrologic models.

The increasing problems concerning the adequacy of water supply and water quality in the Upper and Lower Colorado River basins have created the need to explore alternative policies that can increase the efficiency of water use, reduce current consumptive uses, and improve water quality. Consideration is given to a policy that would reduce the amounts of irrigated acreage in the upper basin of the Colorado River thereby freeing water for alternative uses and reducing salt loadings. An analysis of costs, including estimates of regional income likely to be lost, indicated that a policy involving reduction in irrigated agricultural acreage compares favorably with other water augmentation and salinity reduction programs. (Mastic-Arizona)
W75-04368

PLANNING, MANAGEMENT AND ACCOUNTABILITY IN WATER RESOURCES RESEARCH,
Auburn Univ., Ala. Water Resources Research Inst.
J. C. Warman, and T. J. Joiner.
Available from WRRI, Auburn University, Auburn, Al. Price: $2.00. Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 413, $4.25 paper copy, $2.25 microfiche. Bulletin 21, November 1974. 54 p, 1 fig, 6 append, 25 ref. OWRT X-123(3748)(1)

Descriptors: *Planning, *Management, Water Resources, *Research priorities, Evaluation, Project planning, *Project purposes, *Project post-evaluation, *Project feasibility, Project benefits, *Universities.
Identifiers: *Accountability(responsibility).

This report focuses upon developing quality performance in water resources research through detailed attention to specific factors in program planning, management and accountability. University water resources research programs are problem oriented and are developed on an assessment of the needs of user groups. Two other factors condition this assessment wherever resources are limited and priorities must be established--value systems and policies. Both problems and objectives must be defined. Product objectives are defined in terms of knowledge gained resulting from the research while process objectives specify the research strategies to be followed in search of new knowledge. Other objectives include staff development, administration and communication. Teachers and researchers view their academic jobs as relatively free from authority; their relationships are associational rather than bureaucratic. There is a trend toward accountability; however, there generally is no way to effectively measure research productivity by conventional methods. The value of inputs cannot be directly compared with that of outputs. In this study evaluation means measuring achievement by utilizing controls devised and applied by the researcher to increase his personal effectiveness. The proposed control mechanism is designed to (1) define final and intermediate goals of the research project in terms of precise knowledge levels, (2) designate 'points of no return' for each knowledge level and (3) select checkpoints that trigger status reports indicating probability of achieving the required knowledge levels before their points of no return are reached.
W75-04439

A FRAMEWORK FOR UNCERTAINTY MANAGEMENT IN WATER RESOURCES PLANNING,
Decision Sciences Corp., Jenkintown, Pa.
D. F. Blumberg, J. A. Orlando, and A. B. Shostak.
Army Engineer Institute for Water Resources, IWR Contract Report 74-9, October 1974. 42 p, 10 fig.

Descriptors: *Risks, Water resources, *Planning, *Management, *Methodology, *Decision making, Effects, Floods, Damages, Economic impact, Streams, Evaluation, Forecasting, Costs, Alternative planning, Feasibility, *Flood control, Benefits.
Identifiers: *Risk analysis, *Decision theory, Sensitivity, Environmental impact.

A study has been made to develop a methodology to explicitly consider uncertainties--uncontrollable and unanticipated eventualities--that can adversely affect water resource planning. The study attempts to broaden the planning process by considering the changing nature of the environment for water resource planning and to provide a more efficient way to recognize uncertainties and anticipate their impacts prior to a decision to implement any specific actions. The ultimate purpose is to provide an anticipatory procedure that will help the planner avoid, where possible, the adverse consequences of unanticipated events. The management of uncertainty in water resource planning introduces a major choice involving risk taking: delay action and pay more (in time and resources) to further reduce uncertainty/risk, or take action now and accept the presence of uncertainty/risk. Described is the methodology for: (a) making this choice, recognizing the vital importance of the manager's perception of, and willingness to take, risk; and (b) development of procedures for structuring uncertainty, having made this choice. In essence, the methodology provides a quantitative basis for trading off resources (time and cost) to gain information versus the acceptance of uncertainty/risk. An example flood control problem is given. (Bell-Cornell)
W75-04519

A TWO-DIMENSIONAL MULTI-STAGE PROGRAMMING MODEL: WITH APPLICATION TO RESERVOIR SYSTEMS,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 4A.
W75-04523

ADOPTION OF NETWORK TECHNIQUES IN THE PLANNING AND EXECUTION OF IRRIGATION AND POWER PROJECTS,
Hindustan Construction Col. Ltd., Bombay (India).
For primary bibliographic entry see Field 3F.
W75-04533

THE ROLE OF WATER AND LAND RESOURCES IN ALLEVIATING MALNUTRITION AND HUNGER IN ARID REGIONS,
Bureau of Reclamation, Washington, D.C.
G. G. Stamm.
Presented at Deserts and Arid Lands Symposium, AAAS-CONYCT, Mexico City, 16 p, June 25-27, 1973. 5 fig, 1 tab, 6 ref.

Descriptors: *Human resources, *Water resources development, *Arid lands, *Crop production, *Technology, Irrigation, Agriculture, Water management, Irrigation systems, Land resources, Land management.

The lack of development and crop production in many arid lands of the world is a result of the absence of local technical knowledge and capital needed to explore for and tap water supplies. The first step, assuming that development and utilization of natural resources in these areas is desirable, would be the formation of a positive public policy directed toward providing more adequately for people in these dry areas. An inventory of the human resources as well as the type and amounts of water resources present is also necessary. A critical factor is what type of development system will be used to augment water supplies. Alternatives might include conventional storage and conveyance facilities, weather modification, sea or brackish water conversion, geothermal water production, increasing efficiencies of present systems of ground and surface water supplies, and transbasin water diversion. Trends indicate a rapidly increasing amount of malnutrition and hunger will prevail placing greater demands for world food production. Water development in arid areas is possible with present technologies, and consideration should be given to development of these areas to prevent migration to the already overburdened population centers and as a means of increasing world food supplies. (Mastic-Arizona)
W75-04603

ENGINEERING A VICTORY FOR THE ENVIRONMENT: A CITIZEN'S GUIDE TO THE U.S. ARMY CORPS OF ENGINEERS,
nstitute for the Study of Health and Society, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04755

THE URBAN REGION PLAN: SAINT JOHN, NEW BRUNSWICK), URBAN REGION IMPACT STUDY.
Proctor, Redfern, Bousfield and Bacon, Saint ohn (New Brunswick).
Draft copy. February, 1971. 288 p, 3 plates, 32 tab, append.

Descriptors: *City planning, *Comprehensive lanning, *Regional development, Governments, Land uses, *Regional analysis, Future planning, Canada, Cities, Urbanization, Education, Ecology, Highways.
dentifiers: Saint John, New Brunswick(Can), Kennebecasis River(Can), Saint John River(Can), Urban centers.

The first part of this report, The Region: Data Collection and Analysis, includes topographical and hysiographical features, population trends, employment distribution, present land uses, wildlife, gricultural production, recreation areas, and reional service facilities. Examination of potential egional water supply sources concludes that the Kennebecasis and/or Saint John Rivers could proide a water supply for the ultimate needs of the rea. Environmental quality of both water and air s analyzed. Municipal organization, finances, and ransportation systems and changing life styles are iscussed. Regional population projections inicate growth to 185,000 by 1987 for the Saint John Metropolitan Area. The Urban Region Plan (Part I) develops a concept to permit orderly growth, conomic and efficient provision of facilities and ervices, and the least disruption of the regional cology and rural economy. Principles incorporated are: concentration of urban uses in elected locations, linking centers with a network f high speed roads; and maintenance of a balance ith the environment. Existing situations, requireents and recommendations are presented for rban centers, open space network, water and ewerage systems, highway systems and educaon. (Salzman-North Carolina)
W75-04756

LANNING FOR WATER QUALITY IN THE EAR RIVER SYSTEM IN THE STATE OF TAH.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W75-04757

COMPREHENSIVE PLAN FOR WATER, EWER AND STORM DRAINAGE IN THE OWER RIO GRANDE VALLEY, (VOLUME II).
Nelson (B.L.) and Associates, Inc., Dallas, Tex.
For primary bibliographic entry see Field 5D.
W75-04759

COMPENDIUM OF INFORMATION, (THE METROPOLITAN TORONTO AND REGION CONSERVATION AUTHORITY).
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario).
For primary bibliographic entry see Field 3D.
W75-04760

RE WE READY FOR A CLOSED SYSTEM OF WATER SUPPLY, TREATMENT, AND REUSE - TECHNOLOGY VS. PSYCHOLOGY,
Water Resources Bulletin, Vol 10, No 5, p 942-51, October, 1974. 4 tab, 6 ref.
For primary bibliographic entry see Field 5D.
W75-04761

LIVING CITY, (MELBOURNE, AUSTRALIA, REVIEW OF OPERATIONS, 1972-73).
Melbourne and Metropolitan Board of Works, (Australia).
For primary bibliographic entry see Field 3D.
W75-04762

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York, Research Committee on Distribution Systems.
Journal of the American Water Works Association, Vol 66, No 6, p 385-390, June, 1974. 45 ref.

Descriptors: *Research priorities, *Water distribution(Applied), *Distribution systems, *Management, *Water delivery, Consumptive use, Distribution, Distribution patterns, Natural resources, Pipelines, Supply, Utilities, Water control, Water costs, Water demand, Water storage, Water supply, Technology, Systems analysis, Design data, Design standards, Design criteria, Research and development, Planning, Project planning.
Identifiers: Automatic operational control, Network properties, System stress reduction.

It is difficult to justify investment in research and development to simply satisfy intellectual curiosity, so criteria should include an expectation of high cost-effectiveness and potential for widespread application of results. To establish a background for the research and applied development needs to be cited, basic procedures in planning, analysis, design and in automatic operational control are presented. Two broad programs were identified that probably would yield the greatest return on investment: (1) network properties and data requirements, and (2) system stress reduction. Effects of design expedients employed for simulation to approximate observed field conditions should be evaluated. Possibilities should be investigated for attenuating peak loads so that distribution-system component size could be reduced, thereby prolinging the life of existing facilities. Distribution planning is not the only realm in which attention is at a disparate scale to investment, but investment in distribution facilities represents over half of total water-utility costs. Other needs identified include: the role of water service in reviving declining communities, planning emergency service, hypothetical alternative designs of water services, determination of kinds and amounts of data needed for modeling, development of methods for system analysis, and development of methods for optimal operation of existing systems. (Grden-North Carolina)
W75-04763

COMPREHENSIVE WATER AND SEWER PLAN FOR ALAMANCE COUNTY, NORTH CAROLINA,
Freeman (William F.) Associates, High Point, N.C.
For primary bibliographic entry see Field 5D.
W75-04765

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

DIFFERENCES BETWEEN PLANNED AND ACTUAL COSTS AND BENEFITS IN SMALL WATERSHED DEVELOPMENT,
Economic Research Service, East Lansing, Mich. Natural Resource Economics Div.
For primary bibliographic entry see Field 4D.
W75-04433

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5G.
W75-04526

ENFORCEMENT ECONOMICS IN AIR POLLUTION CONTROL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W75-04569

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04571

ECONOMIC DISINCENTIVES FOR POLLUTION CONTROL: LEGAL, POLITICAL, AND ADMINISTRATIVE DISINCENTIVES,
Environmental Law Inst., Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04576

AN ASSESSMENT OF WET SYSTEMS FOR RESIDENTIAL REFUSE COLLECTION: SUMMARY REPORT,
Curran Associates, Inc., Northampton, Mass.
For primary bibliographic entry see Field 5D.
W75-04577

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX E--COMMERCIAL NAVIGATION.
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-04601

TV INSPECTIONS SLASH SEWER COSTS $300 PER REPAIR,
St. Louis Metropolitan Sewer District, Mo.
For primary bibliographic entry see Field 5G.
W75-04830

ECONOMICS, (LITERATURE REVIEW),
Georgia Inst. of Tech., Atlanta, Ga. Envrionmental Resources Center.
For primary bibliographic entry see Field 5G.
W75-04846

6D. Water Demand

WATER: CANADIAN NEEDS AND RESOURCES,
For primary bibliographic entry see Field 6B.
W75-04359

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04360

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
For primary bibliographic entry see Field 3B.
W75-04508

A REGIONAL MODEL OF THE FUTURE DEMAND FOR TRANSPORTATION: THE CASE OF BARGE TRANSPORTATION,
Institute for Water Resources (Army), Alexandria, Va.
For primary bibliographic entry see Field 6A.
W75-04520

DEMAND FOR IRRIGATION: A CASE STUDY OF GOVERNMENT TUBE-WELLS IN UTTAR PRADESH,
Institute of Economic Growth, Delhi (India).
B. D. Dhawan.
Indian Journal of Agricultural Economics, Vol 28, No 2, p 59-67, April-June 1973. 4 tab, 1 ref.

Descriptors: *Water demand, *Irrigation water, *Elasticity of demand, *Linear programming, Governments, Least squares method, Water policy, Prices, Rainfall, Hydrologic data, Agriculture, Estimating, Equations, Mathematical models, Systems analysis, Time series analysis.
Identifiers: *Tube-wells, *India(Uttar Pradesh), *Multiple regression analysis, Crop pattern, Time series data.

Presented are some estimates of elasticity of demand for irrigation water with respect to four variables: (1) price of farm output; (2) price of irrigation water; (3) normal rainfall; and (4) deviation from normal rainfall. A single-eq(uation linear multiple regression model applied to the time series data in respect of State tube-wells in Uttar Pradesh is described. The model is estimated by the least squares method; the estimates suffer from the single-equation bias of an unknown magnitude. This study provides a basis for important policy implications: (1) The level of tube-well utilization is more sensitive to agricultural prices than to the prices of tube-well water: (2) irrigation water is seriously under-priced in India, with the Government incurring substantial losses in running the irrigation projects, and State tube-wells are no exception in this regard; (3) irrigation rates in relatively high rainfall areas must be relatively high for efficient utilization of the irrigation potential; and (4) the elastic relation between deviation from normal rainfall and demand for irrigation water suggests that large annual fluctuations in revenue receipts of a project can be dampened only be introducing an element of fixity in water rates: the introduction of a two-part tariff for tube-well water is a step in the right direction. (Bell-Cornell)
W75-04529

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
D. A. Quan.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 411, $4.25 in paper copy, $2.25 in microfiche. MSc Thesis, December 1973. 50 p, 20 tab, 28 ref, append. OWRT B-009-WYO(1).

Descriptors: *Wyoming, *Forecasting, *Water demand, *Water requirements, *Estimating, *Computer programs, Data collections, Computer models, Statistics, Municipal water, Water utilization, Sprinkling, Mathematical models, Systems analysis.
Identifiers: Sensitivity.

Reported is a project which tested the applicability of the MAIN II (Municipal and Industrial Needs) Water Forecasting System to five Wyoming, fairly typical western, communities: Cheyenne, Casper, Glenrock, Rock Springs, and Green River. MAIN II is a complex computer program that applies a number of equations to forecasting water demands and a library of water usage coefficients; for estimating water requirements, it employs mathematical models, unit use coefficients, and per capita coefficients. Errors found in the MAIN II program were corrected, and the program was modified to fit the existing data. Certain kinds of data were difficult to obtain for the five communities. Using a base year, forecasts were made and compared with actual water demands. Three optional MAIN II projection methods were tested: internal growth modeling, historical extrapolation of data, and external projection. Results showed the latter two methods to be fairly reliable. The internal growth models were not representative of Wyoming cities due to the atypical growth patterns of Wyoming communities as compared to those of the nation as a whole. Wyoming communities obtain their new water supplies from groundwater sources or by purchasing agricultural surface water rights from streams. The incremental cost for new water is considerable, and financially, therefore, it is vital to the community to be able to forecast water demands in advance of the needs as accurately as possible. (Bell-Cornell)
W75-04541

THE URBAN REGION PLAN: SAINT JOHN, (NEW BRUNSWICK), URBAN REGION IMPACT STUDY.
Proctor, Redfern, Bousfield and Bacon, Saint John (New Brunswick).
For primary bibliographic entry see Field 6B.
W75-04756

ARE WE READY FOR A CLOSED SYSTEM OF WATER SUPPLY, TREATMENT, AND REUSE - TECHNOLOGY VS. PSYCHOLOGY,
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.
For primary bibliographic entry see Field 5D.
W75-04761

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York, Research Committee on Distribution Systems.
For primary bibliographic entry see Field 6B.
W75-04763

THE DESIGN AND PROMOTION OF A SCHEME USING MIXED WATER FROM THE RIVERS ANCHOLME, WITHAM AND TRENT FOR INDUSTRIAL SUPPLY TO HUMBERSIDE,
Rofe, Kennard and Lapworth, London(England).
For primary bibliographic entry see Field 3E.
W75-04764

6E. Water Law and Institutions

DELAWARE RIVER BASIN COMPACT: A REVIEW WITH RESPECT TO ENVIRONMENTAL QUALITY,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
A. L. Strong, J. C. Keene, J. Hillsberg, F. Uthman, and M. Aspin.
April 1, 1971. 95 p, 3 fig, 4 tab, 120 ref.

Descriptors: *Water management(Applied), *Delaware River Basin Commission, *Interstate commissions, *River basin commissions, Water resources, *Delaware River, *Wetlands, Water pollution, Abatement, Delaware, Maryland, New York, New Jersey, Riverbasins, Water pollution treatment, Water pollution sources, Water pollution effects, Water policy, Water supply, Water quality standards, Water resources development, Reviews, Comprehensive planning, Management, Aquatic environment, Marshes, Flood plains.
Identifiers: *Delaware River Basin Compact, Regulatory power, Wetlands protection, Acquisition power.

An assessment of the Delaware River Basin Commission's (DRBC) progress and determination of its long-range needs is presented, including a discussion of its environmental enhancement and protection adequacy, power to abate and control pollution, methods to fund programs, and adequacy of enforcing powers. In the Delaware River basin, the existence and functioning of flood plains, marshes, and other wetlands are threatened by development, either directly or consequentially. No technique has yet been prefected to compare the value of water resource functions of the wetlands with the value of development that conflicts with these functions. This measuring technique is urgently needed. Meanwhile, the importance of these areas is established and warrants rapid, stringent action for their protection. DRBC has adequate planning and acquisition powers to protect the wetlands, but money for acquisition is not yet available. Ahigh priority is placed on protection of the water resource functions of the wetlands. Other suggestions for new DRBC involvement include planning, project review, indirect and direct regulation, stimulating action by other units of government, and various forms of purchase. However, the nature of the Commission depends on action by the federal government and the four states of New York, New Jersey, Pennsylvania and Delaware. (Grden-North Carolina)
W75-04361

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4D.
W75-04362

COMPLYING WITH DISCHARGE REGULATIONS,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04431

AN EVALUATION OF STATE LAND USE PLANNING AND DEVELOPMENT CONTROL IN THE ADIRONDACKS,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
M. K. Heiman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 403, $3.75 paper copy, $2.25 microfiche. Cornell University Water Resources and Marine Sciences Center, Ithaca, Technical Report No 93, 22 p, 3 tab, 2 fig, appendx. OWRT A-049-NY (2), 14-31-0001-4032.

Descriptors: *Land use, *Planning, *Regional development, *Local governments, *Land development, *Parks, State governments, Administration, Evaluation, Constraints, Land resoures, Rural areas, Resource allocation, Human population, *New York.
Identifiers: *Adirondacks(N.Y.), Adirondack Park Agency(N.Y.), *Administrative agencies, *State policies, Compliance theory, Local compliance, Towns.

A regional resource planning and regulatory agency must be able to recognize the significance of local involvement to its survival and performance. The organizational theory and compliance nomenclature presented by Amitui Etzioni ('A Comparative Analysis of Complex Organizations' 1961) offers the agency a useful means by which to conceptualize its relationship with local governments, determine resource allocation schemes and assess its own performance. Recognition by an agency of the variation in local response to its programs and policies and of the variables predicting the nature of local involvement, would enable it to modify its involvement with local governments in a manner encouraging that compliance structure most amenable to agency goal attainment. Since State interest had historically been firmly established in the Adirondacks, thus paving the way for intervention, the policy issues associated with State-level land use control efforts have tended to emerge earlier in this region than elsewhere. Examining New York State's effort to institute land use regulations in the Adirondacks, those specific variables predicting the nature of town compliance were delineated. Agency performance was evaluated and potential constraints on long-range success were discussed.

W75-04445

AN IN-DEPTH LOOK AT FEDERAL POLLUTION CONTROLS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5G.
W75-04544

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6A.
W75-04558

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04571

USED OIL LAW IN THE UNITED STATES AND EUROPE,
Environmental Law Inst., Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04575

RAILROAD AND CANAL COMPANIES--EMINENT DOMAIN (AS AMENDED),
Florida Sess. Laws, Vol 1, Ch. 74-47, p 44-45, approved May 17, 1974, effective immediately (1974). 2 p.

Descriptors: *Railroads, *Canals, *Eminent domain, *Condemnation, Legal aspects, Economics, Bridges, Lakes, Streams, Rivers, Gulfs, Oceans, *Florida, Legislation, Governments, Land use, Natural resources, Water law, Water resources development, Commerce, Compensation, Water management(Applied), Land management, Adoption of practices.
Identifiers: State policy, *Inverse condemnation.

This act relates to the special powers granted by the Florida legislature to railroad and canal companies. Any railroad or canal company which is or may become public carrier may condemn land surrounding any extension or terminal facility on any of the waters of any lake, river, bay, gulf or ocean. This condemned land may be used for depots, yards, switches, turntables, shops and storehouses. The carriers also have been granted the power to condemn any area in and over the waters for use as docks, wharves, elevators, ware or store houses, and all required facilities for the reception, retention, transfer, and forwarding of commerce. All enumerated rights shall be subordinate to the right of the governmental entity wherein the property is located to condemn said property through the exercise of its powers of eminent domain for a public purpose. (Proctor-Florida)
W75-04580

ENVIRONMENTAL LAND AND WATER MANAGEMENT ACT--AMENDMENTS,
For primary bibliographic entry see Field 5G.
W75-04581

COASTAL MAPPING ACT,
Florida Sess. Laws, Vol 1, Ch. 74-56, p 56-61, approved May 20, 1974, effective July 1, 1974. 6 p.

Descriptors: *Maps, *Florida, *Legislation, Recreation, Navigation, Administration, Administrative agencies, Planning, State governments, Boundaries(Property), Land tenure, Standards, Adoption of practices, Measurement, Monitoring, Legal aspects, Water law, Water policy, Public lands.
Identifiers: *Coastal zone, *Mean high water line, State policy, Coastal zone management.

Accurate maps of coastal areas are required for many public purposes, including but not limited to the promotion of marine navigation, the enhancement of recreation, the determination of coastal boundaries, and the implementation of coastal zone planning and management programs by state and local governmental agencies. The Legislature recognized the desirability of the confirmation of the mean high water line as the boundary between Florida state sovereignty land and uplands subject to private ownership. Uniform standards and procedures need to be developed with respect to the establishment of local tidal datums and the determination of the mean high-water and mean low-water lines. The powers and duties of the Florida Department of Natural Resources are spelled out including the responsibility of providing a comprehensive and continuous program of coastal boundary mapping which will permit accurate surveys. Upon the completion of a map or series of maps, a copy of the map is transmitted to the circuit court. Before a map becomes effective, the department is to hold a public hearing in the county where the land is located. (Sperling-Florida)
W75-04582

COASTAL RESOURCES MANAGEMENT AND CONSERVATION REPORT PUBLISHED,
For primary bibliographic entry see Field 2L.
W75-04583

WATER QUALITY MANAGEMENT BASIN PLANS REGULATIONS ADOPTED,
For primary bibliographic entry see Field 5G.
W75-04584

EPA EFFORTS TO END FEEDLOT MANURE POLLUTION CRITICIZED,
For primary bibliographic entry see Field 5G.
W75-04585

EPA TO ISSUE IMPACT STATEMENTS ON SOME REGULATORY ACTIONS,
For primary bibliographic entry see Field 5G.
W75-04586

PERMIT PROVISIONS ADOPTED FOR OCEAN WATER ACTIVITY,
For primary bibliographic entry see Field 5G.
W75-04587

ZAHN, ET AL. V. INTERNATIONAL PAPER CO. (CLASS ACTION SEEKING DAMAGES FROM DISCHARGES),
1 Pollution Control Guide, Vol 3, paragraph 15025, p 15223-15232, 1974. 10 p.

Descriptors: *Judicial decisions, *Adoption of practices, *Legal aspects, *Jurisdiction, *Adjudication procedure, Water pollution, Lakes, United States, Federal government, Economic aspects, Water pollution sources, Water law, Legislation, Water quality control, Legal review, Federal jurisdiction, *New York, *Vermont.
Identifiers: Standing(Legal), Class action suits.

A class action suit was brought by owners and renters of Vermont property on Lake Champlain against a New York State pulpmill for having discharged wastes from its plant which polluted the lake. Damages were alleged based upon the depreciation of the value and the decrease of utility of plaintiffs' properties. The United States Supreme Court held that the failure of the unnamed class members to satisfy the minimum jurisdictional amount requirement for suits in the federal courts requires dismissal of the class action as to those persons. Even though the named plaintiffs satisfied the jurisdictional amount, $10,000, if the court concludes it is not feasible to define a class of property owners each of whom had such a claim, the Court may properly refuse to permit the suit to proceed as a class action. Aggregation of claims to satisfy the jurisdictional amount is not permitted. Any plaintiff who fails to satisfy the jurisdictional amount must be dismissed from the case, even though other individuals allege jurisdictionally sufficient claims. (Sperling-Florida)
W75-04588

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 4, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04589

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE, OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 5, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04590

MONTGOMERY ENVIRONMENTAL COALITION, ET AL. V. FRI, ET AL. (SEEKING DECLARATORY RELIEF FROM FURTHER SEWER HOOKUPS ON POTOMAC).
For primary bibliographic entry see Field 5G.
W75-04591

EPA POLICY ON INJECTION WELLS.
For primary bibliographic entry see Field 5G.
W75-04592

E.P.A. POLICY TO PROTECT THE NATION'S WETLANDS.
For primary bibliographic entry see Field 5G.
W75-04593

WATER QUALITY STANDARDS: THE FEDERAL PERSPECTIVE--PROGRESS TOWARD OBJECTIVES,
For primary bibliographic entry see Field 5G.
W75-04595

WATER QUALITY CONTROL--THE ROLE OF THE INTERSTATE AGENCY,
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 5G.
W75-04596

AMENDING THE ACT OF JULY 4, 1955, AS AMENDED, RELATING TO THE CONSTRUCTION OF IRRIGATION DISTRIBUTION SYSTEMS.
Committee on Interior and Insular Affairs (U.S. Senate).
Senate Report No. 1244, 92nd Cong, 2d Sess. (1972).

Descriptors: *Irrigation, *Water distribution(Applied), *Legislation, *Drainage systems, *Government finance, Construction, Water supply, Legal aspects, Water reuse, Distribution systems, Federal government, Irrigation systems, Water conveyance, Water utilization, Water law, Administrative agencies, Administration.
Identifiers: Administrative regulations, *Congressional hearings.

The purpose of a bill relating to the construction of irrigation distribution systems is to amend the existing reclamation distribution system loan program. The amendment will bring irrigation drainage works and municipal and industrial water

supply works within the existing program. Also, the requirement for the transfer of title of lands to the United States for the duration of the loan has been deleted. The Distributions Systems Loan Act was enacted originally to provide a reclamation project, that has been authorized for construction by the Bureau of Reclamation, the local irrigation district, or other non-federal public entity, with a federal loan to construct the facility. In the seventeen years this program has been operating, eleven loans totalling seventy-four million dollars have been made. The committee unanimously endorses enactment of this bill. (Sperling-Florida)
W75-04597

AQUATIC PLANT CONTROL.
Florida Sess. Laws, Vol 1, Ch 74-65, p 69-71, approved May 23, 1974, effective July 1, 1974. (1974) 3 p.

Descriptors: *Legislation, *Florida, *Aquatic weed control, *Aquatic life, Submerged plants, Natural resources, Water supply, Water resources, Water resources development, Federal agencies, Jurisdiction, Governments, Water law, Water pollution, Water pollution sources, Governmental interrelations, Administrative agencies, Weed control, Aquatic weeds, Biocontrol, Water quality control.
Identifiers: *State policy, Environmental policy.

This Act broadens the authority of the Florida Department of Natural Resources in controlling non-indigenous aquatic plants in the state. State participation on a matching basis with local agencies in funding non-indigenous aquatic plant maintenance programs is encouraged. The Act provides for annual reporting and fiscal accounting. The Department of Natural Resources is authorized to cooperate with the federal government in programs to control the growth of non-indigenous aquatic plants and other noxious aquatic plants. Cooperation between the Department of Natural Resources and the Game and Fresh Water Fish Commission in carrying out various plant control and maintenance functions is permitted. Included in the Act are definitions and a section relating to legislative intent. (Sperling-Florida)
W75-04599

FLOOD DISASTER PROTECTION ACT OF 1973.
For primary bibliographic entry see Field 6F.
W75-04600

EFFECT OF FEEDLOT LAWS AND CLIMATE ON OPEN FEEDLOT WASTE MANAGEMENT,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-04630

EPA PREPARING TO 'RAILROAD' THROUGH NEW POLLUTION RULES COVERING CATTLE FEEDLOTS,
For primary bibliographic entry see Field 5G.
W75-04639

A BRIEF HISTORICAL SURVEY OF FREEDOM OF THE SEAS,
P. Dees.
In: Sea Grant Publication UNC-SG-73-01, p 1-17, March, 1973. 88 ref.

Descriptors: *International law, *Law of the Sea, *International waters, *Foreign trade, *Oceans, Continental shelf, Geology, Navigation, Continental slope, Civil law, Common law, Jurisdiction, Governments, Treaties, Foreign waters, Resources development, Ships.
Identifiers: *Coastal zone management, International agreements, Territorial seas(Jurisdiction), Territorial waters.

From ancient times freedom of the seas has been enforced to maintain unrestricted commercial intercourse. The first maritime codes were the Hellenic Mare Clausum, the Rodian Sea Law adopted by the Romans in 51 B.C. and the Byzantine emperor Justinian's maritime provisions in Corpus Juris Civilis. With the advent of the Age of Discovery Most maritime nations were claiming sovereignty over parts of the open seas. Some influential persons, including Queen Elizabeth I and the Dutch legal scholar Grotius, protested this threat to international maritime freedom. Grotius is the acknowledged 'Father of International Law' for his work Mare Liberum. Although his ideal of freedom of the open sea was heatedly contested, steady progress was made toward that ideal and it was universally recognized by the beginning of the nineteenth century. It has evolved that the open seas are the territory of no state and therefore not subject to any state's legislation, administration, jurisdiction or police over parts of the open sea. The foundation of this doctrine is based on one of two mutually exclusive legal theories: first, the sea belongs to no one (res nullis) or second, the sea belongs to everyone (res communis). (Dillingham-Florida)
W75-04648

CRISIS IN THE SOUTH PACIFIC: TUNABOAT SEIZURES,
J. W. Abel.
In: Sea Grant Publication, UNC-SG-73-01, p 18-28, March 1973. 47 ref.

Descriptors: *International law, *International commissions, *Commercial fishing, *Treaties, *International waters, Law of the sea, Foreign trade, Governmental interrelations, Foreign waters, Fishing, Trespass, Water law, Penalties(Legal), Navigation, Oceans, Boundary disputes, Jurisdiction, Governments, Ships.
Identifiers: *Territorial seas(Jurisdiction), International agreements, *Territorial waters.

An area of major contention in international law is the breadth of a coastal nation's territorial waters. All attempts at codification of a generally accepted breadth of the territorial sea have failed. Thus claims range from a two-hundred mile to a three-mile limit. Chile, Ecuador, Peru and eight other Latin American (C-E-P) states have claimed a two-hundred mile territorial sea. This provoked the Truman Proclamations (1945) that sea and seabed resources contiguous to the United States might be subject to U.S. jurisdiction. C-E-P argues that the historical trend, economic self-preservation, and lack of established principles backup their claim of a 200-mile limit. The United States asserts these claims violate international conventions and established principles. The C-E-P states from 1961 to 1971 have seized 145 tuna vessels. This has resulted in great losses for the U.S. fishing industry, which is entitled by the Fisherman's Protective Act (FPA) to enter the territorial waters of another sovereign if in pursuit of tuna. The FPA contains provisions for the use of sanctions against foreign nations seizing U.S. vessels. (Dillingham-Florida)
W75-04649

JURISDICTION IN NATIONAL WATERS,
L. Allison.
In: Sea Grant Publication, UNC-SG-73-01, p 29-42, March, 1973. 104 ref.

Descriptors: *Jurisdiction, *International law, *Law of the sea, *Treaties, *Internal water, Foreign waters, International waters, Tariff, Water law, Public health, Sanitation, Ships, Harbors, Navigation, Straits, Inland waterways, Governmental interrelations, Oceans, Trespass, Penalties(Legal), Regulation, Foreign trade, Law enforcement.
Identifiers: *International agreements, *Territorial waters, Territorial seas(Jurisdiction).

There is a large body of laws concerning a coastal state's jurisdiction over foreign ships in its internal and territorial waters. Commercial ports are open to foreign ships though military bases are not. The 1958 Geneva Convention provided that internal waters are subject to the particular laws of the coastal state. For unlawful acts concerning only the internal order the coastal state of the ship may yield its jurisdiction to that of the ship's flag state. In a maritime claims case a municipal court has the power to detain a foreign merchant ship and attach it as security for the claim. Navigation and navigational aides to ships are under the control of the coastal state. A coastal nation exercises absolute police, customs regulation and revenue collection powers in its territorial waters, subject only to the right of innocent passage. Certain countries, the U.S.S.R. and the Peoples Republic of China included, generally follow these guidelines but occasionally overstep them. Other nations use their control of their territorial waters as an extension of foreign policy to sanction another nation by denying the other's vessels even innocent passage. The Arab States deny Israel access to the Straits of Tiran and Canada wishes to deny U.S. oil tankers passage to the North American Archipelago for fear of oil spills. (Dillingham-Florida)
W75-04650

AUTHORIZATION FOR SECRETARY OF INTERIOR TO ACQUIRE ADDITIONAL WETLANDS.
Committee on Merchant Marine and Fisheries (U.S. House).
H.R. Report No. 9823, 93d Cong, 1st Sess (1973).

Descriptors: *Federal government, *Legislation, *Government finance, *Adoption of practices, *Wetlands, Wildlife conservation, Administrative agencies, Administration, Economics, Inter-agency cooperation, Planning, Aquatic habitats, Land ownership, Land use, Right-of-way, Ecology, Water law, Water policy, Water management(Applied).
Identifiers: *Administrative regulations, *Congressional hearings.

The bill authorizes the Secretary of the Interior to issue certain obligations and to utilize the revenues to acquire additional wetlands. The wetlands to be acquired include additional waterfowl nesting and breeding grounds. The Secretary of the Interior is authorized to issue, and have outstanding, obligations which mature in less than ten years. The obligation shall bear such rate or rates of interest as determined by the Secretary of the Interior and approved by the Secretary of the Treasury. These obligations may be redeemable at the option of the Secretary of the Interior before maturity. The Secretary is also authorized to purchase any outstanding obligations under this section at any time and at any price. All obligations issued by the Secretary pursuant to this act are to be deemed exempt securities within the meaning of laws administered by the Securities and Exchange Commission. (Sperling-Florida)
W75-04651

A BILL TO ASSURE SAFE DRINKING WATER.
H.R. Rep. No. 5368, 93d Cong, 1st Sess. 1974. 20 p.

Descriptors: *Water purification, *Federal government, *Inter-agency cooperation, *Legislation, *Potable water, Water quality standards, Law enforcement, Penalties(Legal), Civil law, Federal jurisdiction, Regulation, Water quality, Water utilization, Water pollution, Water policy, Public health, Water distribution(Policy), Administrative agencies, Domestic water, Consumptive use, Water distribution(Applied), Water management(Applied), Adoption of practices, Water quality control.
Identifiers: *Administrative regulations.

This bill proposes to ensure safe drinking water by establishing standards of drinking water quality

nd by providing for adequate treatment, surveil-nce and maintenance of water treatment and dis-ibution facilities. The Environmental Protection gency shall establish primary standards to pro-ct public health and secondary standards to as-re esthetically appealing drinking water. The ates shall be responsible for enforcing the stan-rds. Willful violation and conviction will result either one year imprisonment or a $15,000 fine both per violation. Non-willful violation will be ble in a civil suit for not more than $10,000 per olation. Private citizens may commence a civil tion against any government agency for viola-n of the standards or for failure to perform any ty required by the Act. The Act provides for the PA to conduct research studies, and to render nancial and technical assistance to appropriate blic and private agencies conducting studies re-ted to drinking water quality and its effects. illingham-Florida)
75-04652

COMPENDIUM OF INFORMATION, (THE ETROPOLITAN TORONTO AND REGION ONSERVATION AUTHORITY).
etropolitan Toronto and Region Conservation uthority, Woodbridge (Ontario).
r primary bibliographic entry see Field 3D.
75-04760

HE BLOCKADE 'EXCEPTION' TO TERRI-ORIAL WATER JURISDICTION,
M. Martin.
: Sea Grant Publication UNC-SG-73-01, p 43-50, arch 1973. 42 ref.

escriptors: *Law of the sea, *Foregin trade, nternational law, *Governmental interrelations, ommon law, Legal aspects, Water law, Political pects, Jurisdiction, Governments, Navigation, eans, Foreign waters, Export, Import, Federal vernment, Foreign countries, Water policy, In-rnational waters.
entifiers: *Territorial seas(Jurisdiction), Coastal aters.

he international law of naval blockade is a curi-s exception to the basic notions of national vereignty over territorial seas, in that it permits e preemption of the adjacent state's right of ju-diction. Considered are the historical develop-ent of the naval blockade, its place within the mmon law, its use as an instrument of warfare d diplomacy, and its relevance to modern inter-tional law. The traditional common law doctrine blockade has lost most of its relevance and has en subsumed within international law. The two ost recent applications of the blockade by the ited States, the blockade of Cuba in 1962, and e 1972 blockade of North Vietnam, are used to ustrate the evolution of the blockade from a sim-e military tactic to an instrument of diplomatic pression. Modern technology has made it vir-ally impossible to maintain an effective shore ockade and still comply with internation law. odern blockades depend on having enough mili-y power to disregard the rule of law. Blockades the future will follow the style of the Cuban and etnamese blockades. (Deckert-Florida)
75-04766

HE INTERNATIONAL SEABED REGIME: ROPOSALS AND PROSPECTS FOR REALIZA-ON,
M. Neal, Jr.
: Sea Grant Publication, UNC-SG-73-01, p 75-, March 1973. 58 ref.

escriptors: *Beds under water, *Oceans, wnership of beds, Jurisdiction, Water law, eology, Submerged lands, International law, ited Nations, Regime, Bottom sediments, Min-g, Mineral industry, Mining engineering, Inter-tional water, Governmental interrelations, doption of practices, Regulation, Enforcement.
Identifiers: *Seabed mining, *International agreements.

The prospective development of an international seabed regime to regulate international use of the ocean floor is discussed. The regime is chiefly concerned with the commercial aspects of seabed development, mining being of foremost interest. Due to the new developing capital technology and the bugeoning population, the earth's natural resources are being depleted, and man must look for new sources of raw materials. Because interest in the deep seabeds as a source of raw materials is increasing, there has emerged a great need for the establishment of applicable law. In 1968 the United Nations declared that seabed exploitation should be carried out for the benefit of mankind. The General Assembly has more recently buttressed this stand by refusing to honor national ownership of seabed areas, and terming it an international area. In 1974, a Law of the Sea Conference is to be convened to establish international machinery for seabed regulation. All countries taking part agree that in general mankind should benefit. The Conference, however, may be cancelled for a general lack of preparation. Problems with reference to seabed development are great. Questions exist as to the relation of the international seabed and the respective authority of related agencies comprising the seabed regime. (Sperling-Florida)
W75-04767

THE MARINE ENVIRONMENT AND TOXIC SUBSTANCES (WHEN WAS THE LAST TIME YOU HAD A GOOD SWORDFISH STEAK),
B. W. Pittman.
In: Sea Grant Publication, UNC-SG-73-01, p 82-97, March 1973. 67 ref.

Descriptors: *Water pollution, *Oceans, *International law, *Legal aspects, *Adoption of practices, Water law, Oil pollution, Heavy metals, Pesticides, Ecology, Environmental effects, Jurisdiction, Government, Water resources, Biota, Water pollution sources, Water quality, Water quality control, Marine fisheries, Evaluation, Pollution abatement.
Identifiers: International agreements, *Territorial waters, Territorial seas(Jurisdiction).

Man knows little about the ocean's vital resources, and he creates serious problems of marine pollution, particularly with respect to the impact of toxic substances on the marine biota. The problem of marine pollution is both national and international in scope. Most of the pollution of prime marine habitat is caused by land-based activities such as industrial and domestic waste disposal. Effects, however, are not local. Ocean currents and atmospheric conditions tend to cause pollution created by one nation to invade the territorial waters of other nations. Oil, heavy metals, and chlorinated hydrocarbons are the principal sources of pollution. Other sources include dumping, shipping and man's exploitation of marine resources. These pollutants have both short and long term adverse effects. The building of an applicable legal system for protecting the sea may be started by national legislation. Each nation must assume the responsibility of enforcing pollution regulations within its territorial waters. Unilateral action alone will not suffice. International solutions must be found. Several international organizations have been created to research the marine problem. Longterm solutions must include public education, a redirection of world thinking and a study of the population explosion. (Sperling-Florida)
W75-04768

THE DISPOSAL OF RADIOACTIVE WASTES INTO THE SEA: SOME INTERNATIONAL LEGAL CONSIDERATIONS,
G. A. Planer.
In: Sea Grant Publication UNC-SG-73-01, p 98-107, March 1973. 26 ref, 2 append.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, *Water pollution sources, Industrial wastes, Economics, Safety, Radioactivity techniques, International law, Environmental control, Population, Productivity, Environmental effects, Radioactivity effects, Environmental sanitation, Disposal, Waste disposal, Waste storage, Federal jurisdiction, Oceans, Lakes.
Identifiers: *International agreements, *Absolute liability, *Hazardous substances(Pollution).

The development and increasing use of nuclear energy for the generation of electric power, and the expanding applications or radioisotopes in research, industry and medicine, are unavoidably associated with the production of unwanted by-products in the form of complex mixtures of radioactive elements. These by-products, called fission products, present serious problems in terms of their safe disposal. The most important consideration in the treatment of such waste is preventing its return to the environment and injuring man either directly through contact or indirectly through contamination of the food and water supplies. The economic pressure to increase release of contaminants into the environment and to treat as little of the wastes as possible has to be countered by safety considerations which limit the quantity that can be released safely. Two main philosophies of waste disposing are in competition. The first is to concentrate and contain the gas, liquid, or solid waste in such a way that it is at all times under complete control. Harm to the environment or property resulting from release of radioactive contaminants might give rise to a theory of international absolute liability for non-complying nations. A second suggestion is that regulations should be formulated establishing disposal limits for each site individually instead of enacting blanket regulations governing all disposal sites. Recommendations are made to insure the safe disposal of radioactive wastes into both fresh waters and the seas. (Sperling-Florida)
W75-04769

THE LAW OF MARITIME OIL SPILLS,
J. Pendergrass.
In: Sea Grant Publication, UNC-SG-73-01, p 108-118, March 1973. 30 ref.

Descriptors: *Oil pollution, *International law, *Oceans, *Pollution abatement, *Environmental effects, Pollution, Sea water, Oil industry, International waters, Oil wastes, Water pollution sources, Water law, Jurisdiction, Oil spills, United Nations, Water pollution control, Pollution control, Adoption of practices, Waste disposal, Federal government.
Identifiers: *Energy crisis, International agreements, Territorial seas(Jurisdiction).

The problem of oil pollution and its demand for an international solution are described. In the present state of world technology, oil is the principal source of energy. As a result of irregular distributions of oil deposits, massive shipping has been required to transport oil to industrial nations from relatively underdeveloped countries containing the richest deposits of oil. The world's oceans are deteriorating under the increasing strain of oil discharges. Considering the present state of oil pollution and energy needs, a legal solution must be developed. The United Nations' Inter-Governmental Maritime Consultative Organization prepared a treaty to permit governments to deal with oil pollution consequences and another treaty dealing with the question of civil liability for oil pollution damage. After discussion, the representatives of the Organization chose absolute liability with certain defenses as the scheme for establishing responsibility and the owner as the entity on whom such liability is placed. Jurisdiction on civil liability allows an action based on pollution damage to be brought in the courts of the contracting states where damage has been sustained or preventative measures taken. In 1972 the London Convention sought to limit waste dumping at sea. (Sperling-Florida)

W75-04770

AFRICAN ATTITUDES TOWARD THE LAW OF THE SEA,
P. Carruth, Jr.
In: Sea Grant Publication UNC-SG-73-01, p 166-177, March 1973. 35 ref.

Descriptors: *Continental shelf, *Water resources, *Law of the sea, *Boundaries(Property), *Water resources development, Oil industry, Water law, Legislation, Political aspects, Economic aspects, Minerals, Governments, International law, Conservation, Fishing, Social aspects, Legal aspects, Natural resources.
Identifiers: *International agreements.

Nations along the Gold Coast of Africa, such as Ghana, have taken extra measures to protect the wealth that might lie beneath the waters on the extended continental shelf. The Ghana Fishery Conservation Zone presently extends twelve miles off the coast and the territorial continental shelf is restricted to a hundred miles. However, a 1968 law established the territorial seabed at 100 fathoms with an extension to a depth capable of exploitation. Control of coastal oil reserves is one of the possibilities contemplated in this action. The Ivory Coast has analogous legislation. Kenya, Tanzania, and Liberia all have laws similar to other coastal states, those retaining the twelve mile limit. The Nigerians changed their limit in 1971 from twelve miles to thirty. Massive aid for development and offshore oil deposits are said to have prompted this action. The Nigerian government thinks that it will be able to enforce this boundary and that the country is able to develop this resources in some way economically beneficial to Nigeria. Sea laws that deal with other than local territorial issues are virtually non-existent. (Sperling-Florida)
W75-04771

BILL TO ESTABLISH THE POTOMAC NATIONAL RIVER IN THE STATES OF MARYLAND, VIRGINIA, WEST VIRGINIA, AND THE DISTRICT OF COLUMBIA AND FOR OTHER PURPOSES.
H. R. Rep. No 12785, 93d Cong, 2d Sess. (1974).

Descriptors: *Rivers, *Adoption of practices, *Federal government, *Aesthetics, *Administrative agencies, Administration, Regulation, Virginia, West Virginia, Maryland, Wildlife conservation, Land tenure, Condemnation, State governments, Decision-making, Legislation, Administrative decisions, Eminent domain, Land management, Water resources development.
Identifiers: Administrative regulations.

This is a bill to establish the Potomac National River in the states of Maryland, Virginia, West Virginia, and the District of Columbia. The river and the adjacent land area possess unusual natural, scenic, historic, fish and wildlife, and recreational values. To effectuate this act the Secretary of the Interior is authorized to acquire by donation, purchase or transfer from any other federal agency, land or property interests in the area. The boundaries of the national river shall not include more than fifty thousand acres. Property owned by any state or political subdivision thereof may be acquired only by donation. Federal property located within the boundaries may, with the concurrence of the head of the administrating agency, be tranferred to the administrative jurisdiction of the Secretary without a transfer of funds. The Secretary's authority to acquire property by condemnation within the national river shall be suspended for five years. The Secretary may exclude from the suspension any properties under immediate threat of development. (Sperling-Florida)
W75-04772

SOIL CONSERVATION--ADMINISTRATION OF DEPARTMENTS AND CONSERVANCY DISTRICTS.
Iowa Legislative Service, House File 1178, Vol 3, p 292-297, approved May 27, 1974 (1974). 6 p.

Descriptors: *Iowa, *Legislation, *Adoption of practices, *Administration, *Erosion control, Soil conservation, Legal aspects, Soil erosion, Sediment control, Administrative agencies, Decision making, Erosion, Conservation, Land tenure, Regulation, Sedimentation, Sedimentation rates, Administrative decisions, Land management, Water resources development, Surface runoff.
Identifiers: *Administrative regulations, Notice, Nuisance(Legal aspects).

This act relates to the administration of the department of soil conservation, soil conservation districts and conservancy districts in Iowa. The commissioners of any soil conservation district will inspect any land within the district, upon the receipt of a signed complaint, from an owner or occupant of land being damaged by sediment, that soil erosion is occurring in excess of the limits established by the district soil erosion control regulations. If they find that sediment damages are occurring they will issue an administrative order to the landowner, and to the occupant of the land. The order will state as nearly as possible the extent to which soil erosion exceeds the limits established by the district's regulations. The commissioners and their agents have authority, after giving ten days written notice, to enter upon any land without consent to determine whether soil erosion is occurring in violation of the regulations. (Sperling-Florida)
W75-04773

WATERWORKS DEPARTMENT IN CERTAIN CITIES.
Acts of Indiana, Public Law No 81, S. 33, Approved February 21, 1974, Ch. 6.5, p 313-322 (1974). 10 p.

Descriptors: *Indiana, *Legislation, *Adoption of practices, *Administrative agencies, Budget, Contract administration, Decision making, Economic aspects, Eminent domain, Water supply, Water shortage, Public health, Safety, Treatment facilities, Water supply development, Water policy, Water yield, Water purification, Water quality control, Water quality standards.
Identifiers: *State policy.

This Indiana law concern's water works districts in certain cities under Waterworks Department. It defines powers and provides for the imposition of a tax and the issuance of bonds. A waterworks board will be created and composed of five persons appointed by the mayor. They will supervise the waterworks department, which is responsible for the management, control and operation of the filtration and delivery of water within the waterworks district. The waterworks department may prepare budgets for the district. The department may award contracts for the purchase of capital equipment or other property or for the construction of capital improvements. The department may exercise the power of eminent domain. The department will have power to act when it finds existing waterworks are insufficient to furnish a supply of water necessary to protect the public health and safety. The Department may also repair or construct new facilities as necessary. The board must provide an estimate of the cost, specifications, and a description of property rights which are to be acquired. (Sperling-Florida)
W75-04774

UNION OF CONCERNED SCIENTISTS V. ATOMIC ENERGY COMM'N. (REVIEW OF ORDERS OF AEC LICENSING NUCLEAR POWERPLANT).
499 F. 2d 1069 (D.C. Cir. 1974).

Descriptors: *Judicial decisions, *Legal aspects, *Nuclear powerplants, *Water cooling, *Regulation, Licenses, Standards, Thermal pollution, Adoption of practices, Water pollution sources, Engineering structure, Environmental engineering, Administrative agencies, Environmental effects, Design criteria, Specifications, Adjudication procedure, Federal government, Administrative agencies, Administrative decisions.
Identifiers: *Environmental impact statement, *Energy crisis, *Administrative regulations.

This case in the District of Columbia Court of Appeals was an action on petition for review of orders of the Atomic Energy Commission issuing an operating license for a nuclear power station. The court held that the atomic safety licensing board does not have an affirmative duty to evaluate the correctness, rather than the sufficiency of support for uncontested findings. By granting a full-power operating license for a nuclear power plant without first resolving challenges to the interim acceptance criteria for emergency core cooling systems, the commission did not deprive the environmental protection group of due process, violate its own regulations, or abuse its discretion. The commission, it was found, did not act unreasonably in the preparation of a final environmental impact statement prior to the issuance of a license, as well as in the interim acceptance criteria for emergency core cooling systems. (Sperling-Florida)
W75-04775

IN RE HIGHWAY US-24, IN BLOOMFIELD TOWNSHIP, OAKLAND COUNTY (HIGHWAY CONDEMNATION PROCEEDING).
220 N.W.2d 416 (S. Ct. Mich. 1974).

Descriptors: *Eminent domain, *Michigan, *Judicial decisions, *Legal aspects, Environmental control, Water pollution, Water quality, Water law, Legislation, Environmental effects natural resources, Water quality control, Conservation, Adoption of practices, State governments, Water quality standards, Adjudication procedure, Water resources development, Highways, Condemnation.
Identifiers: *Administrative regulations, *State policy.

The Circuit Court held the Highway Condemnation Act unconstitutional as denying due process of law. The Supreme Court reversed holding the Act not to be unconstitutional either as a denial of due process through lack of adequate standards or as a failure to comply with a Michigan constitutional requirement to protect the state's natural resources. The Michigan Constitution states that the legislature must provide for protection of water and other natural resources of the state from pollution, impairment, and destruction. The court, however, held that the legislature is not under a duty to specifically include environmental protection provisions in all relevant legislation. The Environmental Protection Act of 1970 is the chief legislative enactment which fulfills the legislature's duty under the state constitution to protect natural resources. (Sperling-Florida)
W75-04776

WATER POLLUTION--LIQUID WASTES (AS AMENDED).
For primary bibliographic entry see Field 5G.
W75-04777

PROCEDURAL METHODS FOR IMPLEMENTING COLORADO RIVER WATER CONSERVATION MEASURES.
Bureau of Reclamation, Washington D.C.
Federal Register, Vol 37, No 174, p 18076-18078, September 7, 1972.

Descriptors: *Regulation, *Colorado River, *Water conservation, *Boulder Canyon Project Act, Administrative agencies, Water distribu-

ion(Applied), Water resources, Water resources levelopment, Water utilization, Water delivery, Distribution patterns, Distribution systems, Water lemand, Water supply, Water requirements, Water contracts, Water law, Legal aspects, Water llocation(Policy), Water rights, Federal governnent, Planning.
dentifiers: Administrative regulations.

The principal purpose of this revision is to specifially include Indian reservations and federal stablishments in the group of water users equired to follow water conservation practices, nd to provide more positive language to ensure hat all water users are properly notified of deterninations and have an opportunity to appeal. The rocedures established shall apply to every public r private organization in Arizona, California or Nevada which, pursuant to the Boulder Canyon roject Act or to provisions of other Reclamation aws, has a valid contract for the delivery of Colorado River water, with certain exceptions. The Regional Director of the Bureau of Reclamaon shall consult with each user prior to making nnual recommendations relating to water conseration measures and operating practices in the iversion, delivery, distribution and use of Colorado River water. Consultations shall also recede the Regional Directors determination of ach user's estimated water requirements for the nsuing calendar year so that deliveries of Colorado River water under this program will not revent delivery of other authorized distributions. Ritchie-Florida)
W75-04778

MELIORATION OF EFFECTS OF OIL PILLS.
ouncil on Environmental Quality, Washington, .C.
or primary bibliographic entry see Field 5G.
W75-04779

ERGEN COUNTY SEWER AUTHORITY V. ACKENSACK MEADOWLANDS DEVELOPIENT COMMISSION (SEEKING DECLARATOY JUDGMENT THAT PLAINTIFF NOT SUBECT TO LAND USE REGULATIONS OF DEENDANT IN CONSTRUCTING ADDITION TO EWAGE PLANT).
24 A.2d 108 (Sup. Ct. N.J., 1974).

escriptors: *New Jersey, *Judicial decisions, Regulation, *Jurisdiction, *Land use, *Permits, ublic utility districts, Utilities, Water law, Legal spects, Administrative agencies, Administration, aw enforcement, Environment, Local governents, Environmental control, Land resources, eservation, Sewage treatment, Water pollution ources, Zoning control, Legislation, Non-structal altenatives, Legal review, Adoption of pracces.
entifiers: *State policy, *Injunctive relief, Administrative regulations, Declaratory dgment, Environmental policy.

aintiff public corporation brought action seeking declaratory judgment that it was not subject to e land use and building regulations promulgated the defendant, also a public corporation. The aintiff, without prejudice to any claim that the fendant lacked jurisdiction over the plaintiff, plied for and was granted a building permit and ning certificate by the defendant with respect to ditions being made to one of plaintiff's sewage eatment facilities. The plaintiff failed to comply th certain conditions attached to the permit and e defendant countered the plaintiff's action with request for injunctive relief against the violaons. Ruling on the defendant's motion, the Suior Court of New Jersey held that the plaintiff as clearly a county agency or instrumentality thin the mandate of the Hackensack eadowlands Act and thus was subject to the gulatory jurisdiction of the defendant. The court ued an injunction against further construction by the plaintiff in violation of the conditions imposed by the permit. (Deckert-Florida)
W75-04780

INCORPORATED VILLAGE OF CORNWALL V. ENVIRONMENTAL PROTECTION ADMINISTRATION OF THE CITY OF NEW YORK (VILLAGE SEEKING ANNULMENT OF WITHDRAWAL OF CONDITIONAL APPROVAL FOR INTERCONNECTION WITH AQUEDUCT FROM UPSTATE WATERSHED AND ISSUANCE OF FINAL APPROVAL OF APPLICATION).
358 N.Y.S.2d 459 (S. Ct. App. Div. 1974).

Descriptors: New York, *Judicial decisions, *Water supply, *Governmental Interrelations, *Legal aspects, Permits, Local governments, State jurisdiction, Regulation, Administration, Legislation, Electric powerplants, Water transfer, Reservoirs, Water conveyance, Water demand, Water allocation(Policy), Water distribution(Applied), Water law, Legal review, Water supply development, Municipal water, Aqueducts, Adjudication procedure, Water policy, Water management(Applied), Administrative decisions.
Identifiers: *Water rights(Non-riparians), *Administrative regulation.

Petitioner, municipality, sought to have the withdrawal of conditional approval for the petitioner's interconnection with the Catskill aqueduct by the respondent, municipal agency, appellant herein, annulled and sought to have the respondent required to issue final approval for the tie-in. The tie-in was required for the petitioner's planned transfer of its municipal reservoir to a private utility as part of the utility's plan for constructing an electric power plant. The petitioner had expended over one million dollars to effectuate the tie-in. The lower court granted the petition and appeal was taken. The appellant contended that it had the right to deny the petitioner's tie-in application. The Supreme Court of New York, Appellate Division, disagreed and affirmed the lower court ruling. The court ruled that the Water Supply Act did not give the appellant the right to deny the petitioner's application in order to keep it from transferring its reservoir to the utility, and the appellant could not collaterally attack a prior federal court judgment holding that the power plant project would not jeopardize the appellant's water supply. (Deckert-Florida)
W75-04781

HENDRIX, ET AL. V. CREEL, ET AL. (ACTION FOR INJUNCTION TO COMPEL MUNICIPAL CORPORATION TO CLEAR AND MAINTAIN DITCH).
297 So. 2d 364 (Ala. 1974).

Descriptors: *Alabama, *Judicial decisions, *Drainage, *Ditches, *Legal aspects, Surface runoff, Adjacent land owners, Water law, Land tenure, Repulsion(Legal aspects), Easements, Legal review, Surface waters, Streams, Real property, Overland flow, Runoff, Local governments, Drainage effects, Flood protection, Prescriptive rights, Common law, Public rights, Adjudication procedure.
Identifiers: *State policy, *Public trust doctrine.

Plaintiff landowners sought injunctive relief compelling the defendant municipality to clear and maintain a drainage ditch which ran across the properties of the plaintiffs and of the defendant adjacent landowners and to restrain the defendant landowner from impeding the flow of the ditch. The ditch was a well-defined ditch or watercourse which, for over 20 years, had been maintained as a drainage ditch by the defendant municipality. The plaintiffs contended that the municipality had acquired a drainage easement across the plaintiff landowners' property by prescription, and that the municipality owed a duty to the plaintiffs and the public to maintain the ditch. The lower court sustained the defendants' demurrers, and the plaintiffs appealed. The Alabama Supreme Court affirmed the lower court ruling and held that the ditch was not of the character of defined stream to which rights attach that are not applicable to surface waters; that the municipality did not gain a prescriptive easement through its prior maintenance of the ditch; and that the municipality had no duty to maintain proper drainage of surface water from the plaintiffs' property. (Deckert-Florida)
W75-04782

JURISDICTION OF SUBMERGED LANDS--GUAM, THE VIRGIN ISLANDS AND AMERICAN SAMOA.
Hearings on H.R. 6775, 4696 and 6135, Subcomm. on Territorial and Insular Affairs, Comm. on Interior and Insular Affairs, 93d Cong, 1st Sess, September 25, 1973. 80 p.

Descriptors: *United States, *Legislation, *Jurisdiction, *Political aspects, Submerged land, Tidal waters, Measurement, Accretion(Legal aspects), Land reclamation, Oil, Petroleum, Boundaries(Property), National parks, Land use, Land tenure, Land management, Land development, Federal government, *Virgin Islands, *Guam.
Identifiers: *American Samoa.

A report is presented of hearings before the Subcommittees on territorial and insular affairs of the United States House of Representatives. They are considering legislation which would place certain submerged lands within the jurisdiction of the governments of Guam, the Virgin Islands, and American Samoa. The bill transfers the interest of the United States in lands permanently or periodically covered by tidal waters, but not above the mean high-tide line, seaward to a line three miles distant from the coastline. This coastline is to be measured as including any modification by accretion, erosion, reliction, and in artificially made, filled-in, or reclaimed lands. Excepted from this transfer are all deposits of oil, gas, and other minerals, not including coral, sand, and gravel. Also excepted are all adjacent property owned by the United States above the line of the mean high tide, any parcels with structures constructed by the United States, lands administered under the National Park Service, and any lands the President may designate within four months of this legislation's enactment. (Sperling-Florida)
W75-04783

OFFSHORE OIL DRILLING AT SANTA BARBARA, PART 1,
Hearing--Subcomm. on Mines and Mining, Comm. on Interior and Insular Affairs, U.S. House of Representatives, 93d Cong, 1st Sess, November 17, 1973. 162 p.

Descriptors: *Legislation, *Federal government, *Oil industry, *Submerged Lands Act, *Continental shelf, Marine geology, Oceans, Pacific Ocean, Oil pollution, Water pollution, Water pollution control, Oil spills, Oil, Fuels, Natural gas, Navigation, Energy, Shores, Resources development, *California, Adoption of practices, Environmental effects, Social benefit.
Identifiers: *Coastal zone management, *Congressional hearing, Navigational obstructions, Santa Barbara(Calif).

Bills limiting oil production in the Santa Barbara Channel were considered in a hearing before the Subcommittee of Mines and Mining of the Committee on Interior and Insular Affairs in Santa Barbara, California, in November 1973. Local citizens expressed their view that future oil drilling and production in the Channel must be considered as a balance between the need for oil and the need to regulate the environmentally and navigationally hazardous methods of retrieving the oil. Past attempts have resulted in damaging oil spills. In leasing resource rich lands to the oil industry the sub-

committee feels that the government has the right to impose environmental safety standards on industry operations in the seismically unstable area. The three bills would establish a federal ecological preserve on a portion of the outer continental shelf in the Santa Barbara Channel; provide for a moratorium on drilling operations pending the development of technology to control and prevent pollution by oil discharges; and to improve methods of oil production from the submerged lands. Specific regulations are set out for termination of leases, the amounts of compromise settlements, and terms to be met to resume oil drilling. (Dillingham-Florada)
W75-04784

AMENDING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, TO PROVIDE FOR A NATIONAL ENVIRONMENTAL DATA SYSTEM.
Washington D.C., Committee on Interior and Insular Affairs (U. S. Senate).
Senate Report No 945, 92d Cong, 2d Sess (1972).

Descriptors: Environmental effects, *Data collections, Data storage and retrieval, *Legislation, *Ecology, Automation, Administration, Administrative agencies, Adoption of practices, Legal aspects, Water resources development, Land management, Federal government.
Identifiers: *National Environmental Policy Act, *Congressional hearings.

A proposed congressional amendment to the National Environmental Policy Act of 1969 (NEPA) provides for a national environmental data system. An appropriate network of new and existing information processing or computer facilities will be established. The facilities, both private and public, will be located in various areas of the United States and interconnected through a system of communication with a central facility for input, access and general management. Ancillary software and support services required for effective information system operation are also funded. State or regional environmental centers are to support research, education, planning and land and water management of activities necessary to improve environmental quality. Provisions for the purchase of Klamath Indian Forest lands are included. The purpose of the amendment is to bridge the weaknesses of NEPA in reference to accessibility of environmental data. The Committee on Interior and Insular Affairs endorses the amendmentment and recommends passage. (Sperling-Florida)
W75-04785

NUECES RIVER PROJECT, TEXAS, PART 1.
Hearings--Subcomm. on Water and Power Resources, Comm. on Interior and Insular Affairs, U.S. House of Representatives, 93d Cong, 1st Sess, November 10, 1973. 75 p.

Descriptors: *Texas, *Regional development, *Legislation, *Water resources development, *Public benefits, Government, Legal aspects, Water law, Regulation, Planning, Administration, Reclamation, Regional analysis, Resource allocation, Social aspects, Environmental policy, Water quality, Dam construction, Engineering, Water allocation(Policy), State governments, Federal government, Water management(Applied).
Identifiers: *Congressional hearings, State policy, Private interest groups, Nueces River(Tex).

The bill authorizes the Secretary of the Interior to construct, operate, and maintain the Nueces River Project in Texas and other affiliated projects. Included in the hearing transcript is the text of the bill under consideration. The subcommittee heard testimony dealing with regional reclamation as part of the basin project, water resource planning, and reports submitted by administrators of municipal and county water districts. The hearing also deals with the considerations created by concurrent jurisdiction and differing water policies of various local governments affected by the basin project. To achieve regional water resource planning, local areas have established regional planning commissions and councils of local governments to facilitate intergovernmental responses to regional problems. Resolutions submitted by local municipalities endorsing regional planning and construction, and input of private citizens are included. (Sperling-Florida)
W75-04786

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE EAST GREENACRES UNIT, RATHDRUM PRAIRIE PROJECT, IDAHO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U. S. House).
H. R. Rep. No. 987, 91st Cong, 2d Sess (1970).

Descriptors: *Idaho, *Legislation, *Irrigation system, *Water supply, *Water resources development, Multiple purpose projects, Government finance, Recreation, Wildlife conservation, Water sources, Groundwater management, Consumptive use, Economic aspects, Water distribution(Applied), Stream channels, Judicial decisions, Legal aspects, Water conservation, Recreation, Public benefits.
Identifiers: Water rights(Non-riparian), *Administrative regulations.

A report is presented on a bill authorizing the Secretary of the Interior to construct, operate and maintain several projects in Idaho. These projects have multiple purposes of irrigation, municipal and industrial water supply, fish and wildlife enhancement, and recreation. These purposes would be accomplished through the development of a groundwater supply for irrigation to relieve that drain upon Twin Lakes. The community is in need of an adequate and assured water supply for its irrigable lands and domestic use. With such a supply the regional dairy industry could survive. The existing supply of water, obtained from Twin Lakes, is delivered through natural stream channels and poorly maintained open gravity ditches. Serious losses of water are incurred in transit to the lands. The use of Twin Lakes has been further reduced by a decision by the Idaho Supreme Court which limits variation of the water level of Twin Lakes within the range of four feet. (Sperling-Florida)
W75-04787

INTERIM NUCLEAR LICENSING.
Committee on Merchant Marine and Fisheries (U. S. House).
H.R. Rep. No 991, 92d Cong, 2 Sess. (1972).

Descriptors: *Legislation, *Federal government, *Nuclear powerplants, *Permits, Administrative agencies, Supervisory control(Power), Water law, Legal aspects, Regulation, Administration, Nonstructural alternatives, Water quality control, Water pollution sources, Ecology, Electric power production, Environmental control, Interagency cooperation, Water pollution control, Administrative decisions, Environmental effects, Thermal pollution.
Identifiers: Licenses, *National Environmental Policy Act, *Congressional hearings, Administrative regulations, *Environmental impact statements.

The Committee on Merchant Marine and Fisheries, to whom this bill was referred, reported favorably and recommended passage of the amendments to the National Environmental Policy Act of 1969. The purpose of this legislation is to provide interim authority to the Atomic Energy Commission (AEC) to permit the operation of certain nuclear power generating facilities for testing and emergency purposes. This authority applies only to those facilities which have already been constructed under a valid AEC construction license and which lack only an operating license to begin generating electrical power. The AEC may issue such a license only after consultation with the Council on Environmental Quality and the Environmental Protection Agency. The AEC must take environmental consideration into account when issuing a permit. Any permits issued under the authority of this bill would terminate either upon the end of the AEC's NEPA review process or in October 1973. In addition, the AEC has specifically reserved the power to require backfitting of cooling and other facilities at a later date, following full and unabbreviated NEPA review. (Deckert-Florida)
W75-04788

AUTHORIZING THE CITY OF SHERMAN, TEX., TO CONSTRUCT A BARRIER IN DENISON DAM (LAKE TEXOMA) RED RIVER, TEX. AND OKLA., FOR THE PURPOSE OF PROVIDING A MUNICIPAL AND INDUSTRIAL WATER SUPPLY.
H.R. Rep. No 989, Comm. on Public Works, 91st Cong, 2d Sess, April 8, 1970. 3 p.

Descriptors: *Water supply, *Legislation, Dams, *Water storage, *Industrial use, Consumptive use, *Texas, *Oklahoma, Federal government, Economic aspects, Legal aspects, Water resources development, Flood protection, Electric power plants, Recreation, River, Water level, Water distribution(Applied), Navigable waters, Construction, Water conveyance, Water costs, Water conservation, Water law, Public benefits.

A report is presented on a bill authorizing the City of Sherman, Texas, to construct a dam to sub-impound an arm of Denison Dam Lake, Red River, Texas and Oklahoma. The purpose of the sub-impoundment is to provide a municipal and industrial water supply. The bill was reported favorably with amendments. The dam will separate the Big Mineral Arm from Lake Texoma to provide water for Sherman. The proximity of this location to the city would minimize the cost of a transmission line. Population growth expected to the north and northwest makes the site further desirable for a water supply source. This sub-impoundment will not appreciably affect the operation of Denison Dam for the purpose of flood control, hydroelectric power or recreation. Because Lake Texoma constituted navigable waters of the United States specific legislative authority for the construction of a dam is required. The city will reimburse the United States the cost allocable to an amount of storage in the Lake equal to the sub-impoundment, including the loss of power revenues attributable to the sub-impoundment. (Sperling-Florida)
W75-04789

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE TOUCHET DIVISION, WALLA WALLA PROJECT, OREGON-WASHINGTON, AND FOR OTHER PURPOSES.
H.R. Rep. No 884, Comm. on Interior and Insular Affairs, 91st Cong, 2d Sess, March 9, 1970. 9 p.

Descriptors: *Washington, *Multiple-purpose projects, *Irrigation, *Flood protection, *Water allocation(Policy), Legislation, Administration, Construction, Farm use, Water requirements, Government finance, Water supply, Water storage, Reservoir storage, Reservoir operation, Wildlife conservation, Fishing, Recreation, Consumptive use, Streamflow, Adoption of practices, Surface runoff, Water resources development.

A bill to authorize the Secretary of the Interior to construct, operate, and maintain the Touchet Division, Walla Walla Project, with amendments, was reported upon favorably. Funds are appropriated not only for construction costs, but also for the enhancement of the anadromous fishery. The Walla-Walla project in the state of Washington is a multiple-purpose dam and reservoir to provid

ıpplemental irrigation water, a full water supply
other land, and storage regulation sufficient to
ouble its present irrigated acreage. The project
ill also provide for flood control, municipal and
ıdustrial water supply, recreation, and on-site
sh and wildlife development. The Touchet River
alley is limited in agricultural growth potential by
shortage of dependable irrigation water. Present
ater supply for irrigation comes from diversion
unregulated streams. The overdevelopment of
e Touchet River for irrigation has depleted the
ow of the stream seriously. In the summer
onths the runs of anadromous fish have been
estroyed. At other seasons the valley is subject to
ood damage due to a lack of control of runoff
ater. (Sperling-Florida)ll
75-04790

HILOSOPHY ON LIVESTOCK WASTE REGU-
ATION,
issouri Univ., Columbia.
or primary bibliographic entry see Field 5G.
75-04838

HE RELATIONSHIP BETWEEN ANIMAL
ASTES AND WATER QUALITY.
esident's Water Pollution Control Advisory
oard, Washington, D.C.
or primary bibliographic entry see Field 5G.
75-04840

RKANSAS STATE GAME AND FISH
OMM'N. V. EUBANK (SUIT ENJOIN
ROPOSED PARTIAL FISH KILL).
2 S W 2d 540 (Ark 1974).

escriptors: *Judicial decisions, *Arkansas,
ishkill, *Rotenone, *Legal aspects, Social
pects, State governments, Adoption of prac-
es, Decision making, Administrative agencies,
ater law, Administration, Water pollution, Toxic
bstances, Lakes, Land tenure, Adjacent land
vners, Adjudication procedure, Fish manage-
nt, Water pollution sources.
entifiers: Injunctive relief, Hazardous sub-
nces(Pollution).

suit to enjoin a proposed partial fish kill was
d against the Arkansas State Game and Fish
mmission. In reversing the grant of the injunc-
n the Arkansas Supreme Court said the State
me and Fish Commission was not shown to
ve acted arbitrarily, capriciously, or in a wan-
ly injurious manner. The proposed partial fish
l was in a public lake and was opposed by
vners of shore property. A state agency may be
joined if it can be shown that a pending action of
e agency would be beyond the scope of the agen-
's authority. Also an agency can be enjoined if it
about to act in bad faith, arbitrarily, capri-
usly, or in a wantonly injurious manner. It was
ntended that the procedure involved in the fish
l constituted a health hazard and that it sub-
ted them and the public to irreparable damage.
perling-Florida)
75-04844

SURVEY OF FEDERAL AND MISSISSIPPI
VIRONMENTAL LAW WITH AN EXAMINA-
ON OF ITS EFFECT ON LAND DEVELOP-
NT,
ssissippi Univ., University. School of Law.
r primary bibliographic entry see Field 6G.
75-04845

F. Nonstructural Alternatives

OOD HAZARD REPORTS: TOOLS FOR
SOURCE PLANNING AND MANAGEMENT,
l Conservation Service, Grand Rapids, Mich.
r primary bibliographic entry see Field 4A.
75-04432

FLOOD DISASTER PROTECTION ACT OF 1973.
Hearings--Subcomm. on Housing and Urban Affairs, Comm. on Banking, Housing and Urban Affairs, U.S. Senate, 93d Cong, 1st Sess, October 31, 1973, 151 p.

Descriptors: *Federal government, *Flood plain insurance, *Flood protection, *Water policy, Flood control, Flood plain zoning, Legislation, Environmental control, Environmental effects, Water management(Applied), Land management, Resource allocation, Conservation.
Identifiers: *Congressional hearings.

This proposed legislation amends portions of the National Flood Insurance Act of 1968. To implement the declared purposes of the 1973 Act, subsequent to stipulated findings, both the Senate and the House versions of this Act provide for the expansion of the flood insurance program. This expansion is accomplished by increasing the coverage limits, increasing the limitations on the coverage outstanding and requiring acquisitions and constructions in flood-prone areas to be insured in order to qualify for federal financial assistance. The House version, further, extends the insurance coverage to losses from erosion and the undermining of shorelines. Both versions include disaster mitigation requirements. HUD's tentative identification of a flood-prone area can be controverted by the community's data. The designated community, in the alternative, may make application to participate in the insurance program. The House version proposes an amendment to the appeal procedure of an aggrieved community. Also included are the statements of witnesses and concerned individuals and organizations. (Hall-Florida)
W75-04600

SPECIAL FLOOD HAZARD INFORMATION: CYPRESS CREEK, HARRIS COUNTY, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04742

SPECIAL FLOOD HAZARD INFORMATION: CLEAR CREEK, BRAZORIA, FORT BEND, GALVESTON AND HARRIS COUNTIES, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04743

FLOOD PLAIN INFORMATION: BLUE RIVER AND TRIBUTARIES, JOHNSON COUNTY, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04744

FLOOD PLAIN INFORMATION: REPORT ON THE DES PLAINES RIVER, ILLINOIS AND WISCONSIN.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-04746

FLOOD PLAIN INFORMATION -- WILLIAMSON CREEK, AUSTIN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04747

FLOOD PLAIN INFORMATION - CEDAR BAYOU, HOUSTON METROPOLITAN AREA, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04748

FLOOD PLAIN INFORMATION: BIG CREEK, CHETOLAH CREEK AND LINCOLN DRAW, HAYS, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04749

FLOOD PLAIN INFORMATION -- GOOSE CREEK, BAYTOWN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04750

FLOOD PLAIN INFORMATION: MECHUNK CREEK, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04752

FLOOD PLAIN INFORMATION--COASTAL FLOODING, CITY OF CHESAPEAKE, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04753

FLOOD PLAIN INFORMATION: (PATUXENT RIVER) WESTERN BRANCH (FOLLY, LOTTSFORD AND VALD HILL BR.), PRINCE GEORGES COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-04754

6G. Ecologic Impact Of Water Development

ROOKERY BAY: ECOLOGICAL CONSTRAINTS ON COASTAL DEVELOPMENT,
Conservation Foundation, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-04354

DELAWARE RIVER BASIN COMPACT: A REVIEW WITH RESPECT TO ENVIRONMENTAL QUALITY,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6E.
W75-04361

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04397

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04402

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
Army Corps of Engineers, Washington, D.C., September 1974, 9 volumes, Report EP1105-2-3.

Descriptors: *Scientific personnel, Environment, *Geographical regions, *United States, Classification, *Information exchange, Indexing, Management, Ecosystems, *Professional personnel, Documentation, Evaluation, Foreign countries.
Identifiers: *Environmental impact assessment.

This directory is separately published in 9 volumes for nine regional areas of the U.S., and provides user groups with information about skills and interests of environmental scientists and environment-oriented groups. Each directory is divided into three sections designed to: Locate a scientist within a region of the U.S.; locate a scientist outside of the U.S.; and locate a consulting group anywhere. Separate tables within the first two sections provide an alphabetical listing of respondents (scientists); an index by competence in ecosystem management; an index by research or consultive experience (keywords); an index by impact assessment experience; and an index by scientific field and geographic familiarity. The third section lists environmental consulting groups and associations in alphabetical order. Each directory is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402: Volume 1, North Pacific Region, 603 p, $5.50; Volume 2, South Pacific Region, 726 p, $6.45; Volume 3, Missouri River Region, 525 p, $4.85; Volume 4, Southwest Region, 576 p, $5.30; Volume 5, Northcentral Region, 701 p, $6.25; Volume 6, Lower Mississippi Region, 520 p, $4.85; Volume 7, North Atlantic Region, 698 p, $6.20; Volume 8, Ohio River Valley Region, 664 p, $6.00; and Volume 9, South Atlantic Region, 560 p, $5.15.
W75-04468

ENVIRONMENTAL CONSEQUENCES OF LAND USE IN ARID AND SEMIARID AREAS,
Thessaloniki Univ., Salonika (Greece).
P. A. Gerakis.
Journal of Soil and Water Conservation, Vol 29, No 4, September-October 1974. p 160-164, 3 fig, 22 ref.

Descriptors: *Irrigation, *Land use, *Environmental effects, *Arid lands, *Human population, *Irrigation, Water resources, Planning, Dry farming, Erosion, Ecosystems, Grazing, Africa, Research and Development.

A lack of integrated surveys and local applied research has led to incomplete evaluations of arid and semiarid land resources in developing countries. Types and patterns of land use in these regions are based on water availability for humans, demestic animals, and plants. In addition to following a general strategy of obtaining maximum returns from available resources with a minimum of ecological disturbance, research should be promoted to provide sound environmental impact studies. Experimentation with different land use strategies should be tried, not only to prevent environmental degradation, but to improve ecosystem productivity. This objective cannot be achieved until human population pressures are eased through redistribution or control. (Mastic-Arizona)
W75-04514

ON THE VULNERABILITY OF ECOSYSTEMS DISTURBED BY MAN,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5C.
W75-04521

ENVIRONMENTAL VALUES AND WATER QUALITY PLANNING,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 5G.
W75-04530

EPA TO ISSUE IMPACT STATEMENTS ON SOME REGULATORY ACTIONS,
For primary bibliographic entry see Field 5G.
W75-04586

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 4, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04589

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE, OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 5, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04590

E.P.A. POLICY TO PROTECT THE NATION'S WETLANDS.
For primary bibliographic entry see Field 5G.
W75-04593

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES--ENVIRONMENTAL LEGISLATION--NORTH AMERICA.
Environmental Protection Agency, Washington, D.C.
Available from National Technical Information Service, Springfield, Va 22161, U.S. Dept. of Commerce, as PB-227 146, $3.75 in paper copy, $2.25 in microfiche. March 1974, 35 p.

Descriptors: *Environmental sanitation, *Legislation, *Pollution control, *Pollution sources, *North America, Canada, Trinidad, Tobago, United States, Costa Rica, Cuba, Dominican Republic, Guatemala, Honduras, Mexico, Water law, Water resources development, *Bibliographies, Pollution abatement, Water quality control.
Identifiers: Environmental policy.

An annotated bibliography is presented of reports related to national environmental laws in North American countries. Specifically included are pollution control regulations and experiences in implementing legislative authorities. This collection of summarized documents has been received by the United States Environmental Protection Agency from national environmental agencies of other nations. Regulations provide authority to make rules and conduct inspections relating to environmental improvements. Included are specific legislative acts dealing with sanitary control of drinking water, sewage and waste disposal systems and environmental conditions in regard to housing, commercial, and industrial establishments. Included is legislation, which deals with radiation emissions, atomic energy control, and pesticide use in an effort to maintain atmospheric quality standards. (Proctor-Florida)
W75-04594

AQUATIC PLANT CONTROL PROGRAM, STATE OF FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 5G.
W75-04598

ENGINEERING A VICTORY FOR THE ENVIRONMENT: A CITIZEN'S GUIDE TO THE U.S. ARMY CORPS OF ENGINEERS,
Institute for the Study of Health and Society, Washington, D.C.
T. M. Clement, Jr., G. Lopez, and P. T. Mountain.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 974. $3.25 in paper copy, $2.25 in microfiche. July, 1971. 396 p, 5 fig, 34 ref, 4 append.

Descriptors: *Legal aspects, *Alternative planning, *Project planning, *Environmental effects, Water law, Judicial decisions, Environmental control, Water resources planning, Water resources development, Cost-benefit analysis, Project benefits, Discount rates.
Identifiers: *Army Corps of Engineers, *Citizen participation in water resource planning.

This action-oriented citizens' handbook on the present practices of the Army Corps of Engineers includes enabling legislation and congressional guidelines for their work. Pros and cons of their projects (dams, navigation assistance, urban flood control, and regulatory activities) are examined. The handbook's purpose is to guide citizens toward effective participation in water resource planning, with particular regard for the water resource projects of the Army Corps of Engineers. The Corps has shown an increasing interest in citizen participation and environmental issues. Efficiency and professionalism of citizen groups must be raised to approximate the high standards of the Corps. Then citizens can work effectively with the Corps, fostering cooperation where possible. Guidelines for citizen group organization and techniques are explained, stressing the political nature of their activity. The mandated 18 steps followed in all large Corps projects from initial planning through completed construction are examined for appropriate timing and method of citizen input. The best stage is clearly the first 6 steps, the planning and hypothesis stage, but even after-step 12 (Congressional Authorization of Project Construction) alternative economic analysis based on sound benefit-cost calculations will be considered. Information on how to do benefit-cost analysis, environmental surveys, and discount rate computation is included, as well as analyses of court decisions and 3 case studies showing citizen participation at various steps. Throughout, the emphasis is on thorough, patient, well-informed citizen action. (Herr-North Carolina)
W75-04755

UNION OF CONCERNED SCIENTISTS V. ATOMIC ENERGY COMM'N. (REVIEW OF ORDERS OF AEC LICENSING .NUCLEAR POWERPLANT).
For primary bibliographic entry see Field 6E.
W75-04775

AMENDING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, TO PROVIDE FOR A NATIONAL ENVIRONMENTAL DATA SYSTEM.
Washington D.C., Committee on Interior and Insular Affairs (U. S. Senate).
For primary bibliographic entry see Field 6E.
W75-04785

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
G. T. Abbott, and E. T. Holmes.

ssissippi Law Journal, Vol 45, p 821-885, 1974.
3 ref.

scriptors: *Mississippi, *Land resources, and use, *Regulations, *Environmental control, deral government, Legislation, Federal Water llution Control Act, Clean Air Act, Mississippi, nd development, Natural resources, Land, ter law, Water resources development, Evalua-n.
ntifiers: National Environmental Policy Act, te policy, Environmental policy.

deral and state land use controls exist de facto if de jure, and are being promulgated and applied der the guise of environmental protection. The tory of environmental pollution and control is ed through the period of heightened interest in ironmental law which spawned the National ironmental Policy Act (NEPA), the Clean Air (CAA) and the Federal Water Pollution Con- Act (FWPCA) among others. Mississippi pol- on control and coastal land protection legisla- is examined, as well as recent court-ordered ted States Environmental Protection Agency A) regulations implementing the 'non-degrada- ' and indirect sources' clauses of the CAA. se regulations will affect state and federal land control. (Proctor-Florida)
5-04845

RESOURCES DATA

. Network Design

DY OF OROGRAPHIC EFFECT ON OP- IUM NUMBER OF RAINGAUGES,
tral Water and Power Research Station, Poona ia).
. Cole, G. A. Kulkarni, and G. D. Khatavkar.
Distribution of Precipitation In Mountainous as, Volume II; Proceedings of the Geilo Sym- um, Geilo, Norway, July 31-August 5, 1972. rld Meteorological Organization Publication 326 (2 Vol.), Geneva, Switzerland, p 421-431, . 2 fig, 2 tab.

criptors: *Precipitation(Atmospheric), ography, *Rain gages, Network design, ershed management, Rainfall, ersheds(Basins), Data collections, Statistics.
tifiers: *India(Bhatghar River-Koyna River).

ose network of adequate number of raingages ibuted uniformly over the catchment area rally helps in obtaining the estimate of nment mean rainfall with the desired degree of ision. Raingall amounts gaged over the exist- number of raingage stations situated in two catchments, Bhatghar and Koyna, were yzed. Bhatghar catchment has an east-west ad and a certain trend in the rainfall while na has a north-south spread and a good deal of tion but no trend in the rainfall. The optimum ber of raingages required for these two nments for estimating mean monthly or nal rainfall with a desired degree of accuracy confidence levels was calculated and com- d. Methods of allocation of additional ra- es required for the two catchments were con- ed separately on the basis of their peculiar raphic characteristics. (See also W75-01961) s-ISWS)
-04681

CTRA OF PRECIPITATION SERIES IN NTAINOUS REGIONS,
cultural Research Service, Beltsville, Md. ograph Lab.
. Hershfield, G. H. Comer, and B. Levy.
Distribution of Precipitation In Mountainous s, Volume II; Proceedings of the Geilo Sym- m, Geilo, Norway, July 31-August 5, 1972. d Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 432-447, 1973. 6 fig, 3 tab, 4 ref.

Descriptors: *Network design, *Statistics, *Precipitation(Atmospheric), *Time series analysis, Frequency analysis, Rainfall, Watersheds(Basins), Mountains, Storms, Maryland, Idaho, Vermont, Virginia, Hydrology.

Areal variation of precipitation in mountainous areas is a common attribute of observational data. Basic to all investigations that require precipitation information is the development of measures of this variation. Cross spectra determined from series of precipitation data at pairs of nearby stations with differing exposures in mountainous areas were used to examine the variability. The time series consisted of both daily data and short-duration increments from individual major storms from locations in Maryland, Idaho, Vermont, and Virginia. The statistics provided a measure of the persistence and uniformity of the precipitation between the gages, and hence, an indication of the spatial and temporal resolution required for the establishment of an adequate network. The techniques applied to the data were particularly useful in the development of models for predictive purposes in watershed hydrology. The most immediate application is for network design because it provides a measure of the uniformity and persistence of precipitation in time over short distances, and therefore, is an indication of the spatial and temporal resolution required to describe the precipitation characteristics. (See also W75-01961) (Sims-ISWS)
W75-04682

THE USE OF THE MODIFIED TIME SERIES ANALYSIS TECHNIQUE FOR THE DETERMINATION OF AREAL PRECIPITATION ACCURACIES,
Aston Univ., Birmingham (England).
For primary bibliographic entry see Field 2B.
W75-04683

ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD,
O. F. Zudin, and B. A. Nelepo.
In: NASA TT F-801, p 71-79, November 1974. 1 fig, 2 ref.

Descriptors: *Numerical analysis, Analytical techniques, *Data processing, Measurement, Equations.
Identifiers: *Interpolation, *Errors.

Errors in interpolation and the choosing of the range of discreteness when making measurements in a hydrophysical field were discussed. Equations for optimum interpolating based on the theory of linear interpolation of stationary random sequences were presented; analogous equations were derived for the case of data collected at stations located at the apexes of a right triangle. (See also W75-04729) (Sims-ISWS)
W75-04734

7B. Data Acquisition

IDENTIFICATION AND EVALUATION OF WATER TRACERS AMENABLE TO POST-SAMPLING NEUTRON ACTIVATION ANALYSIS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5A.
W75-04355

METHOD FOR THE CONSTRUCTION OF THREE-DIMENSIONAL ELECTRON MICROGRAPHS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W75-04394

SOME CHARACTERISTICS OF HAWAIIAN HIGH-INTENSITY RAINFALL,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2B.
W75-04442

EVALUATION OF THE FILTER PAPER METHOD FOR ESTIMATING SOIL WATER POTENTIAL,
Utah State Univ., Logan.
For primary bibliographic entry see Field 2G.
W75-04506

THE EFFECT OF SOIL TEXTURE AND DENSITY ON THE NEUTRON AND DENSITY PROBE CALIBRATION FOR SOME TROPICAL SOILS,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
For primary bibliographic entry see Field 2G.
W75-04549

A NONDESTRUCTIVE METHOD OF FOLLOWING MOISTURE CONTENT AND TEMPERATURE CHANGES IN SOILS USING THERMISTORS,
Sydney Univ. (Australia). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W75-04605

ISOTOPIC AND CHEMICAL CONSIDERATIONS IN RADIOCARBON DATING OF GROUNDWATER WITHIN THE ARID TUCSON BASIN, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
E. I. Wallick.
PhD Dissertation, 1973. 184 p, 15 fig, 19 tab, 80 ref, append.

Descriptors: *Groundwater basins, *Radioactive dating, *Arizona, *Chemical analysis, *Model studies, *Computer models, Carbon calcite, Carbon radioisotopes, Aquifers, *Chemical properties, Calcium carbonate, Carbon dioxide, Well data, Wells.
Identifiers: Tucson Basin.

A chemical-isotopic equilibrium model was developed for adjustment of radiocarbon ages of groundwater from the arid Tucson basin for dilution of the initial groundwater C-14 activity by the solution of soil calcite having a C-14 of 25 plus or minus, 19% modern. Input to the model consisted of the laboratory chemical analyses for Ca ++, Mg ++, Na+, K+, H4SiO4, SO4=, HCO3-, CO3=, NO3-, and pH, and delta C-13 for the total dissolved carbon in the groundwater. Output consisted of the equilibrium chemical composition of the groundwater, the ratio of soil CO2 derived to total dissolved carbon, Q, and delta C-13 of total dissolved carbon, H2CO3, HCO3-, and CO3= and delta C-13 for the soil CO2 and calcite that initially dissolved in the surface water as it equilibrated with soil minerals. Radiocarbon age of the groundwater is computed from the equation T = 8270 In ((Q + (1-Q) ACaCO3)/Am) where T is the age in years before A.D. 1950, ACaCO3 is the soil calcite activity and Am is the measured activity for the dissolved carbonate in the groundwater, both with respect to modern wood. The validity of the model was tested by comparing the predicted values for delta C-13 (CO2), delta C-13 (CaCO3) with measured values for samples from the Tucson basin. On the basis of these results, the model adequately describes the natural system and may prove useful in future radiocarbon dating work in desert regions.
W75-04647

IMPROVED INSTRUMENTATION FOR MEASURING MELTED PRECIPITATION ON WIND-SWEPT TOPOGRAPHY,
Forest Service (USDA), Moscow, Idaho. Intermountain Forest and Range Experiment Station.
H. F. Haupt.
In: Distribution of Precipitation in Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 73-85, 1973. 3 fig, 4 tab, 14 ref.

Descriptors: *Snowmelt, *Mountains, *Lysimeters, Snow, Rain gages, Mountain forests, Snowpack, Water equivalent, Winds, *Idaho, Precipitation(Atmospheric), *Instrumentation, Measurement.
Identifiers: Windshields, Priest River(Utah), Selkirk Mountain Range(Utah).

The winter performances of three instruments: (1) a standard weighing gage with horizontal orifice and windshield, (2) a similar gage with modified (stereo) orifice and tilted windshield parallel to the slope inclination, and (3) a dual-purpose net precipitation-snowmelt lysimeter--were compared in openings and coniferous forest on the windward and lee side of a mountain ridge in northwestern United States. Mounted on towers in windswept openings, the standard gage-horizontal shield and modified gage-tilted shield were less efficient than the ground-level lysimeter by 49% and 24%, respectively. The lysimeter proved most superior in measuring total seasonal (melted) precipitation. Furthermore, in the windswept forest the lysimeter outperformed the standard and modified gages, but the modified gages were nearly alike in total catch. On the lee side, protected in part from the full blast of wind, the lysimeter was only 7 to 8% more efficient than the mounted gages. (See also W75-01961) (Jones-ISWS)
W75-04655

PRECIPITATION MEASUREMENTS BY MEANS OF STORAGE GAUGES WITH STEREO AND HORIZONTAL ORIFICES IN THE BAYE DE MONTREUX WATERSHED,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 86-95, 1973. 4 fig, 3 tab, 35 ref.

Descriptors: *Rain gages, *Mountains, Orifices, Precipitation(Atmospheric), Slopes, Winds, Snowfall, Topography, Instrumentation, Measurement.
Identifiers: *Stereo gages, *Storage gages, Ridges, Mougin storage gas, Nipher-Billwiller windshields, *Switzerland(Baye de Montreux).

On the steep, open slopes in the proximity of the ridges which are exposed to the rain-bearing westerly winds, the stereo orifices yielded precipitation figures about twice as high as those collected by horizontal orifices. At half the height of the slope in the wooded zone and in sheltered locations, the stereo orifices yielded only a small increase or none at all. The increase of precipitation with altitude was more clearly evidenced in the values of the instruments with orifice surfaces parallel to the slope than in those with horizontal orifices. The results obtained with measurements over a period of 19 years show that stereo orifices are better suited than horizontal orifices for meeting the requirements of precipitation measurements on steep, open slopes exposed to rain-bearing winds. (See also W75-01961) (Jones-ISWS)
W75-04656

EVAPORATION LOSSES FROM STORAGE GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 96-102, 1973. 4 fig, 3 tab, 20 ref.

Descriptors: *Raingages, *Evaporation, Snow, Solar radiation, Air temperature, Seasonal, Statistical methods, Regression analysis, Saturation.
Identifiers: *Storage gages, Wind shields, Mougin gage.

In many countries responsible meteorological services accept an oil layer 2 to 3 millimeters thick for the prevention of evaporation errors in precipitation measurements with storage gages. The results of the investigations described showed that an oil layer of this thickness cannot prevent evaporation from the storage gages and, particularly in summer, the layer may be a further source of errors in precipitation measurements with storage gages. This was also demonstrated by an example from a test area near Lake Geneva where over a period of ten years a storage gage with a 2-mm oil layer recorded an average of about 6% less precipitation in summer than the daily measurements with a standard precipitation gage. (See also W75-01961) (Jones-ISWS)
W75-04657

ANALYSIS OF SNOW COVER DISTRIBUTION FROM AEROPHOTOGRAPHY DATA OVER EXPERIMENTAL MOUNTAIN BASIN OF VARZOB RIVER,
Hydrometeorological Service of the USSR, Moscow.
T. S. Abaljan.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 103-110, 1973. 3 fig, 4 tab, 7 ref.

Descriptors: *Precipitation(Atmospheric), *Snow cover, Water resources, Hydrology, Aerial photography, Snowmelt, Avalanches, Slopes, Snow surveys, Distribution patterns.
Identifiers: *USSR(Varzob River Basin).

The Varzob River Basin was photographed from the air from 7-9 times within each snow melting period of the years 1964-1967. These photographs were used to calculate the snow-covered area at 400 m height intervals. The photographs were also used to determine the change in snow cover as the cover melted and a relationship was established between the snow cover melt and the positive mean daily air temperature. The time interval for the calculation was for 5 days and interpolation was required for these intermediate intervals since photographs were not taken this often. The effects on the distribution of snow by avalanches was noted. (See also W75-01961) (Jones-ISWS)
W75-04658

DEFICIENCIES IN MEASURED SNOW PRECIPITATION IN A MOUNTAINOUS AREA IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo (Norway).
For primary bibliographic entry see Field 2C.
W75-04684

PRECIPITATION ESTIMATES FROM METEOROLOGICAL SATELLITE DATA,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 2B.
W75-04685

AREA PRECIPITATION MEASUREMENT WITH X-BAND RADAR FROM A MOUNTAIN NORTH OF THE ALPS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
W. Attmannspacher.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 544-551, 1973. 6 fig, 1 tab, 2 ref.

Descriptors: *Radar, *Rainfall, *Remote sensing, Rain gages, Measurement, Networks, Mountains, Meteorology, Precipitation(Atmospheric), Statistics.
Identifiers: *Germany(Hohenpeissenberg Mt).

At the isolated mountain peak Hohenpeissenberg measurements of precipitation over an area by aid of an X-band radar were started in 1969. The method of this research and the requirement on the radar equipment were discussed. The results show that the method of measuring areal precipitation by radar is useful, but the attenuation of the radar beam caused by precipitation is too strong for the 3.2 cm wave length; thus, only special cases can be measured exactly. (See also W75-01961) (Sims-ISWS)
W75-04691

A LEAK-PROOF SAMPLING PORT IN GAS ANALYSES STUDIES,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
A. E. Smid, and E. G. Beauchamp.
Soil Science Society of America Proceedings, Vol 38, No 6, p 983-984, November-December 1974. 2 fig, 9 ref.

Descriptors: *Sampling, *Gases, Microbial degradation, Soil gases, Analytical techniques, Nitrogen, *Gas chromatography.
Identifiers: *Serum caps, Septum.

Unmodified rubber serum caps frequently used as sampling ports in gas analysis studies failed to reseal after being punctured. Mean N2 leakage through puncture holes increased from 92 to 5200 microliters/liter after 24 hours with one puncture and to 12,000 microliters/liter after an additional 24 hours with two puncture holes. Leak-proof serum caps were devised by sealing silicone rubber septa into them with silicone rubber sealant. (Visocky-ISWS)
W75-04697

A METHOD FOR MEASURING FIRST-STAGE SOIL WATER EVAPORATION IN THE FIELD,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
For primary bibliographic entry see Field 2D.
W75-04698

MICROMETEOROLOGICAL MEASUREMENTS FOR PESTICIDE DRIFT STUDIES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-04714

AN ASSESSMENT OF WARM FOG - NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W75-04717

TMOSPHERIC WATER RESOURCES
IANAGEMENT PROGRAM - BRIDGER
ANGE CLOUD SEEDING EXPERIMENT,
lontana State University, Bozeman. Dept. of
arth Sciences.
or primary bibliographic entry see Field 3B.
75-04721

TMOSPHERIC MOISTURE PARAMETERIZA-
ION,
nvironmental Technical Applications Center,
ashington, D.C.
or primary bibliographic entry see Field 2B.
75-04724

VESTIGATION OF LAND USE OF
ORTHERN MEGALOPOLIS USING ERTS-1
IAGERY,
artmouth Coll., Hanover, N.H. Dept. of Geog-
phy.
r primary bibliographic entry see Field 7C.
75-04726

IE PROBLEM OF SELECTING AN OPTIMUM
EQUENCY FOR A MEASURING GENERA-
OR IN DETERMINING THE VALUE OF THE
/DROPHYSICAL PARAMETER WITH A
VEN ACCURACY,
A. Stepanyuk.
NASA TT F-801, p 80-84, November 1974. 1
.

scriptors: *Instrumentation, *Electrical equip-
nt, *Measurement, Oceanography, Generators,
tistical methods, Temperature.

e selection of the optimum frequency for a mea-
ing generator for determining the value of the
drophysical parameter with a given degree of
curacy was discussed. Methods from informa-
n theory for measuring generators were
scribed. Conversion of the frequency of genera-
s into digital form by means of statistical
eraging was also described. (See also W75-
29) (Sims-ISWS)
5-04735

E OBJECTIVE ANALYSIS OF RELATIVE
MIDITY,
tish Meteorological Office, Bracknell
gland).
primary bibliographic entry see Field 2B.
5-04791

RITICAL EXAMINATION OF THE TURBU-
NCE INSTRUMENT USED IN THE MARSTA
CRO-METEOROLOGICAL FIELD PRO-
CT,
psala Univ. (Sweden). Dept. of Meteorology.
Hogstrom.
us, Vol 26, No 6, p 672-681, 1974. 9 fig, 9 ref.

criptors: *Turbulence, *Instrumentation,
ds, Temperature, On-site investigations,
er vapor, *Measurement, Flow,
teorology, Evaluation.
ntifiers: *Error analysis, *Dynamic response,
d tunnel tests, Micro-meteorology.

turbulence instrument described earlier
gstrom, 1967), and used in an extensive micro-
eorological field project, was examined criti-
. Static wind tunnel calibrations gave accu-
, reproducible results. Field measurements and
retical considerations indicated complications
e dynamical situation, however. It was shown
the instrument is well suited for the measure-
t of the horizontal component of the wind and
apid fluctuations. For the measurement of the
ulent fluxes of sensible heat and of water
r a correction of order of magnitude 10%
be applied. The instrument was further
n to be unsuited for measuring the shearing stress and the variance of the vertical velocity component. (Jones-ISWS)
W75-04795

SENSITIVITY DISTRIBUTION ALONG THE STRIPS OF COMPENSATION PYRHELIOMETERS,
Institute for Atmospheric Physics, Budapest (Hungary).
G. Major, I. Mersich, and F. Miskolci.
Tellus, Vol 26, No 6, p 691-693, 1974. 4 fig, 9 ref.

Descriptors: *Radiation, Instrumentation, Solar radiation, Measurement, Laboratory tests, Distribution, Methodology, Meteorology.
Identifiers: *Pyrheliometers, Sensitivity, Thermojunction, Distribution curves.

Different sensitivity distribution curves had been found for the sensor of compensation pyrheliometer by laboratory measurement and by calculation. To obtain the real sensitivity distribution a new measuring method was applied, which used the sun as radiation source. The results of laboratory and field measurements were in proper agreement. The sensitivity curve was determined mainly by the structure of thermojunction, but each strip has individual characteristics. (Jones-ISWS)
W75-04796

ROUTINE SURVEILLANCE ALTERNATIVES FOR WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-04803

WATER QUALITY BY PHOTOGRAPHIC ANALYSIS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5A.
W75-04814

SPHERE METHOD TURBIDIMETER,
Nippon Precision Optical Instrument, Co. Ltd., Tokoyo (Japan).
For primary bibliographic entry see Field 5A.
W75-04819

7C. Evaluation, Processing and Publication

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04448

NOTES--WORKSHOP ON COMPUTER-AIDED DESIGN AND SIMULATION OF WASTE TREATMENT SYSTEMS,
Silveston (B and P), Kitchener (Ontario).
For primary bibliographic entry see Field 5D.
W75-04518

A SYSTEMS ANALYSIS OF WATER QUALITY SURVEY DESIGN,
Clemson Univ., S. C.
For primary bibliographic entry see Field 5B.
W75-04522

COMPUTER USE FOR RIVER REGULATION,
Corps of Engineers, Portland, Oreg. North Pacific Div.
For primary bibliographic entry see Field 4A.
W75-04531

OPTIMAL OPERATION OF MULTIPLE RESERVOIR SYSTEM,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-04532

COMPUTER CONTROL OF CHEMICAL ADDITION AT A WATER-TREATMENT PLANT,
Autocon Industries, St. Paul, Minn.
For primary bibliographic entry see Field 5F.
W75-04535

SOLUTION OF SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATIONS: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04539

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04540

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6D.
W75-04541

COASTAL MAPPING ACT,
For primary bibliographic entry see Field 6E.
W75-04582

PHYSIOGRAPHICALLY ADJUSTED PRECIPITATION-FREQUENCY MAPS,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2B.
W75-04672

AREAL RAINFALL ANALYSIS BY COMPUTER,
British Meteorological Office, Bracknell (England).
P. M. Salter.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 497-509, 1973. 4 fig, 5 tab, 8 ref.

Descriptors: *Rainfall, *Data storage and retrieval, *Mapping, Isohyets, Contours, *Computer programs, Data processing, *Areal hydrogeology.
Identifiers: United Kingdom.

The plotting and drawing of isohyetal charts by hand is laborious. The ever-increasing amount of past rainfall data now available in computer-compatible form invites use of the computer to do this work. The method adopted for use for any required area in the United Kingdom is based on a 5-km grid. Rainfall values for the grid points are obtained by interpolation from the irregular station network; an allowance is made for the effects of topography by use of a background field of average annual rainfall. Having obtained grid-point values for this relatively dense and regular network, areal rainfalls over irregular areas may be calculated simply by averaging values within the area. Computer prepared isohyetal charts are sufficiently accurate for many purposes and areal rainfalls for areas of 200 sq km or more can be ob-

tained for most parts of the country. The minimum area may not be as low for an area with a sparse station network. (See also W75-01961) (Sims-ISWS)
W75-04687

COMPUTERIZED CALCULATION OF AREAL PRECIPITATION AND ITS ACCURACY,
Techische Universitaet, Brunswick (West Germany). Leichtweiss Inst. for Water Research.
H. Vahl.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 510-524, 1973. 8 fig, 9 ref.

Descriptors: *Data processing, *Analytical techniques, *Precipitation(Atmospheric), *Areal, Computer programs, Average, Rainfall, Isohyets, Graphical analysis, Numerical analysis, Floods.
Identifiers: Interpolation methods, Thiessen polygons, Germany.

In accordance with the well-known graphical-numerical methods of the computation of areal precipitation, computerized methods were developed and the feasibility of their application was investigated. The accuracy of the results from the computation of areal precipitation of annual and daily amounts of rainfall was compared with the traditionally applied method. The investigations were carried out on a watershed in northwestern Germany with an area of about 4400 sq km and a maximum network density of rain gaging stations of about 2.0 stations per 100 sq km. The developed procedures were briefly described and the results obtained by a large statistical evaluation were discussed. (See also W75-01961) (Sims-ISWS)
W75-04688

A HYBRID COMPUTER SIMULATION MODEL FOR PREDICTING THE EFFECTS OF THE AREAL DISTRIBUTION OF PRECIPITATION ON RUNOFF CHARACTERISTICS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 2B.
W75-04692

ESTIMATING AREAL RAINFALL BY FITTING SURFACES TO IRREGULARLY SPACED DATA,
Institute of Hydrology, Wallingford (England).
K. A. Edwards.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol.), Geneva, Switzerland, p 565-587, 1973. 3 fig, 5 tab, 12 ref.

Descriptors: *Data processing, *Rainfall, *Precipitation(Atmospheric), Average, *Estimating, Model studies, *Areal, Computer models.
Identifiers: *Trend surface fitting, Polynomial surfaces, Double Fourier surfaces.

Some of the most promising fully automated methods of estimating mean areal rainfall involve the fitting of rainfall surfaces to the data points by least-square techniques. Polynomial surfaces (trend surfaces) were compared with double Fourier series surfaces in terms of their goodness of fit to the observed data and the effects of including altitude as a further variable were examined. Methods of simplifying these techniques for practical use were discussed. (See also W75-01961) (Sims-ISWS)
W75-04693

UNSTEADY, UNSATURATED, N-DIMENSIONAL MOISTURE FLOW IN SOIL: A COMPUTER SIMULATION PROGRAM,
Goettingen Univ. (West Germany).
For primary bibliographic entry see Field 2G.
W75-04701

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
R. B. Simpson, D. T. Lindgren, D. J. Ruml, and W. Goldstein.
NASA Contractor Report CR-2459, p 56, September 1974. 19 fig, 4 tab, 13 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Land use, *Urban mapping, Land management, Aerial photography, Planning, Geographical regions, Rhode Island, Connecticut, Massachusetts, Cities, Urbanization, *City planning.
Identifiers: Urban geography, Megalopolis, ERTS.

An urban type land use map was developed for Rhode Island by using ERTS imagery. The development of land use maps for Massachusetts and Connecticut was also described. It was shown that it is practical to compile multi-category land use maps from ERTS. The use of manual read-in by grid cell provides a rapid and inexpensive method of converting a manually compiled land use map to a more broadly useful and flexible digital data base. (Terstriep-ISWS)
W75-04726

AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN,
Linguistic Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 2B.
W75-04729

AUTOMATED SYSTEM FOR MEASUREMENT, COLLECTION AND PROCESSING OF HYDROMETEOROLOGICAL DATA ABOARD SCIENTIFIC RESEARCH VESSELS OF THE GUGMS (SIGMA-S),
Ye. P. Borisenkov, and O. M. Fedorov.
NASA TT F-801, p 1-18, November 1974, 2 fig, 12 ref.

Descriptors: *Research facilities, *Instrumentation, *Data processing, *Oceanography, Meteorology, Automation, Research equipment, Ships, Foreign research, Hydrography.
Identifiers: Scientific research vessels.

The automated system known as SIGMA-s for the measurement, collection, and processing of hydrometeorological data aboard scientific research vessels of the Hydrometeorological Service was discussed. The various components of the system and the interfacing between them were described, as well as the projects that the system is equipped to handle. (See also W75-04729) (Sims-ISWS)
W75-04730

SOFTWARE FOR THE SIGMA-S,
I. A. Dyubkin.
In: NASA TT F-801, p 19-33, November 1974. 2 fig, 18 ref.

Descriptors: *Data processing, *Computer programs, *Oceanography, *Meteorology, Automation, Algorithms, Computers, Mathematics.
Identifiers: Interpolation.

The software needed for the SIGMA-s was described. Various mathematical procedures, such as introducing corrections and parameters, interpolating for depth and altitude, isolating special points and layers in the distribution of hydrometeorological elements, smoothing of signals from sensors, critical analysis of and setting up the results in graphs and tables, coding of the data into information carriers, and recording of the data, were presented. (See also W75-04729) (Sims-ISWS)
W75-04731

THE PROBLEM OF ORGANIZATION OF A COASTAL COORDINATING COMPUTER CENTER,
I. A. Dyubkin, and I. I. Lodkin.
In: NASA TT F-801, p 34-48, November 1974. 4 fig, 11 ref.

Descriptors: *Data storage and retrieval, *Data processing, *Management, Meteorology, Oceanography, Computers, Coordination.

Fundamental principles were provided of the operation of a coastal coordinating and computing center under conditions of automation. Special attention was devoted to the work of Coastal Computer Center of the Arctic and Antarctic Scientific Research Institute. This center generalizes from data collected in expeditions and also from observations made at polar stations. (See also W75-04729) (Sims-ISWS)
W75-04732

A SYSTEM OF AUTOMATED PROCESSING OF DEEP WATER HYDROLOGICAL INFORMATION,
V. A. Romantsov, I. A. Dyubkin, and L. N. Klyukbin.
In: NASA TT F-801, p 49-70, November 1974. 1 fig, 2 tab, 23 ref.

Descriptors: *Data processing, *Oceanography, Computers, Automation, Computer programs, Water chemistry.

An automated system for primary and scientific analysis of deep water hydrological information was presented. Primary processing of the data in this system is carried out on a drifting station which also calculates the parameters of vertical stability of the sea layers, as well as their depths and altitudes. Methods of processing the raw data were described. (See also W75-04729) (Sims-ISWS)
W75-04733

ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD,
For primary bibliographic entry see Field 7A.
W75-04734

THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY,
For primary bibliographic entry see Field 7B.
W75-04735

SMALL PARAMETRIC MODEL OF THE PRECOMPUTATION OF METEOROLOGICAL FIELDS ON THE BASIS OF COMPLETE EQUATIONS AND ITS ENERGETIC ANALOGS,
Ye. P. Borisenkov.
In: NASA TT F-801, p 85-111, November 1974. 1 ref.

Descriptors: *Mathematical model, *Meteorology, Equations, Wind velocity, Thermodynamics, Oceans, Parametric hydrology, Energy, Hydrodynamics.

A small parametric, nonadiabatic model for precomputation of meteorological fields on the basis of complete equations, along with its energetic analogs, was described. The model incorporates integral characteristics of the components of the wind speed and the analogous functions of the total fluxes of the ocean, and uses a Cartesian isobaric system of coordinates. (See also W75-04729) (Sims-ISWS)
W75-04736

ESTIMATE OF HEAT FLUXES ON THE SUBJACENT SURFACE (ACCORDING TO DATA FROM SYNOPTIC ANALYSIS),
A. P. Nagurnyy.
In: NASA TT F-801, p 112-120, November 1974. 2 fig, 6 ref.

Descriptors: *Mathematical models, *Heat flow, Model studies, *Meteorology, *Heat transfer, Data processing, Air circulation, *Synoptic analysis, Convection, Temperature.

Several methods of estimating heat fluxes from nonadiabatic sources distributed over a subjacent surface were discussed. Data calculated by synoptic analysis for the entire northern hemisphere from aerological soundings at the 500 and 400 absolute temperature levels, along with the temperature of the subjacent surfaces, were used. A polytropic model of the atmosphere was used in order to avoid the problems posed by the lack of any complete theory of heat transfer in the lower atmosphere. (See also W75-04729) (Sims-ISWS)
W75-04737

A SMALL-PARAMETER MODEL OF CIRCULATION IN AN HOMOGENEOUS BAROCLINIC OCEAN,
For primary bibliographic entry see Field 2L.
W75-04738

THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES,
For primary bibliographic entry see Field 2L.
W75-04739

THE PROBLEM OF CALCULATING CLOUD COVER IN CALCULATIONS OF LONG WAVE RADIATIONAL CHARACTERISTICS OF THE ATMOSPHERE,
For primary bibliographic entry see Field 2B.
W75-04740

RECONSTRUCTING THE VERTICAL PROFILE OF HUMIDITY ON THE BASIS OF THE VERTICAL PROFILE OF TEMPERATURE,
For primary bibliographic entry see Field 2B.
W75-04741

SPECIAL FLOOD HAZARD INFORMATION: CYPRESS CREEK, HARRIS COUNTY, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04742

SPECIAL FLOOD HAZARD INFORMATION: CLEAR CREEK, BRAZORIA, FORT BEND, GALVESTON AND HARRIS COUNTIES, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04743

FLOOD PLAIN INFORMATION: BLUE RIVER AND TRIBUTARIES, JOHNSON COUNTY, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04744

FLOOD PLAIN INFORMATION: NORTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04745

FLOOD PLAIN INFORMATION: REPORT ON THE DES PLAINES RIVER, ILLINOIS AND WISCONSIN.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-04746

FLOOD PLAIN INFORMATION -- WILLIAMSON CREEK, AUSTIN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04747

FLOOD PLAIN INFORMATION - CEDAR BAYOU, HOUSTON METROPOLITAN AREA, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04748

FLOOD PLAIN INFORMATION: BIG CREEK, CHETOLAH CREEK AND LINCOLN DRAW, HAYS, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04749

FLOOD PLAIN INFORMATION -- GOOSE CREEK, BAYTOWN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04750

FLOOD PLAIN INFORMATION: MECHUNK CREEK, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04752

FLOOD PLAIN INFORMATION--COASTAL FLOODING, CITY OF CHESAPEAKE, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04753

FLOOD PLAIN INFORMATION: (PATUXENT RIVER) WESTERN BRANCH (FOLLY, LOTTSFORD AND VALD HILL BR.), PRINCE GEORGES COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-04754

PLANNING FOR WATER QUALITY IN THE BEAR RIVER SYSTEM IN THE STATE OF UTAH.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W75-04757

AMENDING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, TO PROVIDE FOR A NATIONAL ENVIRONMENTAL DATA SYSTEM.
Washington D.C., Committee on Interior and Insular Affairs (U. S. Senate).
For primary bibliographic entry see Field 6E.
W75-04785

FRONTAL MOTION IN THE ATMOSPHERE,
Tel-Aviv Univ. (Israel), Dept. of Mathematical Sciences.
For primary bibliographic entry see Field 2B.
W75-04792

SURFACE WATER DATA OF THE LLANO TEXAS REGION, PROJECT SANGUINE.
EDAW, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 2E.
W75-04847

8. ENGINEERING WORKS

8A. Structures

FLOATING WAVE BARRIER,
W. W. Bowley.
U.S. Patent No 3,848,419, 5 p, 7 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 942, November 19, 1974.

Descriptors: *Shore protection, *Patents, *Barriers, *Waves(Water), Beaches, Ocean waves, Floats.
Identifiers: *Wave action, *Wave energy, *Kinetic energy, Floating barriers.

A floating wave barrier is comprised of at least one vessel having a top, walls and an open bottom which, when placed in water, has the open bottom submerged. The vessel has at least one plate attached to the outside surface of the vessel and extending around all or a major portion of the vessel periphery. The vessel or vessels, when placed in water, contain a gas and water. When placed in water, the vessels and plate members are fixed to prevent substantial movement in the horizontal direction but are free to move in a vertical direction within the wave with the vertical movement of the connected vessels and plate members being out of phase with each other. The wave barrier dampens the vertical velocity component of waves by generating reflected waves in a seaward direction to impinge upon incoming waves and by displacing water from a wave at its crest to an adjacent wave trough. A number of these barriers are arranged parallel to the shore being protected at varying distances from the shore so that a given portion of the wave contacts more than one barrier prior to reaching the shore. (Sinha-OEIS)
W75-04453

INFLATABLE BARRIERS FOR WATERCOURSES,
Pneumatiques, Caoutchouc Manufacture et Plastiques Kleber-Colombes (France). (assignee)
J. V. Ganzinotti.
U.S. Patent No 3,855,800, 4 p, 9 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1419, December 24, 1974.

Descriptors: *Patents, *Erosion control, *Barriers, Rivers, Inland waterways.
Identifiers: *Inflatable barriers, *Watercourses.

An inflatable barrier is used for retaining water in a watercourse. It comprises at least one inflatable enclosure secured to an element anchored directly or indirectly in such watercourse and constructed in such a fashion as to prevent erosion. Means are provided for anchoring the enclosure in relation to the watercourse bed, and this means incorporates an anchoring strip of supple material such as rubber that is securable to the bed. This strip has a free extremity or edge porvided with one or more means for removably connecting the barrier to the strip. The anchoring strip may be secured to a rigid member arranged to be laid down in the soil of the bed of the watercourse and this rigid member may take the form of a block of masonry. Alternatively, the anchoring strip may be embedded in the soil of the bed of the watercourse by digging out a

transverse trench using the removed aggregates to form a temporary dam, laying the anchoring strip in the trench preferably at an angle of 45 deg to the plane of the bed, and then filling up the trench with the aggregates previously dug out, thus to secure the strip in relation to the soil of the bed. (Sinha-OEIS)
W75-04467

DESIGN, CONSTRUCTION AND LAUNCHING OF A SUBMARINE OUTFALL SEWER AT WHITSTABLE,
Whitstable Urban District Council(England).
For primary bibliographic entry see Field 5D.
W75-04536

DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY PAVEMENT STRUCTURAL SECTIONS,
Cedergren/KOA, Long Beach, Calif.
H. R. Cedergren, J. A. Arman, and K. H. O'Brien.
Available from the National Technical Information Service Springfield, Va. 22161 as PB-231 173; $7.25 paper copy, $2.25 microfiche. Report No FHWA-RD-73-14, February 1973. 193 p, 27 fig, 6 tab, 23 ref. FH-11-7582.

Descriptors: *Drainage, *Highways, *Design, *Subsurface drainage, Drainage systems, Outlets, Pipes, Paving, Hydrology, Drainage effects, Subsurface waters, Surface waters, Subsurface drains, Drainage engineering, Analytical techniques, Cost-benefit analysis, Maintenance.
Identifiers: Collector drains, Open graded bases, Drainage layers.

Results were presented of interviews with State highway department personnel, field reconnaissance of pavements in 9 states, and 9 case studies of selected pavements in the Federal Highway Administration Regions. Problems with existing drainage design concepts and construction methods were pointed out, showing why many pavements are saturated with water for long periods of time each year. It was deduced that this saturation contributes to considerable shortening of pavement life. A new method of design was presented to take care of the infiltration of surface water. Inflow-outflow analyses and highway geometrics were included in a procedure utilizing a two-layer graded filter to rapidly remove any water entering the structural layers. (See also W75-04213) (Humphreys-ISWS)
W75-04809

8B. Hydraulics

AN EXPERIMENTAL STUDY OF THE FREE SURFACE EFFECT ON A BUOYANT JET,
General Dynamics Corp., Groton, Conn. Electric Boat Div.
B. S. Ryskiewich, and L. Hafetz.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 536, $5.25 in paper copy, $2.25 in microfiche. Report No U440-74-103, p 119, January 1975. 68 fig, 4 tab, 5 ref. OWRT C-4276(No 9045)(1).

Descriptors: *Thermal pollution, *Jets, *Buoyancy, *Turbulence, *Free surfaces, Powerplants, Temperature, Submergence, Design data, Path of pollutants.

The effect of the surface on a submerged, round, turbulent, buoyant jet has been investigated experimentally. The results show that the surface retards temperature reduction leaving the maximum surface temperature at a higher level than would normally occur from an unbounded jet. The effect is particularly apparent for horizontal jets and decreases as the jet angle increases. Jet discharge variables were taken over a broad range; namely, Froude number from 2 to 60.1, discharge angle from 0 deg to 90 deg, and submergence depth from 10 to 80 jet diameters. The discharge variables range covers most cases of practical interest and the results, presented in graphical form, provide valuable data which will enable a power plant diffuser designer to execute his design with confidence in the plume behavior and surface effect. The data will also be useful to the marine biologist and others concerned with the buoyant jet's ecological implications.
W75-04559

RIVER REGIME WITH SPECIAL REFERENCE TO RIVER NILE,
Assiut Univ. (Egypt).
For primary bibliographic entry see Field 2E.
W75-04706

BIFURCATION CHARACTERISTIC REYNOLDS NUMBER,
Alberta Univ., Edmonton.
C. M. Rodkiewicz.
Journal of Hydraulic Research, Vol 12, No 2, p 241-252, 1974. 9 fig, 1 tab, 3 ref.

Descriptors: *Flow separation, *Pipelines, *Pipe flow, *Reynolds number, *Laboratory tests, Networks, Hydraulic systems.
Identifiers: *Bifurcation flow systems, Noises, Blood flow phenomenon, Arterial junctions, Hydrogen bubble technique.

The experimental studies of the flow characteristics in the bifurcation, where a single cylindrical branch leaves the parent trunk, were presented. The range of the entrance Reynolds number varied from 2000 to 11,000. For most bifurcations, around entrance Reynolds number of 7000, an unusual drop in the ratio of the mass flow rate in the side branch to the flow rate in the main branch, R, takes place. This drop was followed by a peculiar local recovery in the R ratio, which may be linked to a change in pressure and consequently may be a contributing factor in the generation of noises within the variable flow piping hydraulic systems. (Bhowmik-ISWS)
W75-04715

CHANNEL FLOW DRIVEN BY A STATIONARY THERMAL SOURCE,
Massachusetts Inst. of Tech., Cambridge.
D. A. Salstein.
Tellus, Vol 26, No 6, p 638-651, 1974. 8 fig, 1 tab, 10 ref. NSF Grant GA-36021X.

Descriptors: Analysis, *Fluid mechanics, *Heat flow, *Channel flow, *Average flow, Momentum equation, Continuity equation, Energy equation, Velocity, Equations, Analytical techniques, Topography, Mathematical studies, Distribution, Reynolds number, Thermal pollution.
Identifiers: *Boundary conditions, *Rayleigh number, Periodic channel, Reynolds stress, Prandtl number, Grashof number, Perturbation technique.

Analytical methods were used to show that mean horizontal flow may be produced from a periodic distribution of stationary heat sources which are placed on a varying topographic surface. Past analyses and experiments of channel flows were reviewed. Conditions necessary for the production of mean horizontal flows were derived for several boundary conditions on the upper fluid surface. The heat balance, momentum flux, and velocity field of this fluid system were discussed for these boundary conditions. (Adams-ISWS)
W75-04793

AN ALTERNATIVE FORMULATION OF THE PROBLEM OF DENSITY JUMP,
Sargent and Lundy, Chicago, Ill.
S. C. Mehrotra.
Tellus, Vol 26, No 5, p 579-581, 1974. 1 fig, 2 ref. NSF Grant GA-31247.

Descriptors: Density, *Continuity equation, *Momentum equation, *Density currents, Froude number, Weirs, Analysis, Entrainment, Depth, Critical flow, *Hydraulic jump, Equations.
Identifiers: *Density jump, Differential equations.

An alternative formulation of the density jump problem was presented. The formulation was not restricted by the Boussinesq assumption and was thus more general than the original formulation of Wilkinson and Wood. A first order ordinary differential equation was obtained for the crest height of a controlling weir as a function of the depth of the flowing layer downstream of the transition. A boundary condition corresponding to the immiscible jump was applied. A closed form solution of the differential equation was found to be possible but an explicit expression of the solution was not presented. (Adams-ISWS)
W75-04797

SIMPLIFIED APPLICATION OF PALMER-BOWLUS FLOW METERS,
ENCIBRA South America, Sao Paulo (Brazil).
R. G. Ludwig, and J. D. Parkhurst.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2764-2769, December 1974. 3 fig, 8 ref.

Descriptors: *Discharge coefficient, *Rating curves, *Flow measurement, *Open channel flow, Measurement, Calibrations, Critical flow, Conduits, Discharge(Water), Flumes, Instrumentation.
Identifiers: *Critical depth meters, *Palmer-Bowlus flumes.

Simplified procedures for determining the rating curves for Palmer-Bowlus type flumes were presented. Rating tables were given for two standardized trapezoidal throat Palmer-Bowlus flumes for use in circular conduits flowing partially full. Discharge coefficients for use in a simple rating equation were shown graphically for rectangular throat flumes in circular and rectangular conduits. (Adams-ISWS)
W75-04802

HYDRAULIC ANALYSIS OF WINNIPEG SUMP INLETS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04804

DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY PAVEMENT STRUCTURAL SECTIONS,
Cedergren/KOA, Long Beach, Calif.
For primary bibliographic entry see Field 8A.
W75-04809

8C. Hydraulic Machinery

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington D.C.
For primary bibliographic entry see Field 5G.
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington D.C.
For primary bibliographic entry see Field 5G.
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04397

SPECIAL METHODS OPEN STORM-BLOCKED PIPELINE.
Water and Sewage Works, Vol 121, No 8, p 60-61, August, 1974.

Descriptors: *Pipelines, *Sewage treatment, Equipment, Costs, Storm sewers, Pumping, Waste disposal, Treatment facilities, *Waste water treatment.
Identifiers: Pipe cleaning.

New techniques for cleaning storm-blocked sewer pipes were developed and implemented by the Robinson Pipe Cleaning Company, Canonsburg, Pennsylvania. Several miles of 42-inch main interceptor sewer line were disabled, in an area from Western Baltimore suburbs to their sewage treatment plant, as a consequence of Tropical Storm Agnes. After damage to the line was repaired, a five-mile portion had to be cleaned, unseen debris removed, and hidden defects located. Specialized small equipment was used, including high-pressure jets, bucket pullout machines, augers, and trash pumps. Water was pumped through jet-equipped trucks at pressures of 1500 psi to break up bulk material. Trash pumps disposed of the slurry created. Heavier objects were handpicked from the line. Brick and brick-sized stone were bucketed through the line and removed through manholes. After final jetting and pumping to flush the material, the pipes were checked visually, using miner's helmet lights and torches. The line was then functionally operative. These methods saved costs and time ranging up to 90 percent of those of replacing the pipe system. (Prague-FIRL)
W75-04808

2D. Soil Mechanics

STRESS-STRAIN RESPONSE FOR SAND,
Punjab Agricultural Univ., Ludhiana (India).
A. Basak, and S. P. Brahma.
Soil Science, Vol 118, No 6, p 358-364, December 1974. 8 fig, 6 ref.

Descriptors: *Sands, *Stress, *Strain, *Soil physical properties, Soil strength, Cohesionless soils, Shear strength, Poisson ratio, Hysteresis, Void ratio, Soil properties, Soil engineering, Laboratory tests.
Identifiers: Kalpi sand.

A three-parameter stress-strain equation was proposed and compared with the experimental stress-strain response of a uniform, subrounded sand. The fitting was found to be excellent up to the failure. With the help of relevant boundary conditions, the constants a, b, and n were expressed as a function of shear strength, initial tangent modulus, and failure strain. Experimental correlation was made between initial void ratio and normal stress with the parameters a, b, and n. (Anderson-ISWS)
W75-04696

2G. Materials

UPDATING AGING SEWERS WITHOUT TRENCHING,
Cliffside Pipelayers, Scarborough (Ontario).
For primary bibliographic entry see Field 5D.
W75-04828

MORE THAN A MYRIAD.
For primary bibliographic entry see Field 5D.
W75-04829

TV INSPECTIONS SLASH SEWER COSTS $300 PER REPAIR,
St. Louis Metropolitan Sewer District, Mo.
For primary bibliographic entry see Field 5G.
W75-04830

8I. Fisheries Engineering

FRESHWATER JELLYFISH (CRASPEDACUSTA SOWERBYI) IN LAKE PATAGONIA, SOUTHERN ARIZONA,
Arizona Cooperative Fishery Unit, Tucson.
B. E. Kynard, and J. C. Tash.
Arizona Academy of Science, Journal, Vol 9, No 2, p 76-77, June 1974. 1 fig, 13 ref.

Descriptors: *Jelly fish, *Arizona, *Fish stocking, *Artificial lakes, Fish, Fisheries, Zooplankton.
Identifiers: Lake Patagonia(Ariz.).

Freshwater jellyfish were discovered in Lake Patagonia during September 1973, the first report of their presence in Arizona. The species was probably introduced into the lake with stocked fish. Feeding studies indicate that the medusae compete directly with young fish for zooplankton and could have a deleterious effect on the fisheries of the lake. Sixty-five medusae were collected at three sites in the lake, and measured. No search was made for polyps. (Mastic-Arizona)
W75-04386

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

PLANNING, MANAGEMENT AND ACCOUNTABILITY IN WATER RESOURCES RESEARCH,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-04439

TENTH ANNUAL REPORT, PROGRAM ACTIVITIES, JULY 1, 1973 - JUNE 30, 1974.
Maryland Univ., College Park. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W75-04654

9D. Grants, Contracts, and Research Act Allotments

TENTH ANNUAL REPORT, PROGRAM ACTIVITIES, JULY 1, 1973 - JUNE 30, 1974.
Maryland Univ., College Park. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 686, $4.75 in paper copy, $2.25 in microfiche. 1974. 79 p, 1 fig, 10 tab. OWRT A-999-MD(10).

Descriptors: *Water Resources Research Act, *Maryland, *Water Resources Institute, *Universities, Training, Grants, Projects, Water pollution, Water quality, Estuaries, Waste disposal, Waste water disposal, Waste water treatment, Farm wastes.

Research and other activities underway at the Maryland Water Resources Research Center during Fiscal Year 1974 (July 1, 1973 - June 30, 1974) are described, and current and anticipated water problems are identified. Competitive multiple uses of water continue to generate the major water resource problems. The Research Center's largest project pertains to the potential impact on soils, crops, and other vegetation of emissions of a large, natural draft, cooling tower that uses brackish water. Other problem areas being studied include treatment and disposal of farm wastes, urban storm runoff, chlorinated sewage effluents, heavy metals and minerals in Chesapeake Bay sediments, water pollution effects on aquatic life, and contributions of tidal marshlands to food chains in estuaries. (Humphreys-ISWS)
W75-04654

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES--ENVIRONMENTAL LEGISLATION--NORTH AMERICA.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04594

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04625

10C. Secondary Publication And Distribution

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
For primary bibliographic entry see Field 6G.
W75-04468

10D. Specialized Information Center Services

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
For primary bibliographic entry see Field 6G.
W75-04468

10F. Preparation Of Reviews

1971 ANNUAL REVIEW OF LITERATURE. WASTE WATER TREATMENT PHYSICAL AND CHEMICAL METHODS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-04437

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 5G.
W75-04474

ECONOMICS, (LITERATURE REVIEW),
Georgia Inst. of Tech., Atlanta, Ga. Envrionmental Resources Center.
For primary bibliographic entry see Field 5G.
W75-04846

EFFECTS OF POLLUTION ON FRESHWATER FISH, (LITERATURE REVIEW),
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5C.
W75-04848

OXYGEN SAG AND STREAM PURIFICATION, (LITERATURE REVIEW),
Georgia Dept. of Natural Resources, Atlanta.
For primary bibliographic entry see Field 05B.
W75-04849

SUBJECT INDEX

2
Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

ABSOLUTE LIABILITY
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

ACCOUNTABILITY (RESPONSIBILITY)
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

ACETATE
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

ACETYLENE REDUCTION
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

ACID-IRON WASTES
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

ACID MINE WATER
Acid Mine Water, A Bibliography,
W75-04625 5G

ACIDIC WATERS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

ACTINOMYCES
Microbiological Production of Geosmin,
W75-04561 5D

ACTIVATED CARBON
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

ACTIVATED SLUDGE
Bacterial Zoogloea Formation,
W75-04572 5D

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

Activated Sludge Bulking (In Japanese),
W75-04824 5D

ADIRONDACKS (N.Y.)
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

ADJUDICATION PROCEDURE
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

ADMINISTRATION
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

ADMINISTRATIVE AGENCIES
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

Waterworks Department in Certain Cities.
W75-04774 6E

ADMINISTRATIVE DECISIONS
EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

ADMINISTRATIVE REGULATION
Amelioration of Effects of Oil Spills.
W75-04779 5G

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

ADMINISTRATIVE REGULATIONS
Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

ADOPTION OF PRACTICES
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Waterworks Department in Certain Cities.
W75-04774 6E

ADSORPTION
Electrochemical Process for Nutrient Removal,
W75-04446 5D

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

AEOLIAN SOILS
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

AERATED LAGOONS
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

AERATION
Sewage Treatment System,
W75-04456 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

AERATION

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

AERIAL PHOTOGRAPHY
Water Quality by Photographic Analysis,
W75-04814 5A

AEROBIC TREATMENT
New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

AESTHETICS
Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

AGE
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

AGRICULTURAL CHEMICALS
Ecological History of DDT in Arizona,
W75-04387 5C

AGRICULTURAL RUNOFF
Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

AGRICULTURE
Drainage for Agriculture,
W75-04537 3F

AIR CIRCULATION
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

AIR POLLUTION
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Enforcement Economics in Air Pollution Control,
W75-04569 5G

AIR POLLUTION CONTROL
Enforcement Economics in Air Pollution Control,
W75-04569 5G

AITKEN NUCLEI
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

ALABAMA
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

ALAMANCE COUNTY (N.C.)
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

ALBEDO
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

ALGAE
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

ALGAE (INTERTIDAL)
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

ALGAE STRIPPING
Methods of Removing Nitrates From Water,
W75-04626 5D

ALGORITHMS
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

ALLIGATOR WEEDS
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

ALTERNATIVE COSTS
Enforcement Economics in Air Pollution Control,
W75-04569 5G

ALTERNATIVE PLANNING
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrial Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5C

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6C

ALTERNATIVE WATER USE
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

ALUMINUM
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

ALUMINUM SMELTING WASTES
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

AMERICAN SAMOA
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

AMMONIA
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5B

AMMONIA (ANHYDROUS)
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5B

AMMONIA DESORPTION
Ammonia Desorption by Diffused Aeration,
W75-04812 5D

AMPHIPODS
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

ANALYTICAL TECHNIQUES
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

ANTARCTIC
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

ANTARCTIC OCEAN
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

ANTHROPOGENIC FLUORIDE
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

APPLICATION RATES
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

AQUATIC BACTERIA
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

AQUATIC ENVIRONMENT
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

AQUATIC LIFE
Aquatic Plant Control.
W75-04599 6E

AQUATIC WEED CONTROL
Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Aquatic Plant Control.
W75-04599 6E

AQUIFERS
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

AREAL
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

AREAL HYDROGEOLOGY
Areal Rainfall Analysis by Computer,
W75-04687 7C

ARENICOLA-MARINE
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

ARID CLIMATES
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

ARID LANDS
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

ARIZONA
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

Ecological History of DDT in Arizona,
W75-04387 5C

Slats in the Southwest,
W75-04621 5D

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

ARKANSAS
Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

ARMY CORPS OF ENGINEERS
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

ARROYOS
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

ARTIFICIAL HEART RECIPIENTS
Population Radiation Exposure,
W75-04420 5C

ARTIFICIAL LAKES
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

ARTIFICIAL PRECIPITATION
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

ASBESTIFORM AMPHIBOLE MINERALS
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

ASBESTOS
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

ASSAY
Radiation Dosimetry,
W75-04414 5C

ATLANTIC OCEAN
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

ATMOSPHERE
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

Frontal Motion in the Atmosphere,
W75-04792 2B

ATMOSPHERIC MOISTURE
Atmospheric Moisture Parameterization,
W75-04724 2B

ATTITUDES
The Brandywine: Five Years After,
W75-04360 6B

AUSTRALIA
Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

More Than a Myriad.
W75-04829 5D

AUSTRIA (ALPS)
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

AUTOMATION
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

AVERAGE FLOW
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

BACTERIA
Biologic Detection and Control of Water Pollution,
W75-04447 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

Bacterial Zoogloea Formation,
W75-04572 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

BALDCYPRESS
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

BARGES
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

BARLEY
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

BARRIERS
Floating Wave Barrier,
W75-04453 8A

Inflatable Barriers for Watercourses,
W75-04467 8A

BASALTIC AQUIFERS
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

BAYTOWN (TEX)
Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

BEAR RIVER (UTAH)
Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

BEDS UNDER WATER
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

BENEFICIAL USE
Nuclear Techniques in Medical Science,
W75-04412 5A

Population Radiation Exposure,
W75-04420 5C

BENEFITS
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

BENTHIC COMMUNITY
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

BENTHOS
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

BIBLIOGRAPHIES
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

Acid Mine Water, A Bibliography,
W75-04625 5G

Economics, (Literature Review),
W75-04846 5G

Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

BIBLIOGRAPHY
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

BIFURCATION FLOW SYSTEMS
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

BIG CREEK (KAN)
Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

BIOCHEMICAL OXYGEN DEMAND
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

BIOCHEMISTRY
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

BIOCONTROL
Biologic Detection and Control of Water Pollution,
W75-04447 5C

BIODEGRADATION
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

BIOINDICATORS
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

BIOLOGICAL CONTROL
Radiation Biophysics,
W75-04415 5C

BIOLOGICAL PROPERTIES
Analyzing Biological Properties of Wastes,
W75-04842 5A

BIOLOGICAL TREATMENT
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

BIOLOGY
Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Physics,
W75-04413 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

BIONOMY
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloff (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2

BLACK SPRUCE
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2

BLACK WATER
Method for Treatment of Coal Washer Waters,
W75-04463 5

BLUE RIVER (KAN)
Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4

BOILING WATER REACTORS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and Illinois Power Company.
W75-04395 5

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station Units 1 and 2, Gulf States Utilities Company.
W75-04396 5

BOULDER CANYON PROJECT ACT
Procedural Methods for Implementi Colorado River Water Conservation Measure
W75-04778 6

BOUNDARIES (PROPERTY)
African Attitudes Toward the Law of the Sea,
W75-04771 6E

BOUNDARY CONDITIONS
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

BRACHISH WATER
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

BRACKISH WATER
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

BRACKISH-WATER FISH
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

BRANDYWINE WATERSHED (PA)
The Brandywine: Five Years After,
W75-04360 6B

BRASSICA-NIGRA
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

BRAZIL
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

BRAZIL (LAGOONS OF CANANEIA)
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

BREAM
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

BREEDING
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

BRIDGER RANGE (MONT)
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

BRINES
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

BUBBLES
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

BULK DENSITY
Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Activated Sludge Bulking (In Japanese),
W75-04824 5D

BULKING
Activated Sludge Bulking (In Japanese),
W75-04824 5D

BUOYANCY
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

BURNING
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

BUYUK MENDERES RIVER BASIN (TURKEY)
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

CALCIUM
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

CALCIUM CHLORIDE
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

CALIFORNIA
Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

The Social Redemption of Pure Garbage,
W75-04553 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

Trace Metals in Wastewater Effluents,
W75-04806 5B

CANADA
Water: Canadian Needs and Resources,
W75-04359 6B

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

Updating Aging Sewers Without Trenching,
W75-04828 5D

CANADA (ONTARIO)
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

CANALS
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

River Regime With Special Reference to River Nile,
W75-04706 2E

CANNERIES
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

CAPE COD BAY (MASS)
Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

CARBON-13
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

CARBON ADSORPTION METHOD
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

CARBON DIOXIDE
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

CARBON RADIOISOTOPES
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

CARBON TETRACHLORIDE EXTRACTION
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

CARBONATE AQUIFERS
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

CARBONATE ROCKS
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

CARIBBEAN SEA
Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

CATIONS
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

CATTLE
Fast Fluch System,
W75-04622 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

CEDAR BAYOU (TEX)
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

CENTRIFUGATION
Trace Metals in Wastewater Effluents,
W75-04806 5B

CESIUM-137
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

CESSPOOLS
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

CHANNEL FLOW
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

CHANNEL MORPHOLOGY
River Regime With Special Reference to River Nile,
W75-04706 2E

CHEMICAL ANALYSIS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

CHEMICAL AVOIDANCE
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

CHEMICAL OXYGEN DEMAND
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

CHEMICAL PROPERTIES
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

CHEMICAL TREATMENT
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Removal of Boron From Water,
W75-04462 5D

CHEMICAL WASTES
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

CHEMICALS
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

CHESAPEAKE (VA)
Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

CHETOLAH CREEK (KAN)
Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

CHIRONOMID PUPAL EXUVIAE
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

CHLORINATION
Electrochemical Process for Nutrient Removal,
W75-04446 5D

Method for Electrosanitizing Waste Water,
W75-04464 5D

CHLORINE
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

CIRCULATION
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

CIRCULATORY SYSTEM
Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

CITIZEN PARTICIPATION IN WATER RESOURCE PLANNING
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

CITY PLANNING
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

CLAMS
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

CLEAR CREEK (TEX)
Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

CLIMATES
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

CLIMATIC DATA
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

CLIMATOLOGY
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

CLINICAL DIAGNOSIS
Medical Uses of Isotopes,
W75-04417 5C

CLOUD COVER
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

CLOUD PHYSICS
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

Atmospheric Moisture Parameterization,
W75-04724 2B

CLOUD SEEDING
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

CLOUDBURSTS
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

COAGULATION
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

COAL MINE WASTES
Method for Treatment of Coal Washery Waters,
W75-04463 5D

Acid Mine Water, A Bibliography,
W75-04625 5G

COALESCENCE
The Coalescence of Water Drops,
W75-04728 1A

COASTAL ZONE
Coastal Mapping Act,
W75-04582 6E

COASTAL ZONE MANAGEMENT
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

COASTAL ZONE MANAGEMENT ACT
Coastal Resources Management and Conservation Report Published,
W75-04583 2L

COASTS
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Coastal Resources Management and Conservation Report Published,
W75-04583 2L

COLLISION-COALESCENCE PROCESS
The Coalescence of Water Drops,
W75-04728 1A

COLORADO
Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

COLORADO RIVER
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

COMBINED REFUSE/SEWAGE TREATMENT
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

COMBINED SEWERS
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

COMMERCIAL FISHING
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

COMPOSTING
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

COMPREHENSIVE PLANNING
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

COMPUTER APPLICATIONS
Computer Use for River Regulation,
W75-04531 4A

COMPUTER MODELS
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Orographic Influences on Distribution of Precipitation,
W75-04664 2B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

COMPUTER PROGRAMS
Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

Computer Use for River Regulation,
W75-04531 4A

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Areal Rainfall Analysis by Computer,
W75-04687 7C

Software for the Sigma-S,
W75-04731 7C

CONDEMNATION
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

CONDENSATION
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

CONFINEMENT PENS
Tailor Made Confinement Barn,
W75-04617 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Slats in the Southwest,
W75-04621 5D

CONGERIA LEUCOPHAETA
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

CONGRESSIONAL HEARING
Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

CONGRESSIONAL HEARINGS
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Flood Disaster Protection Act of 1973.
W75-04600 6F

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

Nueces River Project, Texas, Part 1.
W75-04786 6E

Interim Nuclear Licensing.
W75-04788 6E

CONNECTICUT
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

CONSTITUTIONAL LAW
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

CONSTRUCTION
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

CONTACT WATER (OIL)
Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

CONTAINMENT BOOMS
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

CONTINENTAL SHELF
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

African Attitudes Toward the Law of the Sea,
W75-04771 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

CONTINUITY EQUATION
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

CONTROL
Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

CONTROL SYSTEMS
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

COOLING WATER DISCHARGES
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

CORN (FIELD)
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

CORSICA (LAGOON OF BIGUGLIA)
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

COST ANALYSIS
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Enforcement Economics in Air Pollution Control,
W75-04569 5G

COST-BENEFIT ANALYSIS
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

COSTS
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Economics, (Literature Review),
W75-04846 5G

CRITICAL DEPTH METERS
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

CRITICAL PATH METHOD
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

CROP PRODUCTION
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

CROP YIELD
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

CROPS
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Manure Promoted for Cropland.
W75-04839 5G

CRUSTACEANS
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

CYANIDES
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

CYPRESS CREEK (TEX)
Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

CYPRINODONTIDAE
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

CZECHOSLOVAKIA (ORLIK VALLEY RESERVOIR)
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

DAIRY INDUSTRY
Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

He Solved His Manure Handling Problem,
W75-04634 5D

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

DATA COLLECTIONS
Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

DATA PROCESSING
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2I

Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

Software for the Sigma-S,
W75-04731 7C

The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

DATA STORAGE AND RETRIEVAL
Areal Rainfall Analysis by Computer,
W75-04687 7C

The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

DDT
Ecological History of DDT in Arizona,
W75-04387 5C

DECISION MAKING
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

DECISION THEORY
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

DEFOLIATION
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

DEHYDRATION
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

DEICERS
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

DEICING CHEMICALS
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

DELAWARE RIVER
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

DELAWARE RIVER BASIN COMMISSION
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

DELAWARE RIVER BASIN COMPACT
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

DEMAND
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

DEMONSTRATION WATERSHEDS
Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

DENITRIFICATION
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Methods of Removing Nitrates From Water,
W75-04626 5D

DENSITY CURRENTS
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

DENSITY JUMP
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

DENSITY PROBES
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

DENSITY STRATIFICATION
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

DES PLAINES RIVER (ILL-WIS)
Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

DESALINATION
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Method and Apparatus for Producing a Distillate,
W75-04465 3A

Hydrate Forming in Water Desalination,
W75-04466 3A

Methods of Removing Nitrates From Water,
W75-04626 5D

DESALINATION PLANTS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

DESALINATION PROCESSES
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

DESERT PLANTS
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

DESERTS
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

DESIGN
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

Rational Basis for Septic Tank System Design,
W75-04801 5D

DESIGN

Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

DESIGN CRITERIA
Water Management Systems,
W75-04538 3F

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

DESIGN DATA
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

DESIGN FLOW
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

DESIGN STANDARDS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

DESIGN STORM
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

DETERGENTS
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

DEWATERING
Dewatering Bovine Animal Manure,
W75-04627 5D

DIATOMS
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

DIET
Effect of Ration on Manure Salt Content,
W75-04834 5D

DIFFUSIVE MODELS
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

DIFFUSIVITY
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

DIGESTORS
New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

DIMICTIC LAKES
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

DIPTERA
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

DISCHARGE COEFFICIENT
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

DISCHARGE (WATER)
Complying with Discharge Regulations,
W75-04431 5G

DISEASES
Medical Uses of Isotopes,
W75-04417 5C

DISINCENTIVES (ECONOMIC)
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

DISINFECTION
Method for Electrosanitizing Waste Water,
W75-04464 5D

DISSOLVED OXYGEN
Biologic Detection and Control of Water Pollution,
W75-04447 5C

DISTILLATION
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Method and Apparatus for Producing a Distillate,
W75-04465 3A

DISTRIBUTION PATTERNS
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

DISTRIBUTION SYSTEMS
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

DISTRICT OF COLUMBIA
Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

DISTRUBUTION SYSTEMS
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

DITCHES
Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

DIURNAL DISTRIBUTION
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

DOMESTIC WASTES
Sewage Treatment System,
W75-04456 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Rational Basis for Septic Tank System Design,
W75-04801 5D

Sources of Metals in New York City Wastewater,
W75-04805 5B

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

DOMESTIC WATER
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

DOSE
Population Radiation Exposure,
W75-04420 5C

DOSE-RATE
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

DOSIMETRY
Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

DRAINAGE
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Drainage for Agriculture,
W75-04537 3F

Water Management Systems,
W75-04538 3F

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

DRAINAGE SYSTEMS
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

DREDGING
Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

DROPS (FLUIDS)
The Coalescence of Water Drops,
W75-04728 1A

DRYLAND CONDITIONS
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

DURATION CURVES
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

DUST STORMS
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

DYNAMIC MODELING
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

DYNAMIC PROGRAMMING
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

DYNAMIC RESPONSE
A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

EASTERN ALPS
Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

ECOLOGICAL STUDIES
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

ECOLOGY
Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

ECONOMIC ANALYSIS
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

ECONOMIC IMPACT
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

ECONOMICS
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

ECOSYSTEMS
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

EFFLUENT CHARGES
Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

EFFLUENTS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Complying with Discharge Regulations,
W75-04431 5G

EGYPT
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

ELASTICITY OF DEMAND
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

ELECTRIC POWERPLANTS
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

ELECTRICAL EQUIPMENT
The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

ELECTROCHEMISTRY
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

ELECTRON MICROSCOPY
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

ELECTRONS
Radiation Physics,
W75-04413 5C

ELECTROOXIDATION
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

ELEVATION
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

EMBRYO DEVELOPMENT
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

EMINENT DOMAIN
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

EMINENT DOMAIN

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

ENERGY

Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

Energy Needed to Manage Animal Waste.
W75-04554 5D

ENERGY BUDGET

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

ENERGY CRISIS

The Law of Maritime Oil Spills,
W75-04770 6E

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

ENERGY FLOW

Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

ENTEROBACTERIA

Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

ENTROPHICATION

Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

ENVIRONMENT

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

ENVIRONMENTAL CONTROL

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

ENVIRONMENTAL EFFECTS

Radiation Biophysics,
W75-04415 5C

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

EPA Policy on Injection Wells.
W75-04592 5G

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

The Law of Maritime Oil Spills,
W75-04770 6E

ENVIRONMENTAL ENGINEERING

Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

ENVIRONMENTAL IMPACT ASSESSMENT

Directory of Environmental Life Scientists,
W75-04468 6G

ENVIRONMENTAL IMPACT STATEMENT

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

ENVIRONMENTAL IMPACT STATEMENTS

Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Interim Nuclear Licensing.
W75-04788 6E

ENVIRONMENTAL POLICY

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

EPA Policy on Injection Wells.
W75-04592 5G

ENVIRONMENTAL QUALITY

Environmental Values and Water Quality Planning,
W75-04530 5G

ENVIRONMENTAL SANITATION

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

EPIPHYTIC ALGAE

A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

EQUATIONS

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

EQUATIONS OF MOTION (ATMOSPHERIC)

Frontal Motion in the Atmosphere,
W75-04792 2B

EROSION

Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

EROSION CONTROL

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Inflatable Barriers for Watercourses,
W75-04467 8A

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

ERROR ANALYSIS

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

RRORS
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

STIMATING
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

STUARIES
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

STUARINE ENVIRONMENT
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

STUARINE RESOURCES
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

STUARY
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

UTROPHICATION
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

VALUATION
Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Swine Waste Management Systems,
W75-04629 5D

VAPORATION
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Evaporation Losses from Storage Gauges,
W75-04657 7B

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

VAPORATORS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

VAPORIMETERS
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

EVAPOTRANSPIRATION
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

EVAPOTRANSPIRATION CONTROL
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

EXCESSIVE PRECIPITATION
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

EXTRATERRESTRIAL
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

FABRICATION
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

FARM MANAGEMENT
EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

FARM WASTES
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

Coprology: A Pollution Solution,
W75-04545 5D

Farms are Not in the Country Any More,
W75-04546 5D

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

Fertility,
W75-04550 5D

Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Tailor Made Confinement Barn,
W75-04617 5D

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Fast Fluch System,
W75-04622 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

Swine Waste Management Systems,
W75-04629 5D

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

Management of Swine Waste by a Lagoon System,
W75-04632 5D

Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

He Solved His Manure Handling Problem,
W75-04634 5D

Manure Handling Systems for the Future,
W75-04635 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

FARM WASTES

Test Swine Waste Disposal Systems,
W75-04637 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Symposium on Animal Waste Management.
W75-04832 5D

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Effect of Ration on Manure Salt Content,
W75-04834 5D

Future Developments in Feedlot Waste Management,
W75-04836 5D

Philosophy on Livestock Waste Regulation,
W75-04838 5G

Manure Promoted for Cropland.
W75-04839 5G

The Relationship Between Animal Wastes and Water Quality.
W75-04840 5G

Analyzing Biological Properties of Wastes,
W75-04842 5A

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

FARMS

Farms are Not in the Country Any More,
W75-04546 5D

FASCICLE DENSITY (PINES)

Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

FAUNA

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

FEASIBILITY STUDIES

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

FEDERAL GOVERNMENT

Coastal Resources Management and Conservation Report Published,
W75-04583 2L

Flood Disaster Protection Act of 1973.
W75-04600 6F

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

Interim Nuclear Licensing.
W75-04788 6E

FEDERAL JURISDICTION

Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

FEDERAL WATER POLLUTION CONTROL ACT

Complying with Discharge Regulations,
W75-04431 5G

Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

Amelioration of Effects of Oil Spills.
W75-04779 5G

FEED LOTS

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Fast Fluch System,
W75-04622 5D

Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

He Solved His Manure Handling Problem,
W75-04634 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Future Developments in Feedlot Waste Management,
W75-04836 5D

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

FEEDLOTS

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

FEEDS

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

FERTILITY

Fertility,
W75-04550 5D

FERTILIZERS

Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

Fertility,
W75-04550 5D

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Manure Promoted for Cropland.
W75-04839 5G

FILTER PAPER METHOD

Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

FILTERABILITY TESTS

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

LTERS
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

LTRATION
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Method for Treatment of Coal Washery Waters,
W75-04463 5D

Trace Metals in Wastewater Effluents,
W75-04806 5B

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

ILAND
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

INISH ARCHIPELAGO
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

: KRUMMHOLZ
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

H
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

H BEHAVIOR
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

H DIETS
Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

FISH FARMING
Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

FISH POPULATIONS
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

FISH STOCKING
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

FISH WASTES
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

FISHKILL
Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

FLASH DISTILLATION
Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Method and Apparatus for Producing a Distillate,
W75-04465 3A

Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

FLETCHER-POWELL METHOD
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

FLOATING BARRIERS
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

FLOCCULATION
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

FLOOD CONTROL
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

FLOOD DAMAGE
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

FLOOD DATA
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOOD FORECASTING
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOOD PLAIN
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

FLOOD PLAIN INSURANCE
Flood Disaster Protection Act of 1973.
W75-04600 6F

FLOOD PLAIN MANAGEMENT
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

FLOOD PLAIN ZONING
Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

FLOOD PLAINS
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOOD PROFILES
Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

FLOOD PROTECTION
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Flood Disaster Protection Act of 1973.
W75-04600 6F

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

FLOOD RECURRENCE INTERVAL
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

FLOOD ROUTING
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

FLOOD WAVES
Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

FLOODING
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOODS
Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOODS PROFILES
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

FLORIDA
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

Coastal Mapping Act,
W75-04582 6E

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Aquatic Plant Control.
W75-04599 6E

FLOTATION
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

FLOW
Drainage for Agriculture,
W75-04537 3F

FLOW CHARACTERISTICS
Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOW CONTROL
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

FLOW MEASUREMENT
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

FLOW RATES
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

FLOW SEPARATION
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

FLUID MECHANICS
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

FLUORIDES
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

FOG
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

FOG MICROPHYSICS
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

FOOD CHAINS
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

FOOD PROCESSING INDUSTRY
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

FOOD SAFETY
Mercury in Food: A Scientific Status Summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition,
W75-04579 5C

FOODS
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

FORAGE GRASSES
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

FORECASTING
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Manure Handling Systems for the Future,
W75-04635 5D

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

The Objective Analysis of Relative Humidity,
W75-04791 2B

FOREGIN TRADE
The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

FOREIGN RESEARCH
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

FOREIGN TRADE
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

FOREST HYDROLOGY
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

FORESTS
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

FRACTIONATORS
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

FRANCE (DOURDUFF RIVER)
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

FREE SURFACES
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

FREQUENCY ANALYSIS
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

FRONTS (ATMOSPHERIC)
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

Frontal Motion in the Atmosphere,
W75-04792 2B

FRUIT PEEL REMOVAL
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

FUEL REPROCESSING
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

FUELS
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

FWPCA AMENDMENTS OF 1972
Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

GARBAGE
The Social Redemption of Pure Garbage,
W75-04553 5D

GAS AND LIQUID TREATMENT
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

GAS CHROMATOGRAPHY
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

GASES
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

GEOCHEMISTRY
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

GEOGRAPHICAL REGIONS
Directory of Environmental Life Scientists,
W75-04468 6G

GEOLOGIC FORMATIONS
High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

GEORGIA
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

GEOSMIN PRODUCTION
Microbiological Production of Geosmin,
W75-04561 5D

GEOSTROPHIC EQUATIONS
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

GEOTHERMAL STUDIES
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

GERMANY (HOHENPEISSENBERG MT)
Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

GERMANY (OKER RIVER)
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

GERMINATION
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

GLACIOLOGY
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

GOVERNMENT FINANCE
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

GOVERNMENTAL INTERRELATIONS
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

GRADIENT FLOW
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

GRAIN SORGHUM
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

GRAIN SORGHUM

Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

GRASSES
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

GRASSLANDS
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

GRAVITY WAVES
The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

GREAT LAKES
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

GREEN BAY (WIS)
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

GREENLAND
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

GRINDERS (REFUSE)
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

GROUND WATER
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

GROUNDWATER
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

GROUNDWATER BASINS
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

GROUNDWATER MOVEMENT
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

GROWTH RATES
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

GUAM
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

GULF COASTAL PLAIN
Raindrop Characteristics in South Central United States,
W75-04713 2B

GULF OF MEXICO
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

GULLIES
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

HAIL
Hail and Its Distribution,
W75-04604 2C

HATCHING
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

HAWAII
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

HAZARDOUS SUBSTANCES (POLLUTION)
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

HEAT
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

HEAT BALANCE
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

HEAT DIFFUSION
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

HEAT FLOW
Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

HEAT OF CONDENSATION
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

HEAT OF HYDRATION
Hydrate Forming in Water Desalination,
W75-04466 3A

HEAT SOURCES
Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

HEAT TRANSFER
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

HEATED DISCHARGE
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

HEAVY METALS
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

HIGH-LEVEL WASTES
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

HIGHWAYS
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

HOGS
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Swine Waste Management Systems,
W75-04629 5D

Management of Swine Waste by a Lagoon System,
W75-04632 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

OLDING PONDS
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

MAN PATHOLOGY
Medical Uses of Isotopes,
W75-04417 5C

MAN POPULATION
Population Radiation Exposure,
W75-04420 5C

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

MAN RESOURCES
Environmental Values and Water Quality Planning,
W75-04530 5G

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

MIC ACID
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

MIDITY
Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

The Objective Analysis of Relative Humidity,
W75-04791 2B

RRICANE TIDAL FLOODING
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

DRATION
Hydrate Forming in Water Desalination,
W75-04466 3A

DRAULIC CONDUCTIVITY
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

HYDRAULIC JUMP
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

HYDRAULIC TRANSPORT
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

HYDROELECTRIC POWER
Computer Use for River Regulation,
W75-04531 4A

HYDROGEOLOGY
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

HYDROGRAPH ANALYSIS
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

HYDROLOGIC DATA
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Computer Use for River Regulation,
W75-04531 4A

ICE
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

Hail and Its Distribution,
W75-04604 2C

Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

ICE FORMATION
Hydrate Forming in Water Desalination,
W75-04466 3A

ICE STONES
Hail and Its Distribution,
W75-04604 2C

ICEBERGS
Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

IDAHO
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

ILLINOIS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

IMPACT (RAINFALL)
Raindrop Characteristics in South Central United States,
W75-04713 2B

IMPERIAL VALLEY (CALIF)
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

IN-UNIT CONTROL
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

INCINERATION
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

INDEX RELATIONS
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

INDIA (BHATGHAR RIVER-KOYNA RIVER)
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

INDIA (UTTAR PRADESH)
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

INDIANA
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

Waterworks Department in Certain Cities.
W75-04774 6E

INDUSTRIAL USE
Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

INDUSTRIAL WASTES
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

Sources of Metals in New York City Wastewater,
W75-04805 5B

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

INDUSTRIAL WATER
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

INFILTRATION
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

INFILTRATION RATES
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

INFLATABLE BARRIERS
Inflatable Barriers for Watercourses,
W75-04467 8A

INFORMATION EXCHANGE
Directory of Environmental Life Scientists,
W75-04468 6G

INFRARED FILM
Water Quality by Photographic Analysis,
W75-04814 5A

INHIBITION EXPERIMENTS
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

INJECTION
Development of an Organic Waste Slurry Injector,
W75-04616 5D

INJECTION WELLS
EPA Policy on Injection Wells.
W75-04592 5G

INJUNCTIVE RELIEF
Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

INPUT-OUTPUT ANALYSIS
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

INSECTS
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

INSTRUMENT
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

INSTRUMENTATION
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

INTAKES
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

INTER-AGENCY COOPERATION
A Bill to Assure Safe Drinking Water.
W75-04652 6E

INTER-RIVER TRANSFER WORKS
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

INTERNAL WATER
Jurisdiction in National Waters,
W75-04650 6E

INTERNATIONAL AGREEMENTS
Jurisdiction in National Waters,
W75-04650 6E

The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

African Attitudes Toward the Law of the Sea,
W75-04771 6E

INTERNATIONAL COMMISSIONS
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

INTERNATIONAL JOINT COMMISSION
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

INTERNATIONAL LAW
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

Jurisdiction in National Waters,
W75-04650 6E

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

The Law of Maritime Oil Spills,
W75-04770 6E

INTERNATIONAL WATERS
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

INTERPOLATION
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

INTERSTATE COMMISSIONS
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

INVERSE CONDEMNATION
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

INVERTEBRATES
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

ION FLOTATION
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

IONIC EQUILIBRIUM
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

IOWA
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Tailor Made Confinement Barn,
W75-04617 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

IRRIGATED LAND
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

IRRIGATION
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Water Management Systems,
W75-04538 3F

Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Fast Fluch System,
W75-04622 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

IRRIGATION EFFECTS
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

IRRIGATION EFFICIENCY
More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

IRRIGATION PRACTICES
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

IRRIGATION PROGRAMS
More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

IRRIGATION SYSTEM
Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

IRRIGATION SYSTEMS
Winch-Driven Irrigation Apparatus,
W75-04452 3F

IRRIGATION WATER
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

ISLAND MASS EFFECTS
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

JAPAN
Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

JELLY FISH
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

JETS
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

JUDICIAL DECISIONS
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

JUNIPER TREES
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

JURISDICTION
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Jurisdiction in National Waters,
W75-04650 6E

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

KANSAS
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

KINETIC ENERGY
Floating Wave Barrier,
W75-04453 8A

KUWAIT
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

LABORATORY TESTS
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

LAGOONS
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

LAKE MICHIGAN
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

LAKE SEDIMENTS
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

LAKE VECHTEN (NETHERLANDS)
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

LAKES
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

LAND APPLICATION
Irrigation for Land Application of Animal Waste,
W75-04638 5D

LAND DEVELOPMENT
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

LAND DISPOSAL
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

LAND MANAGEMENT
Environmental Land and Water Management Act--Amendments,
W75-04581 5G

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

LAND RESOURCES
Environmental Land and Water Management Act--Amendments,
W75-04581 5G

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

LAND SPREADING
Development of an Organic Waste Slurry Injector,
W75-04616 5D

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

Symposium on Animal Waste Management.
W75-04832 5D

LAND USE
The Brandywine: Five Years After,
W75-04360 6B

The Classification of Some Nigerian Soils,
W75-04390 2G

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

LAND USES
The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

LANDFILLS
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

LANDSCAPING
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

LAW ENFORCEMENT
Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

LAW OF THE SEA
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Jurisdiction in National Waters,
W75-04650 6E

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

African Attitudes Toward the Law of the Sea,
W75-04771 6E

LEACHATE
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

LEACHING
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

LEAD
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

LEAF WATER POTENTIAL
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

LEASES
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5C

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5C

LEGAL ASPECTS
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4

Used Oil Law in the United States and Europe
W75-04575 5

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5

Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Philosophy on Livestock Waste Regulation,
W75-04838 5G

Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

EGISLATION
Complying with Discharge Regulations,
W75-04431 5G

Coastal Mapping Act,
W75-04582 6E

Coastal Resources Management and Conservation Report Published,
W75-04583 2L

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Aquatic Plant Control.
W75-04599 6E

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Waterworks Department in Certain Cities.
W75-04774 6E

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Amelioration of Effects of Oil Spills.
W75-04779 5G

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

Nueces River Project, Texas, Part 1.
W75-04786 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

Interim Nuclear Licensing.
W75-04788 6E

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

LETHAL LIMIT
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

LEVEES
Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

LIAPUNOV DIRECT METHOD
On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

LIGNINS
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

LIMNOLOGY
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

LINCOLN DRAW (KAN)
Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

LINEAR PROGRAMMING
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

LIQUID PRECIPITATION
About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

LIQUID WASTES
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

LITTER
Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

LITTORAL
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

LIVESTOCK
Farms are Not in the Country Any More,
W75-04546 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Philosophy on Livestock Waste Regulation,
W75-04838 5G

LOCAL GOVERNMENTS
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

LOCAL PRECIPITATION
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

LONGEVITY
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

LOUISIANA
Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Raindrop Characteristics in South Central United States,
W75-04713 2B

LOUISIANA (ST. CHARLES PARISH)
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

LUBBOCK (TEX)
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

LYSIMETERS
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

MACROPHYTES
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

MAGNESIUM
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

MAINTENANCE
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

MANAGEMENT
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

Energy Needed to Manage Animal Waste.
W75-04554 5D

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

Tailor Made Confinement Barn,
W75-04617 5D

Swine Waste Management Systems,
W75-04629 5D

Management of Swine Waste by a Lagoon System,
W75-04632 5D

The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

MAPPING
Areal Rainfall Analysis by Computer,
W75-04687 7C

MAPS
Coastal Mapping Act,
W75-04582 6E

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

MARINE ALGAE
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

MARINE GEOLOGY
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

MARKETABLE EFFLUENT PERMITS
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

MARYLAND
Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

MARYLAND (PATUXENT ESTUARY)
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

MASS WASTING
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

MASSACHUSETTS
Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

MASSACHUSETTS (BUZZARDS BAY)
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

MASSACHUSETTS (NARRAGANSETT BAY)
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

MATHEMATICAL MODELS
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

Small Parametric Model of the Precomputation of Meteorological Fields on the Basis of Complete Equations and Its Energetic Analogs,
W75-04736 7C

Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

A Small-Parameter Model of Circulation in an Homogeneous Baroclinic Ocean,
W75-04738 2L

Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

MATHEMATICAL PROGRAMMING
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

MAXIMUM PROBABLE FLOOD
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

MEAN HIGH WATER LINE
Coastal Mapping Act,
W75-04582 6E

MEASUREMENT
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

adiation Instrumentation - Radiological
hemistry,
V75-04411 5A

adiation Dosimetry,
/75-04414 5C

eficiencies in Measured Snow Precipitation in
Mountainous Area in Norway,
/75-04684 2C

he Problem of Selecting an Optimum
requency for a Measuring Generator in Deter-
ining the Value of the Hydrophysical Parame-
r with a Given Accuracy,
/75-04735 7B

Critical Examination of the Turbulence In-
rument used in the Marsta Micro-Meteorolog-
al Field Project,
75-04795 7B

CHUNK CREEK (VA)
ood Plain Information: Mechunk Creek, Al-
marle County, Virginia.
75-04752 4A

LBOURNE (AUST)
ving City, (Melbourne, Australia, Review of
erations, 1972-73).
75-04762 3D

RCUROUS PERCHLORATE
lubility Studies of Metallic Mercury in Pure
ater at Various Temperatures,
75-04815 5A

RCURY
e Effects of Mercuric Chloride Upon
spiration in Congeria Leucophaeta,
75-04472 5C

ercury in Aquatic Systems: Methylation, Ox-
tion-Reduction, and Bioaccumulation,
75-04570 5B

ercury in Food: A Scientific Status Summary
the Institute of Food Technologists' Expert
nel on Food Safety and Nutrition,
75-04579 5C

lubility Studies of Metallic Mercury in Pure
ter at Various Temperatures,
75-04815 5A

QUITE
od Boring Insect Infestations in Relation to
squite Control Practices,
5-04380 3B

ABOLISM
e Effect of Temperature and Chemical Pollu-
ts on the Behavior of Several Esturine Or-
isms,
5-04353 5C

duction Ecology of Two Caribbean Marine
osystems: II. Metabolism and Energy Flow,
5-04480 5C

ALLIC MERCURY
ubility Studies of Metallic Mercury in Pure
ter at Various Temperatures,
5-04815 5A

ALS
rces of Metals in New York City Waste-
er,
5-04805 5B

ce Metals in Wastewater Effluents,
5-04806 5B

METEORIC WATER
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

METEOROLOGY
Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

Software for the Sigma-S,
W75-04731 7C

Small Parametric Model of the Precomputation of Meteorological Fields on the Basis of Complete Equations and Its Energetic Analogs,
W75-04736 7C

Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

METHANE BACTERIA
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

METHODOLOGY
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

METHYLMERCURY
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

MICE
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

MICHIGAN
In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

MICRODENSITOMETERS
Water Quality by Photographic Analysis,
W75-04814 5A

MICROGRAPHS (THREE DIMENSIONAL)
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

MICROMETEOROLOGY
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

MILKING MACHINE COMPRESSOR
Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

MINE DRAINAGE
Acid Mine Water, A Bibliography,
W75-04625 5G

MINE WASTES
Method for Treatment of Coal Washery Waters,
W75-04463 5D

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

MINNESOTA
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

MISSISSIPPI
Raindrop Characteristics in South Central United States,
W75-04713 2B

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

MISSISSIPPI RIVER
Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

MISSOURI
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

MODEL STUDIES
Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

A Balanced Approach to Resource Extraction and Creative Land Development Associated

MODEL STUDIES

with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

The Coalescence of Water Drops,
W75-04728 1A

Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

MOHAWK RIVER (NY)
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

MOISTURE
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

MOISTURE CONTENT
The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Atmospheric Moisture Parameterization,
W75-04724 2B

MOJAVE DESERT
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

MOMENTUM EQUATION
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

MONITORING
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

MONTANA
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

MONTANA (GALLATIN RIVER)
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

MOOUNTAINS
Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

MOSQUITO LARVAE
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

MOTORS (OUTBOARD)
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

MOUNTAINS
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

Orographic Influences on the Distribution o Precipitation,
W75-04676 2B

Influence of Orography on the Share o Precipitation in the East Alpine High Mountains,
W75-04679 2B

Precipitation Estimates from Meteorologica Satellite Data,
W75-04685 2B

MULTI-LEVEL PROGRAMMING
An Operational Framework for Coastal Zon Management Planning.
W75-04558 6

MULTIPLE-PURPOSE PROJECTS
Authorizing the Secretary of the Interior t Construct, Operate, and Maintain the Touch Division, Walla Walla Project, Orego Washington, and for Other Purposes.
W75-04790 6

MULTIPLE-PURPOSE RESERVOIRS
A Two-Dimensional Multi-Stage Programmi Model: With Application to Reservoir System
W75-04523 4

Computer Use for River Regulation,
W75-04531 4

Optimal Operation of Multiple Reserv System,
W75-04532 4

MULTIPLE REGRESSION ANALYSIS
Demand for Irrigation: A Case Study Government Tube-Wells in Uttar Pradesh,
W75-04529 6

MULTIPLE RESERVOIR SYSTEMS
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

MUNICIPAL WASTES
More Than a Myriad.
W75-04829 5D

MUNICIPAL WATER
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

Sewage Treatment in the Potteries,
W75-04823 5D

MUSSELS (FRESHWATER)
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

MUTATIONS
Radiation Biophysics,
W75-04415 5C

NATIONAL ENVIRONMENTAL POLICY ACT
EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

Interim Nuclear Licensing.
W75-04788 6E

NAVIGABLE WATERS
Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

NEBRASKA
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

NEEDLE GROWTH (PINES)
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

NETWORK DESIGN
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

NETWORKS
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

NEUTRON ABSORPTION
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

NEUTRON ACTIVATION ANALYSIS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

NEUTRON PROBES
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

NEVADA
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

NEW GUINEA
A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

NEW HAMPSHIRE
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

NEW JERSEY
Farms are Not in the Country Any More,
W75-04546 5D

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

NEW YORK
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

NEW YORK BIGHT
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

NEW YORK CITY (NY)
Sources of Metals in New York City Wastewater,
W75-04805 5B

NEW ZEALAND
The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

NIGERIA
The Classification of Some Nigerian Soils,
W75-04390 2G

NIGERIA (SAMARU)
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

NILE RIVER VALLEY
River Regime With Special Reference to River Nile,
W75-04706 2E

NITRATE-NITROGEN
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

NITRATES
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Methods of Removing Nitrates From Water,
W75-04626 5D

NITRIFICATION
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

NITRILOTRIACETIC ACID
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

NITRITES
Methods of Removing Nitrates From Water,
W75-04626 5D

NITROGEN
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Electrochemical Process for Nutrient Removal,
W75-04446 5D

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

Methods of Removing Nitrates From Water,
W75-04626 5D

NITROGEN

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

NITROGEN COMPOUNDS
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

NITROGEN FIXATION
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

NITROGEN MASS BALANCE
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

NITTANY VALLEY (PA)
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

NON-STRUCTURAL ALTERNATIVES
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

NONPOINT POLLUTION (AGRICULTURAL)
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

NORTH AMERICA
International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

NORTH CAROLINA
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

NORTH TYGER RIVER (SC)
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

NORWAY
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

NORWAY (SALSVATN LAKE)
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

NORWAY (SOGNEFJORD REGION)
Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

NUCLEAR ENERGY
Nuclear Techniques in Medical Science,
W75-04412 5A

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Population Radiation Exposure,
W75-04420 5C

NUCLEAR POWERPLANTS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

Interim Nuclear Licensing.
W75-04788 6E

NUCLEAR WASTES
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

NUCLEATION
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

NUMERICAL ANALYSIS
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

NUTRIENT EXCHANGE
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

NUTRIENT REMOVAL
Electrochemical Process for Nutrient Removal,
W75-04446 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

NUTRIENTS
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

NUTRITION
Mercury in Food: A Scientific Status Summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition,
W75-04579 5C

OAHU (H.I.)
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

OCEAN CIRCULATION
A Small-Parameter Model of Circulation in an Homogeneous Baroclinic Ocean,
W75-04738 2L

OCEAN CURRENTS
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

OCEANOGRAPHIC METHODS
Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

OCEANOGRAPHY
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2E

Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

Software for the Sigma-S,
W75-04731 7C

A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2E

OCEANS
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

Permit Provisions Adopted for Ocean Waste Activity,
W75-04587 5G

A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768

The Law of Maritime Oil Spills,
W75-04770

ODORS
Microbiological Production of Geosmin,
W75-04561 5D

OHIO
New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

OHIO RIVER
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

OIL
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

OIL INDUSTRY
Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

OIL-LAYER THICKNESS
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

OIL POLLUTION
Methods for Elimination of Oil Slicks,
W75-04455 5G

Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

The Law of Maritime Oil Spills,
W75-04770 6E

OIL SPILLS
Methods for Elimination of Oil Slicks,
W75-04455 5G

Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

Amelioration of Effects of Oil Spills.
W75-04779 5G

OIL WASTES
Used Oil Law in the United States and Europe,
W75-04575 5G

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

OIL WELLS
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

OKLAHOMA
Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

OLIGOTROPHIC SEAS
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

ON-SITE DATA COLLECTIONS
Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

ON-SITE INVESTIGATIONS
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

OPEN CHANNEL FLOW
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

OPERATING POLICY
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

OPERATION AND MAINTENANCE
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

OPERATIONS
Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

OPERATIONS RESEARCH
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

OPTIMIZATION
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

ORDINANCES
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

OREGON
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

ORGANIC COMPOUNDS
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

ORGANIC WASTES
Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

ORGANIC WASTES *WASTE TREATMENT
Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

OROGRAPHY
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

OROGRAPHY

Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

OSMOSIS
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

OUTFALL SEWERS
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

More Than a Myriad.
W75-04829 5D

OVERFLOW
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

OWNERSHIP OF BEDS
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

OXIDATION
Method for Electrosanitizing Waste Water,
W75-04464 5D

OXIDATION DITCH
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

OXIDATION LAGOONS
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

OXYGEN
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

OXYGEN-18
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

OXYGEN SAG
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

OXYGENATION
Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

OZONE
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

PACIFIC NORTHWEST U.S.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

PAKISTAN
Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

PALMER-BOWLUS FLUMES
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

PARKS
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

PATENTS
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Winch-Driven Irrigation Apparatus,
W75-04452 3F

Floating Wave Barrier,
W75-04453 8A

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Methods for Elimination of Oil Slicks,
W75-04455 5G

Sewage Treatment System,
W75-04456 5D

Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

Method for Treatment of Coal Washery Waters,
W75-04463 5D

Method for Electrosanitizing Waste Water,
W75-04464 5D

Method and Apparatus for Producing a Distillate,
W75-04465 3A

Hydrate Forming in Water Desalination,
W75-04466 3A

Inflatable Barriers for Watercourses,
W75-04467 8A

PATH OF POLLUTANTS
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

PATUXENT RIVER (MD)
Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

PEAK DISCHARGE
Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

PENNSYLVANIA
The Brandywine: Five Years After,
W75-04360 6B

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

PEPPER PLANTS
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

PERCOLATE CHARACTERISTICS
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

ERCOLATION
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

ERFORMANCE
Slats in the Southwest,
W75-04621 5D

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

ERMITS
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Interim Nuclear Licensing.
W75-04788 6E

STICIDE DRIFT
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

STICIDES
Ecological History of DDT in Arizona,
W75-04387 5C

ENOLOGY
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

OSPHATES
Electrochemical Process for Nutrient Removal,
W75-04446 5D

OSPHORUS
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

OTOCHEMISTRY
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

OTOSYNTHESIS
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

PHREATOPHYTES
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

PHYSICAL PROPERTIES
Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

PHYTOPLANKTON
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

PILOT PLANTS
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

PINE TREES (RED)
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

PIPE FLOW
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

PIPELINES
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

Bifurcation Characteristic Reynolds Number,
W75-04715 8B

Special Methods Open Storm-Blocked Pipeline.
W75-04808 8C

PLANNING
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Water: Canadian Needs and Resources,
W75-04359 6B

Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Environmental Values and Water Quality Planning,
W75-04530 5G

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

Economics, (Literature Review),
W75-04846 5G

PLANT GROWTH
Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

PLANT GROWTH REGULATORS
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

PLANT POPULATIONS
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

PLASTIC PIPES
Updating Aging Sewers Without Trenching,
W75-04828 5D

PLUMES
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

PNEUMATIC TRANSPORTATION
Pneumatic Transportation of Manure,
W75-04641 5D

POECILIA-RETICULATA
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

POLAND
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

POLITICAL ASPECTS
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

POLLUTANT IDENTIFICATION
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

POLLUTANT IDENTIFICATION

Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

Water Quality by Photographic Analysis,
W75-04814 5A

Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

Analyzing Biological Properties of Wastes,
W75-04842 5A

POLLUTION ABATEMENT

Methods for Elimination of Oil Slicks,
W75-04455 5G

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

The Law of Maritime Oil Spills,
W75-04770 6E

POLLUTION CHARGES (TAXES)

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

POLLUTION CONTROL

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

POLLUTION SOURCES

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

POLYARTHRA-REMATA

The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

POLYMERS

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

POLYVINYL ALCOHOL

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

POPULATION EXPOSURE

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

POTABLE WATER

Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

POTASSIUM

Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

POULTRY

Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

PRECIPITATION (ATMOSPHERIC)

Hail and Its Distribution,
W75-04604 2C

Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

Orographic Influences on Distribution of Precipitation,
W75-04664 2B

Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

PRECOAT FILTERS
Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

PREDATION
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

PRELIMINARY TREATMENT
Sewage Treatment in the Potteries,
W75-04823 5D

PRESSURIZED WATER REACTORS
Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

PRINCIPAL COMPONENT ANALYSIS
Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

PROBABLE MAXIMUM PRECIPITATION
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

PRODUCTION
Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

PROFESSIONAL PERSONNEL
Directory of Environmental Life Scientists,
W75-04468 6G

PROJECT FEASIBILITY
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Environmental Values and Water Quality Planning,
W75-04530 5G

PROJECT PLANNING
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

PROJECT POST-EVALUATION
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

PROJECT PURPOSES
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

PROJECTS
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

PROJECTS PLANNING
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

PROTEINS
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

PSYCHOLOGICAL ASPECTS
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

PUBLIC BENEFITS
Nueces River Project, Texas, Part 1.
W75-04786 6E

PUBLIC HEALTH
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Population Radiation Exposure,
W75-04420 5C

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

PUBLIC TRUST DOCTRINE
Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

PUDDLING
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

PULP WASTES
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

PUMPING
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

PYRHELIOMETERS
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

RACEWAY FISH PRODUCTION SYSTEMS
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

RADAR
Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

RADIATION
Radiation Physics,
W75-04413 5C

Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

RADIATION EFFECTS
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

RADIATION EXPOSURE
Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

RADIOACTIVE DATING
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

RADIOACTIVE EFFECTS
Radiation Physics,
W75-04413 5C

RADIOACTIVE WASTE DISPOSAL
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

RADIOACTIVITY
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

Radiation Dosimetry,
W75-04414 5C

RADIOACTIVITY EFFECT
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

RADIOACTIVITY EFFECTS
Radiation Biophysics,
W75-04415 5C

RADIOISOTOPES
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

RAILROADS
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

RAIN GAGES
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

RAINCELLS
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

RAINDROP SIZE
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

RAINDROPS
Raindrop Characteristics in South Central United States,
W75-04713 2B

RAINFALL
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

Areal Rainfall Analysis by Computer,
W75-04687 7C

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

The Objective Analysis of Relative Humidity,
W75-04791 2B

Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

RAINFALL INTENSITY
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

RAINFALL SIMULATORS
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

RAINGAGES
Evaporation Losses from Storage Gauges,
W75-04657 7B

RANGE MANAGEMENT
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

RATING CURVES
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

RAYLEIGH NUMBER
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

REAMING
Updating Aging Sewers Without Trenching,
W75-04828 5D

RECESSION LIMB
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

RECLAIMED WATER
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

RECLAMATION
The Social Redemption of Pure Garbage,
W75-04553 5D

RECREATION
Environmental Values and Water Quality Planning,
W75-04530 5G

RECYCLING
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Coprology: A Pollution Solution,
W75-04545 5D

The Social Redemption of Pure Garbage,
W75-04553 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Manure Handling Systems for the Future,
W75-04635 5D

Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

REEDY RIVER (SC)
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

REGIME
River Regime With Special Reference to River Nile,
W75-04706 2E

REGIONAL ANALYSIS
The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

REGIONAL DEVELOPMENT
Water: Canadian Needs and Resources,
W75-04359 6B

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

Nueces River Project, Texas, Part 1.
W75-04786 6E

REGULATION
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

EPA Policy on Injection Wells.
W75-04592 5G

Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

Amelioration of Effects of Oil Spills.
W75-04779 5G

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Philosophy on Livestock Waste Regulation,
W75-04838 5G

REGULATIONS
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

REMOTE SENSING
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

REOVIRUSES
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

RESEARCH AND DEVELOPMENT
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Physics,
W75-04413 5C

Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Medical Uses of Isotopes,
W75-04417 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Population Radiation Exposure,
W75-04420 5C

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

RESEARCH FACILITIES
Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

RESEARCH PRIORITIES
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

RESERVOIR STORAGE
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

RESERVOIRS
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

RESOURCES DEVELOPMENT
A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

RESPIRATION
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

REVIEWS
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

REVIEWS

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

Economics, (Literature Review),
W75-04846 5G

Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

REYNOLDS NUMBER
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

RIO GRANDE RIVER
Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

RISK ANALYSIS
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

RISKS
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

RIVANNA RIVER (VA)
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

RIVER BASIN COMMISSIONS
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

RIVER BASIN DEVELOPMENT
Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

RIVER BASINS
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

RIVER FLOW
River Regime With Special Reference to River Nile,
W75-04706 2E

RIVER REGULATION
Computer Use for River Regulation,
W75-04531 4A

RIVERS
Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

ROCKY MOUNTAIN REGION
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

ROLOFFIA-ROLOFFI
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

ROOKERY BAY (FLA)
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

ROOT DEVELOPMENT
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

ROOT DISTRIBUTION
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

ROOT SYSTEMS
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

ROTARY VACUUM FILTER
Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

ROTATIONAL FLOW
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

ROTENONE
Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

RUNOFF
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

He Solved His Manure Handling Problem,
W75-04634 5D

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

SAFETY
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

SAHEL ZONE
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

SALINE WATER
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

SALINITY
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

SALMONELLA
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

SALT BALANCE
Water Management Systems,
W75-04538 3F

SALT CREEK
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

SALTS
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

Effect of Ration on Manure Salt Content,
W75-04834 5D

SAMPLING
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

AN FRANCISCO BAY
Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

AN JOAQUIN (CALIF)
Methods of Removing Nitrates From Water,
W75-04626 5D

ANDS
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

Stress-Strain Response for Sand,
W75-04696 8D

ANITARY LANDFILLS
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

ANITARY WASTES
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

ARDINELLA-AURITA
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

ATELLITES (ARTIFICIAL)
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

ATURATED SOILS
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

ATURATION
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

AUDI ARABIA
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

CHEDULING
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

CIENTIFIC PERSONNEL
Directory of Environmental Life Scientists,
W75-04468 6G

COTLAND (HIGHLANDS)
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

EA WATER
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

EABED MINING
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

SEALANTS
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SEASONAL
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

SEASONAL PATTERNS
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

SEDIMENT
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

SEDIMENT-WATER INTERFACES
Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

SEDIMENTATION
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

River Regime With Special Reference to River Nile,
W75-04706 2E

Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

SEDIMENTS
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

SEEPAGE
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

SEEPAGE CONTROL
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SELF PURIFICATION
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

SENECA LAKE (NY)
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

SEPARATION TECHNIQUES
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

SEPTIC TANKS
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

Rational Basis for Septic Tank System Design,
W75-04801 5D

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

SERUM CAPS
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

SETTLING BASINS
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

Activated Sludge Bulking (In Japanese),
W75-04824 5D

SEWAGE
Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

SEWAGE DISPOSAL
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

Rational Basis for Septic Tank System Design,
W75-04801 5D

SEWAGE EFFLUENT
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

SEWAGE OUTFALLS
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

SEWAGE TREATMENT
Sewage Treatment System,
W75-04456 5D

SEWAGE TREATMENT

Method for Electrosanitizing Waste Water,
W75-04464 5D

Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

Special Methods Open Storm-Blocked Pipeline.
W75-04808 8C

Sewage Treatment in the Potteries,
W75-04823 5D

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

SEWER REPAIR
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

SEWERS
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

Updating Aging Sewers Without Trenching,
W75-04828 5D

SEWERS SYSTEMS
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

SHORE PROTECTION
Floating Wave Barrier,
W75-04453 8A

SHOWERS
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

SHUNGANUNGA CREEK (KAN.)
Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

SILICA GELS
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

SILVERSIDES
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

SIMULATION ANALYSIS
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

Computer Use for River Regulation,
W75-04531 4A

Water Management Systems,
W75-04538 3F

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

SIMULATION LANGUAGES
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATION
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

SIMULTATED RAINFALL
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

SITES
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

SLATS
Slats in the Southwest,
W75-04621 5D

SLUDGE DISPOSAL
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

SLURRIES
Development of an Organic Waste Slurry Injector,
W75-04616 5D

SMALL WATERSHEDS
Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

SNOW
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

SNOW COURSES
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

SNOW COVER
Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

SNOW REMOVAL
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

SNOW REMOVAL *MAINTENANCE
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

SNOWFALL
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

SNOWMELT
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

SODIUM
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

SOIL CHEMICAL PROPERTIES
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

SOIL CHEMISTRY
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

SOIL CLASSIFICATION
The Classification of Some Nigerian Soils,
W75-04390 2G

SOIL CONDITIONS
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

SOIL DENSITY
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

SOIL DISPOSAL FIELDS
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Rational Basis for Septic Tank System Design,
W75-04801 5D

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

SOIL FORMATION
The Classification of Some Nigerian Soils,
W75-04390 2G

SOIL LOSS
Raindrop Characteristics in South Central United States,
W75-04713 2B

SOIL MOISTURE
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

SOIL MOISTURE METERS
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

SOIL PHYSICAL PROPERTIES
Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Stress-Strain Response for Sand,
W75-04696 8D

SOIL PROFILE
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

SOIL PROFILES
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

SOIL PROPERTIES
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

SOIL STABILIZATION
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

SOIL STRUCTURE
The Classification of Some Nigerian Soils,
W75-04390 2G

SOIL SURFACES
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

SOIL TEMPERATURE
Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

SOIL TEXTURE
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

SOIL TREATMENT
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

SOIL WATER
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

SOIL WATER DEFICIT
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

SOIL WATER MOVEMENT
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

SOIL-WATER-PLANT RELATIONSHIPS
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

SOIL WATER POTENTIAL
Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

SOILS
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

Drainage for Agriculture,
W75-04537 3F

Water Management Systems,
W75-04538 3F

SOLAR ENERGY
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

SOLID ADSORBENTS
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

SOLID WASTE COLLECTION
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

SOLID WASTES
Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

SOLUBILITY
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

SORGHUM
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

SOUTH CAROLINA
Biologic Detection and Control of Water Pollution,
W75-04447 5C

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

Fast Fluch System,
W75-04622 5D

SOUTHWEST U.S.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

SPECIFICATIONS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

SPECTROPHOTOMETRY
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

SPRINGS
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

SPRINKLER IRRIGATION
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

ST. LOUIS (MO)
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

STABILITY
River Regime With Special Reference to River Nile,
W75-04706 2E

STANDARD SAMPLES
Microbiological Production of Geosmin,
W75-04561 5D

STATE POLICIES
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

STATE POLICY
Aquatic Plant Control.
W75-04599 6E

Waterworks Department in Certain Cities.
W75-04774 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

STATISTICAL METHODS
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

STATISTICS
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

STEREO GAGES
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

STOCHASTIC PROCESSES
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

STOCHASTIC RESERVOIR THEORY
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

STORAGE GAGES
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Evaporation Losses from Storage Gauges,
W75-04657 7B

STORAGE REQUIREMENTS
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

STORAGE TANKS
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

STORM DRAINS
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

STORM RUNOFF
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

STORM SURGES
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

STORM WATER
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

Sources of Metals in New York City Wastewater,
W75-04805 5B

STRAIN
Stress-Strain Response for Sand,
W75-04696 8D

STRAITS
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

STRAITS OF GIBRALTER
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

STRATIFICATION
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

STRATOSPHERE
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

STREAM CLASSIFICATION
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

STREAM PURIFICATION
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

STREAMFLOW
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

STREET DRAINAGE
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

STREPTOMYCES
Microbiological Production of Geosmin,
W75-04561 5D

STRESS
Stress-Strain Response for Sand,
W75-04696 8D

STRIP MINES
Acid Mine Water, A Bibliography,
W75-04625 5G

SUBFLOOR
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SUBIRRIGATION
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

SUBMERGED LANDS ACT
Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

SUBSURFACE DRAINAGE
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

SUBSURFACE INVESTIGATIONS
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

SUBSURFACE RUNOFF
The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

SUBURBAN AREAS
Farms are Not in the Country Any More,
W75-04546 5D

SUGARBEETS
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

SULFATE-REDUCING BACTERIA
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

SURFACE DRAINAGE
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

SURFACE RUNOFF
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

SURFACE WATERS
Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

SURGE TANKS
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

SURGES
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

SURVEYS
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

SUSPENDED MATTER
Sphere Method Turbidimeter,
W75-04819 5A

SUSPENDED SOLIDS
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

SWAMPS
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

SWEDEN
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

SWEDEN (LAKE MALAREN)
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

SWINE
Management of Swine Waste by a Lagoon System,
W75-04632 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

SWINE WASTEWATER
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

SWISS PREALPS
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

SWITZERLAND (BAYE DE MONTREUX)
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

SYNOPTIC ANALYSIS
Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

SYSTEMS ANALYSIS
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

TAIWAN
Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

TAMARISK
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

TECHNOLOGY
The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

TELEVISION INSPECTION
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

TEMPERATURE
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

TEMPERATURE AVOIDANCE
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

TERRACING
A Balanced Approach to Resource Extraction and Creative Land Development Associated

with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

TERRITORIAL SEAS (JURISDICTION)
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

TERRITORIAL WATERS
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

Jurisdiction in National Waters,
W75-04650 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

TERTIARY TREATMENT
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

TESTS
Analyzing Biological Properties of Wastes,
W75-04842 5A

TEXAS
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

Nueces River Project, Texas, Part 1.
W75-04786 6E

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

THERMAL CONDUCTIVITY
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

THERMAL POLLUTION
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Biologic Detection and Control of Water Pollution,
W75-04447 5C

Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

THERMAL RADIATION
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

THERMOCLINE
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

THUNDERSTORMS
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

TILE EFFLUENTS
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

TIME SERIES ANALYSIS
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

TOPOGRAPHY
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

TORNADOES
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

TORONTO (CANADA)
A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

TOXICITY
Medical Uses of Isotopes,
W75-04417 5C

TRACE ELEMENTS
Trace Metals in Wastewater Effluents,
W75-04806 5B

TRACER TECHNIQUES
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

TRACERS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

TRACTIVE FORCES
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

TRANSFORMATIONS
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

TRANSMUTATION
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

TRANSMUTATIONS
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

TRANSPIRATION
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

TRANSPIRATION CONTROL
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

TRANSPORTATION
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

TRAP EFFICIENCY
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

TREATIES
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

Jurisdiction in National Waters,
W75-04650 6E

TREATMENT FACILITIES
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

TREND SURFACE FITTING
Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

TREYNOR (IOWA)
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

TRICKLE IRRIGATION
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

TRICKLING FILTERS
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

TRISODIUM CARBOXYMETHYLOXYSUCCINATE
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

TRITIUM
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

TROPICAL SOILS
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

TRULOPSIS AUSTROMARINA
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

TRUCKEE RIVER (NEV-CALIF)
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

TUBE-WELLS
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

TURBIDIMETERS
Sphere Method Turbidimeter,
W75-04819 5A

TURBIDITY
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

Sphere Method Turbidimeter,
W75-04819 5A

TURBIDITY REMOVAL
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

TURBULENCE
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

TURF GRASSES
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

ULTRAVIOLET RADIATION
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

UNITED KINGDOM
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

UNITED KINGDOM (RIVER CHEW)
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

UNITED STATES
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

Directory of Environmental Life Scientists,
W75-04468 6G

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

UNIVERSITIES
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

UNOX SYSTEM
Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

UNSATURATED FLOW
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

UNSATURED FLOW
Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

UNSTEADY FLOW
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

URBAN HYDROLOGY
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

URBAN MAPPING
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

URBAN RAINFALL
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

URBAN RUNOFF
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

URBAN WATER RESOURCES
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

URBANIZATION
The Brandywine: Five Years After,
W75-04360 6B

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

USSR
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

USSR (VARZOB RIVER BASIN)
Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

USSR (VITIM RIVER BASIN)
Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

UTAH
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

VALUE ENGINEERING
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

VARIABILITY
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

VEGETATION EFFECTS
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

VERMONT
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

VERTICAL DISTRIBUTION
Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

VIRGIN ISLANDS
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

VIRGINIA
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

VIRUSES
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

WASATCH FRONT RANGE (UTAH)
Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

WASHINGTON
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

WASTE CHARACTERIZATION
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

WASTE DILUTION
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

WASTE DISPOSAL
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

Farms are Not in the Country Any More,
W75-04546 5D

Fertility,
W75-04550 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Used Oil Law in the United States and Europe,
W75-04575 5G

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Fast Fluch System,
W75-04622 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

Manure Handling Systems for the Future,
W75-04635 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

Symposium on Animal Waste Management.
W75-04832 5D

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

WASTE DISPOSAL WELLS
EPA Policy on Injection Wells.
W75-04592 5G

WASTE DUMPS
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

WASTE HANDLING
Nutrient Recovery: New Concept in Waste Handling.
W75-04620 5D

WASTE IDENTIFICATION
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

WASTE MANAGEMENT
Coprology: A Pollution Solution,
W75-04545 5D

Effect of Ration on Manure Salt Content,
W75-04834 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Future Developments in Feedlot Waste Management,
W75-04836 5D

WASTE MIGRATION
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

WASTE PARTITIONING
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

WASTE STORAGE
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

He Solved His Manure Handling Problem,
W75-04634 5D

Pneumatic Transportation of Manure,
W75-04641 5D

WASTE TREATMENT
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

Coprology: A Pollution Solution,
W75-04545 5D

Fertility,
W75-04550 5D

Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

The Social Redemption of Pure Garbage,
W75-04553 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Swine Waste Management Systems,
W75-04629 5D

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Management of Swine Waste by a Lagoon System,
W75-04632 5D

He Solved His Manure Handling Problem,
W75-04634 5D

Manure Handling Systems for the Future,
W75-04635 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

Pneumatic Transportation of Manure,
W75-04641 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

WASTE WATER DISPOSAL
Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

WASTE WATER (POLLUTION)
E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

WASTE WATER TREATMENT
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

Electrochemical Process for Nutrient Removal,
W75-04446 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Sewage Treatment System,
W75-04456 5D

Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Method for Treatment of Coal Washery Waters,
W75-04463 5D

Method for Electrosanitizing Waste Water,
W75-04464 5D

Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Coprology: A Pollution Solution,
W75-04545 5D

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

Microbiological Production of Geosmin,
W75-04561 5D

Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Fast Fluch System,
W75-04622 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

Trace Metals in Wastewater Effluents,
W75-04806 5B

Special Methods Open Storm-Blocked Pipeline.
W75-04808 8C

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

Sewage Treatment in the Potteries,
W75-04823 5D

Activated Sludge Bulking (In Japanese),
W75-04824 5D

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

More Than a Myriad.
W75-04829 5D

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

Symposium on Animal Waste Management.
W75-04832 5D

WASTES

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

WATER ALLOCATION (POLICY)

Water: Canadian Needs and Resources,
W75-04359 6B

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

WATER ANALYSIS

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

WATER AVAILABILITY

Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

WATER BALANCE

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

WATER CLARIFICATION

Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

WATER CONSERVATION

The Brandywine: Five Years After,
W75-04360 6B

More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

WATER CONVEYANCE

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER COOLING

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

WATER DELIVERY

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

WATER DEMAND

Water: Canadian Needs and Resources,
W75-04359 6B

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER DEMANDS

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

WATER DISTRIBUTION

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

WATER DISTRIBUTION (APPLIED)

Winch-Driven Irrigation Apparatus,
W75-04452 3F

Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

WATER DROPS

The Coalescence of Water Drops,
W75-04728 1A

WATER HARDNESS

Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

WATER HARVESTING

More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

WATER HYACINTH

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

WATER IMPORTING

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER LAW

Water: Canadian Needs and Resources,
W75-04359 6B

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

WATER LEVEL FLUCTUATIONS

Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

WATER LOSS

Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

WATER MANAGEMENT (APPLIED)

Water: Canadian Needs and Resources,
W75-04359 6B

The Brandywine: Five Years After,
W75-04360 6B

Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

Drainage for Agriculture,
W75-04537 3F

Water Management Systems,
W75-04538 3F

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

ATER PERMITS
Complying with Discharge Regulations,
W75-04431 5G

ATER POLICY
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Flood Disaster Protection Act of 1973.
W75-04600 6F

ATER POLLUTION
Nitrogen Release Associated with the Decrease n Soil Organic Matter in Newly Cultivated oils,
W75-04367 5B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irgated Desert Soil,
W75-04370 5G

etrievable Surface Storage Facility, Alternave Concepts Engineering Studies.
W75-04401 5D

ontrol of Pollution from Animal Feedlots and euse of Animal Wastes,
W75-04615 5D

hemical and Physical Characterization of Tar amples from the Marine Environment,
W75-04718 5A

re we Ready for a Closed System of Water upply, Treatment, and Reuse - Technology vs. sychology,
W75-04761 5D

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

Water Quality by Photographic Analysis,
W75-04814 5A

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

Sewage Treatment in the Potteries,
W75-04823 5D

WATER POLLUTION CONTROL
Water: Canadian Needs and Resources,
W75-04359 6B

Complying with Discharge Regulations,
W75-04431 5G

Methods for Elimination of Oil Slicks,
W75-04455 5G

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

WATER POLLUTION EFFECTS
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

WATER POLLUTION SOURCES
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

Amelioration of Effects of Oil Spills.
W75-04779 5G

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

Sources of Metals in New York City Wastewater,
W75-04805 5B

WATER POTENTIAL
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

WATER PURIFICATION
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

A Bill to Assure Safe Drinking Water.
W75-04652 6E

WATER QUALITY
Environmental Values and Water Quality Planning,
W75-04530 5G

WATER QUALITY

Drainage for Agriculture,
W75-04537 3F

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Water Quality by Photographic Analysis,
W75-04814 5A

The Relationship Between Animal Wastes and Water Quality.
W75-04840 5G

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

WATER QUALITY ACT

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

WATER QUALITY CONTROL

Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Methods for Elimination of Oil Slicks,
W75-04455 5G

Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

WATER QUALITY MANAGEMENT

Sewage Treatment in the Potteries,
W75-04823 5D

WATER QUALITY STANDARDS

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

WATER-REPELLENCY

Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

WATER REQUIREMENTS

Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

WATER RESOURCES

An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

African Attitudes Toward the Law of the Sea,
W75-04771 6E

WATER RESOURCES DEVELOPMENT

Water: Canadian Needs and Resources,
W75-04359 6B

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

African Attitudes Toward the Law of the Sea,
W75-04771 6E

Nueces River Project, Texas, Part 1.
W75-04786 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

Economics, (Literature Review),
W75-04846 5G

WATER RESOURCES INSTITUTE

Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

WATER RESOURCES RESEARCH ACT

Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

WATER REUSE

Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Coprology: A Pollution Solution,
W75-04545 5D

Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

WATER RIGHTS

Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

WATER RIGHTS (NON-RIPARIANS)

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

WATER SAMPLING

Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

WATER SOURCES

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

WATER STORAGE
Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

WATER SUPPLY
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

Sources of Metals in New York City Wastewater,
W75-04805 5B

Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

ATER SUPPLY DEVELOPMENT
Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

ATER TABLE
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

ATER TEMPERATURE
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

WATER TREATMENT
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

WATER UTILIZATION
Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

WATER YIELD
Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

WATER YIELD IMPROVEMENT
Control of Gambel Oak with Three Herbicides,
W75-04366 3B

Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

WATERCOURSES
Inflatable Barriers for Watercourses,
W75-04467 8A

WATERSHED MANAGEMENT
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

WATERSHEDS (BASINS)
The Brandywine: Five Years After,
W75-04360 6B

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

WAVE ACTION
Floating Wave Barrier,
W75-04453 8A

WAVE ENERGY
Floating Wave Barrier,
W75-04453 8A

WAVES (WATER)
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Floating Wave Barrier,
W75-04453 8A

WEATHER
Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

WEATHER MODIFICATION
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

WEATHER PATTERNS
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

WEATHERING
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

WEIGHTING FUNCTION
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

WEIGHTING FUNCTIONS (ANALYSIS)
The Objective Analysis of Relative Humidity,
W75-04791 2B

WELL PERMITS
EPA Policy on Injection Wells.
W75-04592 5G

WETLANDS
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

WHEAT
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

WHEAT YIELD
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

WHITE PERCH
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

WILLIAMSON CREEK (TEX)
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

WIND VELOCITY
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

WINDBREAKS
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

WINDS
Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

WINNIPEG (MANITOBA)
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

WISCONSIN
He Solved His Manure Handling Problem,
W75-04634 5D

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

WOOD BORING INSECTS
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

WYOMING
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

YEASTS
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

YOLO LIGHT CLAY
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

YUGOSLAVIA
The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

YUGOSLAVIA (GORSKI KOTAR AND LIKA)
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

YUGOSLAVIA (LIKA-GORSKI KOTAR)
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

ZERO DISCHARGE
An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

ZOOGLOEA SP.
Bacterial Zoogloea Formation,
W75-04572 5D

ZOOPLANKTON
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

AUTHOR INDEX

AARSTAD, J. S.
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

ABALJAN, T. S.
Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

ABBOTT, G. T.
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

ABEL, J. W.
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

ABRAHAM, C. E.
Computer Use for River Regulation,
W75-04531 4A

ADAM, K. M.
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

ADAMS, C. E.
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

ADAMS, J. E.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

AGEE, J. L.
Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

AIKEN, C. L. V.
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

AIYAMA, T.
Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

AL-ADSANI, A. M. S.
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

AL-KHAFAF, S.
Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

ALAM, F. C. K.
Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

ALATI, A.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

ALARO, J. F.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

ALLISON, L.
Jurisdiction in National Waters,
W75-04650 6E

ALLISON, L. E.
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

AMIARD-TRIQUET, C.
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

ANDERSON, H. W.
Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

ANDRE, P. D.
Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Slats in the Southwest,
W75-04621 5D

ANDREWS, D. J.
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

ANDREWS, J. F.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

ANIOL, R.
Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

ARCHULETA, R. F.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

ARKIN, G. F.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

ARMALY, F.
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

ARMAN, J. A.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

ASPIN, M.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

ATKINS, M. J.
The Objective Analysis of Relative Humidity,
W75-04791 2B

ATTMANNSPACHER, W.
Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

AVNIMELECH, Y.
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

BARCKHAUSEN, R.
Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

BALDING, F. R.
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

BANKS, P. A.
Sewage Treatment in the Potteries,
W75-04823 5D

BARFIELD, B. J.
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

BARGER, W. R.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

BARTLETT, H. D.
Dewatering Bovine Animal Manure,
W75-04627 5D

BARTLETT, J. W.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BASAK, P.
Stress-Strain Response for Sand,
W75-04696 8D

BASSETT, C. R.
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

BAUMANN, E. R.
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

BAZLOVA, T. I.
Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

BEATLEY, J. C.
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

BEAUCHAMP, E. G.
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

BECK, L. A.
Methods of Removing Nitrates From Water,
W75-04626 5D

BELL, D. T.
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

BENECKE, P.
Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

BENEDICT, J.
The Brandywine: Five Years After,
W75-04360 6B

BENOIT, D. A.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

BENSON, C. R.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

BERNDT, H.
Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

BERRY, J. G.
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

BERTHOUEX, P. M.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

BEWTRA, J. K.
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

BIENIARZ, K.
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

BIGGAR, J. W.
The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

BLAIR, B. J.
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

BLANCHARD, B. J.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

BLEAK, A. T.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

BLEASDALE, A.
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

BLUMBERG, D. F.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

BOLTON, R. E.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

BORISENKOV, YE. P.
Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

A Small-Parameter Model of Circulation in an Homogeneous Baroclinic Ocean,
W75-04738 2L

Small Parametric Model of the Precomputation of Meteorological Fields on the Basis of Complete Equations and Its Energetic Analogs,
W75-04736 7C

BOS, R. E.
Dewatering Bovine Animal Manure,
W75-04627 5D

BOUMA, J.
Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

BOWLEY, W. W.
Floating Wave Barrier,
W75-04453 8A

BOWYER, F. J.
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

BOYUM, A.
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

BRABY, L. A.
Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Dosimetry,
W75-04414 5C

BRADFORD, B. H.
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

BRADFORD, J. M.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

BRADY, L. A.
Radiation Biophysics,
W75-04415 5C

BRAHMA, S. P.
Stress-Strain Response for Sand,
W75-04696 8D

BRANDSON, N. B.
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

BRAUD, H. J.
Raindrop Characteristics in South Central United States,
W75-04713 2B

BRAY, L. A.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BREVIK, T. J.
He Solved His Manure Handling Problem,
W75-04634 5D

BREWER, R.
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

BRIDGE, B. J.
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

BRIGHT, P. L.
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

BRINKMANN, W. L. F.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

BRODZINSKI, R. L.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

BROWN, C. L.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

BROWN, H. D.
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

BROWN, R. H.
Fast Fluch System,
W75-04622 5D

BROWNELL, L. E.
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

BROWNING, V. D.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2

BUDDEMEIER, R. W.
Radiocarbon, Carbon-13 and Tritium in Wate Samples from Basaltic Aquifers and Carbonat Aquifers on the Island of Oahu, Hawaii,
W75-04441 2I

BULJAN, M.
Contact (Oil) Water Determination in Terrestri al-Waters Using an Oceanographic Method,
W75-04502 5A

BUNNELL, L. R.
Medical Uses of Isotopes,
W75-04417 5C

BURAS, N.
Water Management Systems,
W75-04538 3

BURD, R. S.
Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

BURGER, L. L.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BURKHEAD, C. E.
Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

BURNHAM, J. B.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

BURNS, R. E.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BUTCHBAKER, A. F.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

BUTLER, B. J.
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

BYERLEY, J. J.
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

CAMPBELL, C. J.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

CAMPBELL, C. P.
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

CAPPENBERG, T.
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

CARMICHAEL, R. D.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

CARROLL, R. J.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

CARRUTH, P. JR.
African Attitudes Toward the Law of the Sea,
W75-04771 6E

CARTER, C. E.
Raindrop Characteristics in South Central United States,
W75-04713 2B

CASLER, G. L.
Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

CEDERGREN, H. R.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

CEHAK, K.
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

CHAN, Y. K.
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

CHAPMAN, S. W. JR.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

CHAUDHARY, M. R.
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

CHEN, A.
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

CHEN, K. Y.
Trace Metals in Wastewater Effluents,
W75-04806 5B

CHERRY, D. S.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

CHERUBINI, A.
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

CHESNESS, J. L.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

CHILDS, K. E.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

CHIPLEY, A. S.
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

CHIU, S. Y.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

CHOI, E. S-H.
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

CHRISTENSEN, G. M.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

CHRISTENSEN, L. R.
Laboratory Studies on Feedlot Runoff,
W75-04653 5D

CLARK, J.
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

CLARK, K. N.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

CLARK, R. N.
Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

CLARY, W. P.
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

CLEASBY, J. L.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

CLEMENT, T. M. JR.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

CLEMENTS III, E. V.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

COCHRAN, V. L.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

COHEN, J. M.
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

COLE, C. V.
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

COLLIS-GEORGE, N.
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

COMER, G. H.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

CONNELL, J. R.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

COOK, P. M.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

COOLEY, A. M.
Separation, Dewatering and Disposal of Sugar-beet Transport Water Solids, (Phase I),
W75-04565 5D

CORNISH, P. M.
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

CORRIN, M. L.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

COURTRIGHT, B.
Winch-Driven Irrigation Apparatus,
W75-04452 3F

COX, M. F.
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

CRAM, J. S.
Water: Canadian Needs and Resources,
W75-04359 6B

CREER, J. M.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

CROSS, F. T.
Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

CUNGE, J. A.
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

CUNNINGHAM, G. L.
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

DALE, A. C.
Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

DAUGHERTY, R. V.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

DAVIS, P. A.
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

DAY, D. L.
In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

DE CASABIANCA, M-L.
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

DE RIDDER, N. A.
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

DECKER, J. R.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

DEES, P.
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

DELIJANIC, I.
The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

DELUCIA, R. J.
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

DENDY, F. E.
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

DESSOUKY, M. I.
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

DHAWAN, B. D.
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

DIVINE, J. R.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

DIXON, A. L. JR.
Methods for Elimination of Oil Slicks,
W75-04455 5G

DOBRENZ, A. K.
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

DONOVAN, T. J.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

DORN, P.
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

DOSS, B. D.
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

DOWNING, P. B.
Enforcement Economics in Air Pollution Control,
W75-04569 5G

DRUMHELLER, K.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

DUDLEY, J. G.
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

DURU, J. O.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

DYUBKIN, I. A.
The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

Software for the Sigma-S,
W75-04731 7C

A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

DZURISIN, G. L.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

EDA, M.
Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

EDWARDS, K. A.
Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

EDWARDS, R. R. C.
Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

EFTINK, B.
Manure Handling Systems for the Future,
W75-04635 5D

EL-RAMLY, N.
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

ELIASSEN, A.
Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

ELLIS, B.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

ELLIS, L. V.
Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

ENNS, K.
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

EPLER, P.
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

FAIRBANK, W. C.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

FARMER, E. E.
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

FARQUHAR, J.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

FARRAH, S. R.
Bacterial Zoogloea Formation,
W75-04572 5D

FARRINGTON, J. W.
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

FEDOROV, O. M.
Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

FELL, J.
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

FEREBEE, R. N.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

FERGUSON, H. L.
The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

FLEMING, B.
Tailor Made Confinement Barn,
W75-04617 5D

FLETCHER, J. E.
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

FLIEGEL, M. H.
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

FLOYD, J. M.
Raindrop Characteristics in South Central United States,
W75-04713 2B

FORD, D. E.
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

FORDYCE, I. V.
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

FOUTZ, A. L.
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

FRANK, S.
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

FRANZ, M.
Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

FREEMAN, G. E.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

FRIEDMAN, I.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

FUKS, Z. R.
The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

FULLERTON, C. M.
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

GALAKHOV, Z. P.
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

GANZINOTTI, J. V.
Inflatable Barriers for Watercourses,
W75-04467 8A

GARRETT, P.
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

GARRETT, W. D.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

GARTON, J. E.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

GEE, G. W.
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

GEORGE, R. M.
Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

GERAKIS, P. A.
Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

GERBER, N. N.
Microbiological Production of Geosmin,
W75-04561 5D

GERO, A. J.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

GIBSON, C. I.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

GIFT, J. J.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

GIGON, A.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

GILBERTSON, C. B.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

GILCHRIST, R. W.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

GILLILAND, B. E.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

GILLIS, M. F.
Medical Uses of Isotopes,
W75-04417 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

GJORSVIK, O. G.
Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

GLASS, G. E.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

GODA, T.
Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

GOERING, C. E.
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

GOLD, R. C.
Development of an Organic Waste Slurry Injector,
W75-04616 5D

GOLDSTEIN, W.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

GOLUEKE, C. G.
Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

GOOD, W. R.
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

GORDON, N. R.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

GORE, B. F.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

GOTTBRATH, J.
Swine Waste Management Systems,
W75-04629 5D

GRABSKE, R. J.
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

GRANSTROM, M. L.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

GRAU, C. R.
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

GRAVES, R. E.
An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

GREEN, F. H. W.
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

GREEN, R. L.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

GREER, J. D.
Raindrop Characteristics in South Central United States,
W75-04713 2B

GRICE, G. D.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

GRIGGS, B.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

GULMON, S. L.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

GUPTA, V. L.
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

GUTHRIE, R. K.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

HADAS, A.
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

HAFETZ, L.
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

HAFEZ, A. A. R.
Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

HAGIHARA, T.
Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

HAIR, M. E.
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

HAKALA, T.
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

HAMM, D.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

HANKS, R. J.
Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

HANN, J. A.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

HANSEN, E. M.
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

HARBO, R.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

HARDISTY, D. M.
Rational Basis for Septic Tank System Design,
W75-04801 5D

HARDY, B. E.
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

HARGROVE, T.
Test Swine Waste Disposal Systems,
W75-04637 5D

HARPSTEAD, M. I.
The Classification of Some Nigerian Soils,
W75-04390 2G

HART, V. L.
Spy Mesa Yields Better Understanding of Pinyon-Juniper in Range Ecosystem,
W75-04375 2I

HARTE, J.
On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

HAUG, R. M.
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

HAUKIOJA, E.
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

HAUPT, H. F.
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

HAWKINS, H. S.
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

HEALY, K. A.
Rational Basis for Septic Tank System Design,
W75-04801 5D

HEDENLAND, L. D.
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

HEIMAN, M. K.
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

HEIMBACH, J. A.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

HELD, I. M.
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

HELLSTROM, D. I.
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

HERMANSON, R. E.
Management of Swine Waste by a Lagoon System,
W75-04632 5D

HERSHFIELD, D. M.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

HEWLETT, J. D.
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

ILER, E. A.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

ILL, T. K.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

ILLSBERG, J.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

INMAN, W. C.
Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

INN, G. M.
Nuclear Techniques in Medical Science,
W75-04412 5A

IRSCH, A.
Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

JAGLAND, E.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

JGSTROM, U.
A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

JLM, H. W.
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

HOLMES, E. T.
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

HOLT, R. F.
Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

HOLTAN, H. N.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

HORSFIELD, B.
Swine Waste Management Systems,
W75-04629 5D

HORSFIELD, B. C.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

HORTON, J. S.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

HOWE, C. W.
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

HRUBANT, G. R.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

HSIEH, J. J. C.
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

HSIEH, Y. P.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

HUANG, C.-Y.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

HUANG, J. C.
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

HUANG, J. Y. C.
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

HUBLY, D. W.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

HUFEN, T. H.
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

HULL, A. C. JR.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

HULT, J. L.
Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

HUNGATE, F. P.
Medical Uses of Isotopes,
W75-04417 5C

HUNTER, I.
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

HUNTER, W. G.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

HUTCHINSON, P.
The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

HUTTON, J. T.
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

HYLAND, R. E.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

IDSO, S. B.
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

ILLIAN, J. R.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

IRWIN, W. A.
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

ISRAELSEN, E. K.
A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

JACKIVICZ, T. P. JR.
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

JACOBS, J. J.
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

JACOBSON, R. L.
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

JAMES, L. D.
Economics, (Literature Review),
W75-04846 5G

JAN, T. K.
Trace Metals in Wastewater Effluents,
W75-04806 5B

JANES, B. E.
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

JEGLUM, J. K.
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

JENKINS, D.
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

JESTER, W. A.
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

JIUSTO, J. E.
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

JOHNSON, G. V.
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

JOHNSON, O. S.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

JOHNSON, R. G.
Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

JOHNSON, W. S.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

JOHNSTON, H. S.
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

JOHNSTON, R.
Environmental Values and Water Quality Planning,
W75-04530 5G

JOINER, T. J.
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

JONES, C. J.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

JORDAN, R. L.
Methods for Elimination of Oil Slicks,
W75-04455 5G

JORDAN, W. R.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

JORQUE, M.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

KADLEC, J.
Swine Waste Management Systems,
W75-04629 5D

KAWAHARA, O.
Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

KEENE, J. C.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

KELLER, H. M.
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

KELLER, J.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

KELLER, W.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

KEM, J. A.
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

KENNAUGH, J. H.
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

KHALIL, M. B.
River Regime With Special Reference to River Nile,
W75-04706 2E

KHARSHAN, A. A.
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

KHATAVKAR, G. D.
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

KIRDA, C.
The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

KIRSCHNER, S. L.
Sources of Metals in New York City Wastewater,
W75-04805 5B

KLAGES, M. G.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

KLASS, D. L.
Hydrate Forming in Water Desalination,
W75-04466 3A

KLEIN, L. A.
Sources of Metals in New York City Wastewater,
W75-04805 5B

KLEIN, N. W.
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

KLEIN, S. A.
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

KLEPPER, B.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

KLETT, R. H.
Effect of Ration on Manure Salt Content,
W75-04834 5D

KLOOSTER, S. A.
Water Quality by Photographic Analysis,
W75-04814 5A

KLYUKBIN, L. N.
A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

KNOX, R. A.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

KOMAROV, V. D.
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

KOON, J. L.
Management of Swine Waste by a Lagoon System,
W75-04632 5D

KOSOROK, J. R.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

KOVACS, S.
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

KOWAL, J.
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

KRANS, J. V.
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

KUGELMAN, I. J.
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

KUHNER, J.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

KULKARNI, G. A.
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

KULKARNI, K. M.
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

KULPERGER, R. J.
Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

KURIHARA, T.
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

KUZMINSKI, L. N.
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

KYNARD, B. E.
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

KYUSHIN, S.
Activated Sludge Bulking (In Japanese),
W75-04824 5D

LAAK, R.
Rational Basis for Septic Tank System Design,
W75-04801 5D

LADD, T. A.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

LAI, M. G.
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

LAILAS, N.
Complying with Discharge Regulations,
W75-04431 5G

LAL, P.
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

LAL, R.
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

LAM, C. M.
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

LANG, M.
Sources of Metals in New York City Wastewater,
W75-04805 5B

LANGMUIR, D.
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

LANNER, M.
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

LARSON, J. J.
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

LARSON, R. E.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

LARYEA, K. B.
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

LAU, L. S.
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

LEANORD, B. R. JR.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

LECH, R. F.
Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

LEE, E. S.
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

LEE, H.
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

LEE, H. W.
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

LEE, T-F. D.
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

LEETMAA, A.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

LESSOR, D. L.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

LESTER, D. H.
Medical Uses of Isotopes,
W75-04417 5C

LEVI, D. R.
Philosophy on Livestock Waste Regulation,
W75-04838 5G

LEVIN, A. G.
About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

LEVIN, Z.
The Coalescence of Water Drops,
W75-04728 1A

LEVY, B.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

LEVY, D.
On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

LEWELLAN, T. K.
Nuclear Techniques in Medical Science,
W75-04412 5A

LEWIS, M. J.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

LEWIS, R. B.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

LIAO, P. B.
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

LIEB, D. F.
Method for Electrosanitizing Waste Water,
W75-04464 5D

LIGON, J. T.
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

LIIKALA, R. C.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

LINDGREN, D. T.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

LINDLEY, M.
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

LIROFF, R. A.
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

LODKIN, I. I.
The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

LOEHR, R. C.
Ammonia Desorption by Diffused Aeration,
W75-04812 5D

LOGAN, L. D.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

LOPEZ, G.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

LOWE, R. L.
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

LUDWIG, R. G.
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

LUNDBERG, E. A.
Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

LUTHIN, J. N.
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

MACAULEY, D. C.
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

MACKAY, J. S.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

MACKENZIE, A. J.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

MADDEN, J. M.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

MAHONEY, G. W. A.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

MAJOR, G.
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

MALLEVIALLE, J.
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

MALOUF, J. B.
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

MANGAN, G. F. JR.
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

MANKKI, J.
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

MANNERING, J. V.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

MANNING, A. W.
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

MANSON, S. T.
Radiation Physics,
W75-04413 5C

MARTIN, D. M.
The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

MARTIN, K. L.
Analyzing Biological Properties of Wastes,
W75-04842 5A

MASSENGALE, M. A.
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

MATHERS, A. C.
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

MATSUI, E.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

MATTER, F. S.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

MAVINIC, D. S.
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

MCCOMAS, F.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

MCELROY, A. D.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

MCERLEAN, A. J.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

MCKEE, R. W.
Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Population Radiation Exposure,
W75-04420 5C

MCKIM, J. M.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

MCKINNEY, R. W.
Methods for Elimination of Oil Slicks,
W75-04455 5G

MCLAUGHLIN, S. J.
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

MCPARTLAND, J. T.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

MCPHERSON, M. B.
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

MEEK, B. D.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

MEHROTRA, S. C.
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

MEHTA, S. C.
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

MEIER, P. M.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

MELDRIM, J. W.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

MERCURI, A. J.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

MEREDITH, D. D.
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

MERSICH, I.
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

METZGER, J. B.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

MEYER, J. L.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

MIHURSKY, J. A.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

MILLER, D. W.
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

MILLER, J. F.
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

MILLER, R. D.
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

MILNE, G. A.
Sewage Treatment System,
W75-04456 5D

MISKOLCI, F.
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

MISRA, P. K.
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

MITCHELL, V. L.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

MOMMESSIN, P. R.
Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

MONTZ, G. N.
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

MOONEY, H. A.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

MORRISON, S. M.
Analyzing Biological Properties of Wastes,
W75-04842 5A

MOUNTAIN, P. T.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

MUCHIN, V. M.
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

MULLER, C. H.
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

MULLINER, H. R.
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

MUSIL, R.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

NACHTWEY, D. S.
Radiation Biophysics,
W75-04415 5C

NAGURNYY, A. P.
Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

NAIKSATAM, A. S.
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

NASH, N.
Sources of Metals in New York City Wastewater,
W75-04805 5B

NEAL, A. M. JR.
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

NEAL, L. A.
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

NELEPO, B. A.
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

NELP, W. P.
Nuclear Techniques in Medical Science,
W75-04412 5A

NELSON, G. R.
Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

NICHOLS, JEAN ANN
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

NIELSEN, D. R.
The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

NIELSEN, J. M.
Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

NISHITA, H.
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

NORRISH, K.
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

NUTTER, W. L.
The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

NYE, J. C.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

O'BRIEN, K. H.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

O'CONNOR, S. G.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

OLIVER, J. C.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

ONAT, E.
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

ORLANDO, J. A.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

ORR, D. V.
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

OTIS, R. J.
Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

PAINE, M.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

PALLESEN, L. C.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

PALMER, H. E.
Nuclear Techniques in Medical Science,
W75-04412 5A

PAN, P. S.
Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

PAPENDICK, R. I.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

PARETZKE, H. G.
Radiation Physics,
W75-04413 5C

PARKHURST, J. D.
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

PARLANGE, J-Y.
Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

PECK, E. L.
Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

PEDERSEN, K.
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

PEGRAM, G. G. S.
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

PEJLER, B.
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

PENDERGRASS, J.
The Law of Maritime Oil Spills,
W75-04770 6E

PETER, K. D.
Method and Apparatus for Producing a Distillate,
W75-04465 3A

PETERSON, R. E.
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

PETERSON, W. D.
Removal of Boron From Water,
W75-04462 5D

PETROSKY, B. R.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

PHANTUMVANIT, D.
Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

PICK, P. E.
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

PIEST, R. F.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

PITTMAN, B. W.
The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

PLANER, G. A.
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

PLESKO, N.
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

POOLE, W. H.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

POON, C. P. C.
Electrochemical Process for Nutrient Removal,
W75-04446 5D

POPP, L.
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

PORTER, L.
Radiation Physics,
W75-04413 5C

PRIHAR, S. S.
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

QUAN, D. A.
Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

QUAN, E. L.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

QUIGLEY, T. M.
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

QUINN, J. G.
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

RAIA, J. C.
Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

RAINER, R. K.
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

RANCITELLI, L. A.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

REDDELL, D. L.
Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

REDMORE, D.
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

REINERS, W. A.
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

REINHORN, T.
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

REISENAUER, A. E.
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

RENARD, K. G.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

RESIDE, J.
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

RHODES, R. A.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

RIBLE, J. M.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

RICHARDSON, D. L.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

RICHERSON, P.
Environmental Values and Water Quality Planning,
W75-04530 5G

RIEDEL, J. T.
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

RIEMATH, W. F.
Medical Uses of Isotopes,
W75-04417 5C

RILEY, J. P.
A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

RINGLER, T. A.
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

RISK, N. E.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

RITCHIE, J. T.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

ROBERTSON, J.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

RODKIEWICZ, C. M.
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

ROESCH, W. C.
Radiation Biophysics,
W75-04415 5C

Radiation Dosimetry,
W75-04414 5C

ROHATGI, N.
Trace Metals in Wastewater Effluents,
W75-04806 5B

ROMANTSOV, V. A.
A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

ROOD, O. E.
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

ROSEN, H. M.
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

ROWE, GILBERT T.
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

RUML, D. J.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

RUSSO, D.
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

RYAN, J. L.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

RYDEN, B. E.
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

RYSKIEWICH, B. S.
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

SADOWSKY, V.
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

SALATI, E.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

SALSTEIN, D. A.
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

SALTER, P. M.
Areal Rainfall Analysis by Computer,
W75-04687 7C

SANDER, F.
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

SASAKI, B. R.
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

SASMAN, R. T.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

SATO, K.
Sphere Method Turbidimeter,
W75-04819 5A

SAVAGE, S. M.
Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

SAVCHENKO, V. G.
The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

SAWHNEY, B. L.
Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

SCHAFER, C. J.
Complying with Discharge Regulations,
W75-04431 5G

SCHAPLER, F. L.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

SCHERZ, J. P.
Water Quality by Photographic Analysis,
W75-04814 5A

SCHICKEDANZ, P. T.
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

SCHLESINGER, W. H.
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

SCHMIDT, C. J.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

SCHNEIDERMAN, M. H.
Radiation Biophysics,
W75-04415 5C

SCHON, E. A.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

SCHREIBER, A.
Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

SCHREIBER, B.
Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

SCHREIBER, E.
Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

SCHULZE, F. E.
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

SCHUMAN, S. P.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

SCOTTER, D. R.
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

SEARCY, G. K.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

SEARLE, L.
Manure Handling Systems for the Future,
W75-04635 5D

SEO, K. K.
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

SEREBRENY, S. M.
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

SEVRUK, B.
Evaporation Losses from Storage Gauges,
W75-04657 7B

Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

SHAW, E. M.
A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

SHERARD, D. R.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

SHIH, C. Y.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

SHIMKO, A. N.
Pneumatic Transportation of Manure,
W75-04641 5D

SHOSTAK, A. B.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

SHUBERT, R. H.
Method for Treatment of Coal Washery Waters,
W75-04463 5D

SIMPSON, R. B.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

SINGH, K. S.
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

SINIK, N.
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

SKAAR, E.
Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

SMID, A. E.
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

SMITH, C. S. JR.
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

SMITH, J. L.
Development of an Organic Waste Slurry Injector,
W75-04616 5D

SMITH, K. L. JR.
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

SMITH, R. D.
Atmospheric Moisture Parameterization,
W75-04724 2B

SMITH, R. J.
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

SMITH, R. L. JR.
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

SOLOMON, J.
The Social Redemption of Pure Garbage,
W75-04553 5D

SONA, K.
Activated Sludge Bulking (In Japanese),
W75-04824 5D

SPALDING, J. F.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

SPENCER, W. F.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

SRINATH, E. G.
Ammonia Desorption by Diffused Aeration,
W75-04812 5D

ST, H. S.
Updating Aging Sewers Without Trenching,
W75-04828 5D

ST, P. P.
Methods of Removing Nitrates From Water,
W75-04626 5D

STAFFORD, D. B.
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

STAMM, G. G.
The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

STANSELL, J. R.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

STEFAN, H.
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

STEFANSON, R. C.
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

STEPANYUK, V. A.
The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

STEPHENSON, D. A.
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

STEVENS, J. H.
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

STEWART, B. A.
Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

STILLMAN, N. W.
Method for Electrosanitizing Waste Water,
W75-04464 5D

STOKES, H. B. JR.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

STOKES, H. W.
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

STONE, H. E.
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

STORR, D.
The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

STRONG, A. L.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

SUAREZ, M. J.
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

SUMNER, J. S.
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

SUPER, A. B.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

SUTTON, J. D.
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

SWEAZY, R. M.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

SWEET, H. R.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

SWEETEN, J. M.
Future Developments in Feedlot Waste Management,
W75-04836 5D

SWIFT, W. H.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

TAIGANIDES, E. P.
Coprology: A Pollution Solution,
W75-04545 5D

TALSMA, T.
The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

TASH, J. C.
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

TAYLOR, F. W.
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

TELLER, C. J.
Farms are Not in the Country Any More,
W75-04546 5D

TERRY, R. C.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

THATCHER, A. P.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

Spy Mesa Yields Better Understanding of Pinyon-Juniper in Range Ecosystem,
W75-04375 2I

THOMAS, C. W.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

THOMAS, G. W.
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

THOMAS, J. D.
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

THOMPSON, J.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

THOMPSON, J. R.
Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

THURLOW, D. L.
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

TIETJEN, G. L.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

TILLSON, D. D.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

TIMMONS, J. F.
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

TOBUREN, L. H.
Radiation Physics,
W75-04413 5C

TOLLNER, H.
Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

TOUSSAINT, C. R.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

TRNOVSKY, M.
Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

TROMBLE, J. R.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

TSCHESCHKE, P.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

TUCKER, J. H.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

TURKEL, E.
Frontal Motion in the Atmosphere,
W75-04792 2B

TURNER, D. O.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

UECKERT, D. N.
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

UHLER, K. A.
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

UNGER, P. W.
Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

UNZ, R. F.
Bacterial Zoogloea Formation,
W75-04572 5D

UPCHURCH, S. B.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

UTHMAN, F.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

VAHL, H.
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

VAN DER PLOEG, R. R.
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

VAN EPPS, G. A.
Control of Gambel Oak with Three Herbicides,
W75-04366 3B

VAN MAREN, MARION J.
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

VANDERHOEF, L. N.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

VAURAS, J.
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

VOLK, V. V.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

VUGLINSKI, V. S.
Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

WALKER, W. G.
Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

WALLACE, R. W.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

WALLICK, E. I.
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

WANG, L. K.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

WANG, M. H.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

WARD, R. C.
Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

WARE, G. W.
Ecological History of DDT in Arizona,
W75-04387 5C

WARMAN, J. C.
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

WASSERMAN, C.
The Brandywine: Five Years After,
W75-04360 6B

WATSON, J. R.
Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

WATSON, W. D. JR.
Enforcement Economics in Air Pollution Control,
W75-04569 5G

WELBORN, H. L.
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

WELLS, D. M.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

WENZEL, H. G.
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

WHEATON, R. Z.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

WHITEHEAD, J. A.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

WIEBE, P. H.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

WIERSMA, J. L.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

WILCOX, L. C.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

WILLIAMS, J.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

WILLIAMS, L.
Hail and Its Distribution,
W75-04604 2C

WILLRICH, T. L.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

WILSON, R.
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

WILSON, R. S.
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

WILSON, S. K.
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

WILSON, T. E.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

WILSON, W. E.
Radiation Physics,
W75-04413 5C

WINSTANLEY, D.
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

WISE, G. G.
Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

WOGMAN, N. A.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

WOLLA, M.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

WOODY, W. M.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

WORKMAN, J. P.
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

WRIGHT, H. A.
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

WRIGHT, J. F.
Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

WUNZ, E. C.
Dewatering Bovine Animal Manure,
W75-04627 5D

WYATT, G. M.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

YOUNG, C. S.
Trace Metals in Wastewater Effluents,
W75-04806 5B

ZAFIRIOU, O. C.
Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

ZAHNER, R.
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

ZHIDIKOV, A. P.
About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

ZUDIN, O. F.
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

ORGANIZATIONAL INDEX

ABRAHAM BALDWIN AGRICULTURAL COLL., TIFTON, GA.
Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

AD HOC PANEL OF THE ADVISORY COMMITTEE ON TECHNOLOGY INNOVATION, BOARD ON SCIENCE AND TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT, COMMISSION ON INTERNATIONAL RELATIONS.
More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

ADELPHI UNIV., OAKDALE, N.Y. INST. OF MARINE SCIENCE.
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

AGRICULTURAL RESEARCH SERVICE, BATON ROUGE, LA.
Raindrop Characteristics in South Central United States,
W75-04713 2B

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. HYDROGRAPH LAB.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

AGRICULTURAL RESEARCH SERVICE, BRAWLEY, CALIF. IMPERIAL VALLEY CONSERVATION RESEARCH CENTER.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

AGRICULTURAL RESEARCH SERVICE, CHICKASHA, OKLA.
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

AGRICULTURAL RESEARCH SERVICE, COLUMBIA, WATERSHED RESEARCH UNIT.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

AGRICULTURAL RESEARCH SERVICE, LOGAN, UTAH.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

AGRICULTURAL RESEARCH SERVICE, OXFORD, MISS. SEDIMENTATION LAB.
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

AGRICULTURAL RESEARCH SERVICE, PEORIA, ILL. NORTHERN MARKETING AND NUTRITION RESEARCH DIV.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

AGRICULTURAL RESEARCH SERVICE, PROSSER, WASH.
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

AGRICULTURAL RESEARCH SERVICE, PULLMAN, WASH.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

AGRICULTURAL RESEARCH SERVICE, RIVERSIDE, CALIF. SALINITY LAB.
Drainage for Agriculture,
W75-04537 3F

AGRICULTURAL RESEARCH SERVICE, TEMPLE, TEX. BLACKLAND CONSERVATION RESEARCH CENTER.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

AGRICULTURAL RESEARCH SERVICE, TUCSON, ARIZ. SOUTHWEST WATERSHED RESEARCH CENTER; AND SOIL CONSERVATION SERVICE, PHOENIX, ARIZ.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

ALBERTA UNIV., EDMONTON.
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

ALL-UNION RESEARCH INST. OF CATTLE-BREEDING, PODOLSK (USSR).
Pneumatic Transportation of Manure,
W75-04641 5D

AMERICAN CRYSTAL SUGAR CO., DENVER, COLO.
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

AMERICAN FROZEN FOOD INST., WASHINGTON, D.C.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

AMERICAN SOCIETY OF CIVIL ENGINEERS, NEW YORK.
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

AMERICAN WATER WORKS ASSOCIATION, NEW YORK. COMMITTEE ON RESEARCH.
Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

AMERICAN WATER WORKS ASSOCIATION, NEW YORK, RESEARCH COMMITTEE ON DISTRIBUTION SYSTEMS.
Water-Distribution Research and Applied Development Needs.
W75-04763 6B

AMSTERDAM UNIV. (NETHERLANDS). INST. OF TAXONOMIC ZOOLOGY.
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

ARIZONA COOPERATIVE FISHERY UNIT, TUCSON.
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

ARIZONA UNIV., TUCSON.
Ecological History of DDT in Arizona,
W75-04387 5C

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

ARIZONA UNIV., TUCSON. DEPT. OF GEOSCIENCES.
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

ARIZONA UNIV., TUCSON. DEPT. OF SOILS, WATER, AND ENGINEERING.
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

ARIZONA UNIV., TUCSON. GEOPHYSICS LAB.
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

ARMY ENGINEER DISTRICT, BALTIMORE, MD.
Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

ARMY ENGINEER DISTRICT, CHICAGO, ILL.
Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

ARMY ENGINEER DISTRICT, GALVESTON, TEX.
Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

ARMY ENGINEER DISTRICT, JACKSONVILLE, FLA.
Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

ARMY ENGINEER DISTRICT, KANSAS CITY, MO.
Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

ARMY ENGINEER DISTRICT, NORFOLK, VA.
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

ARMY ENGINEER TOPOGRAPHIC LABS., FORT BELVOIR, VA. EARTH SCIENCES DIV.
Hail and Its Distribution,
W75-04604 2C

ASSIUT UNIV. (EGYPT).
River Regime With Special Reference to River Nile,
W75-04706 2E

ASTON UNIV., BIRMINGHAM (ENGLAND).
The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

ATLANTIC RICHFIELD HANFORD CO., RICHLAND, WASH.
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

ATMOSPHERIC ENVIRONMENT SERVICE, CALGARY (ALBERTA).
The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

AUBURN UNIV., ALA. DEPT. OF AGRONOMY AND SOILS.
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

AUBURN UNIV., ALA. WATER RESOURCES RESEARCH INST.
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

AUTOCON INDUSTRIES, ST. PAUL, MINN.
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH.
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Physics,
W75-04413 5C

Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Medical Uses of Isotopes,
W75-04417 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Population Radiation Exposure,
W75-04420 5C

Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

BELLAIRS RESEARCH INST., ST. JAMES (BARBADOS).
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

BERGEN UNIV. (NORWAY). GEOFISISK INSTITUTT.
Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

BOWLING GREEN STATE UNIV., OHIO.
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

BRISTOL UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

BRITISH METEOROLOGICAL OFFICE, BRACKNELL (ENGLAND).
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Areal Rainfall Analysis by Computer,
W75-04687 7C

The Objective Analysis of Relative Humidity,
W75-04791 2B

BUREAU OF LAND MANAGEMENT, WASHINGTON, D. C.
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

BUREAU OF RECLAMATION, BOULDER CITY, NEV. REGION 3.
Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

BUREAU OF RECLAMATION, WASHINGTON, D.C.
The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

BURNS AND ROE, INC., ORADELL, N.J.
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

CALIFORNIA UNIV., BERKELEY. SANITARY ENGINEERING RESEARCH LAB.
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

CALIFORNIA UNIV., DAVIS.
Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING.
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

CALIFORNIA UNIV., DAVIS. DIV. OF ENVIRONMENTAL STUDIES.
Environmental Values and Water Quality Planning,
W75-04530 5G

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W75-04394 5A

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W75-04421 5A

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W75-04373 2G

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W75-04539 6A

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W75-04540 6A

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W75-04385 2I

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W75-04809 8A

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W75-04681 7A

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W75-04490 2H

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W75-04495 2E

CH2O, INC., LA GRANDE, DREG. (ASSIGNEE).
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W75-04452 3F

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W75-04497 2L

CLAYTON JUNIOR COLL., MORROW, GA.
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

CLEMSON UNIV., S. C.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

CLEMSON UNIV., S. C. DEPT. OF AGGRICULTURAL ENGINEERING.
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

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W75-04447 5C

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W75-04828 5D

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRICULTURAL ENGINEERING.
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W75-04616 5D

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

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W75-04717 2B

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W75-04842 5A

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W75-04368 6B

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W75-04489 5C

COMMITTEE ON GOVERNMENT OPERATIONS (U.S. HOUSE).
Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS (U. S. HOUSE).
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W75-04787 6E

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Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

COMMITTEE ON MERCHANT MARINE AND FISHERIES (U.S. HOUSE).
Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

Interim Nuclear Licensing.
W75-04788 6E

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W75-04484 2D

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Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

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W75-04700 2G

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W75-04801 5D

CONNECTICUT UNIV., STORRS. DEPT. OF PLANT SCIENCE.
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W75-04399 3F

CONSERVATION FOUNDATION, WASHINGTON, D.C.
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W75-04354 5C

CORNELL UNIV., ITHACA, N. Y.
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W75-04526 5G

CORNELL UNIV., ITHACA, N.Y. AGRICULTURAL WASTE MANAGEMENT PROGRAM.
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W75-04812 5D

CORNELL UNIV., ITHACA, N.Y. DEPT. OF ECOLOGY AND SYSTEMATICS.
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

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W75-04445 6E

CORPS OF ENGINEERS, PORTLAND, OREG. NORTH PACIFIC DIV.
Computer Use for River Regulation,
W75-04531 4A

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W75-04779 5G

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W75-04577 5D

DARTMOUTH COLL., HANOVER, N.H. DEPT. OF GEOGRAPHY.
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W75-04726 7C

DECISION SCIENCES CORP., JENKINTOWN, PA.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

DEL MONTE CORP., SAN FRANCISCO, CALIF.
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W75-04564 5D

DELAWARE RIVER BASIN COMMISSION, TRENTON, N.J.
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W75-04596 5G

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W75-04628 3F

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W75-04618 5D

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W75-04444 6A

DEUTSCHER WETTERDIENST, HOHENPEISSENBERG (WEST GERMANY). METEOROLOGISCHES OBSERVATORIUM.
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W75-04691 7B

DIAMOND SHAMROCK CORP., CLEVELAND, OHIO. (ASSIGNEE).
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W75-04464 5D

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W75-04395 5G

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W75-04396 5G

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W75-04397 5G

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W75-04505 5G

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W75-04818 5A

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W75-04512 3C

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W75-04433 4D

EDAW, INC., SAN FRANCISCO, CALIF.
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W75-04657 7B

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W75-04802 8B

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W75-04575 5G

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

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Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

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W75-04431 5G

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W75-04724 2B

FEDERAL INST. OF HYDROMETEOROLOGY, BELGRADE (YUGOSLAVIA).
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W75-04376 2I

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W75-04655 7B

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W75-04383 2I

OREST SERVICE (USDA), UTAH. FOREST CIENCES LAB.
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W75-04689 2B

REEMAN (WILLIAM F.) ASSOCIATES, HIGH OINT, N.C.
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W75-04765 5D

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W75-04465 3A

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W75-04559 8B

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W75-04849 5B

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W75-04455 5G

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

GRACE (W.R.) AUSTRALIA LTD., MELBOURNE. DAVIDSON CHEMICALS DIV.
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W75-04697 7B

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W75-04533 3F

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W75-04469 5C

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W75-04470 5C

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W75-04666 2B

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W75-04658 7B

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W75-04659 2C

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W75-04668 2B

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W75-04353 5C

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W75-04703 2B

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W75-04643 5D

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W75-04755 6G

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W75-04428 5D

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Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

MISSISSIPPI UNIV., UNIVERSITY. SCHOOL OF LAW.
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

MISSOURI UNIV., COLUMBIA.
Philosophy on Livestock Waste Regulation,
W75-04838 5G

MISSOURI UNIV., COLUMBIA. DEPT. OF AGRICULTURAL ENGINEERING.
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

MISSOURI UNIV., ROLLA. DEPT. OF MECHANICAL AND AEROSPACE ENGINEERING.
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

MONTANA STATE UNIV., BOZEMAN. DEPT. OF PLANT AND SOIL SCIENCE.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

MONTANA STATE UNIVERSITY, BOZEMAN. DEPT. OF EARTH SCIENCES.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

NATAL UNIV., DURBAN(SOUTH AFRICA).
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO.
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, PRINCETON, N.J. GEOPHYSICAL FLUID DYNAMICS LAB.
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

NATIONAL WATER QUALITY LAB., DULUTH, MINN.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

NATIONAL WEATHER SERVICE, SILVER SPRING, MD. OFFICE OF HYDROLOGY.
Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

NAVAL ORDNANCE LAB., WHITE OAK, MD.
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

NAVAL RESEARCH LAB., WASHINGTON, D.C. OCEAN SCIENCES DIV.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

NEBRASKA UNIV., LINCOLN. AGRICULTURAL EXPERMENT STATION.
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

NEBRASKA UNIV., LINCOLN. DEPT. OF CIVIL ENGINEERING.
Laboratory Studies on Feedlot Runoff,
W75-04653 5D

NELSON (B.L.) AND ASSOCIATES, INC., DALLAS, TEX.
Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

NEW JERSEY AGRICULTURAL EXPERIMENT STATION, NEW BRUNSWICK.
Farms are Not in the Country Any More,
W75-04546 5D

NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF BIOLOGY.
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

NEW YORK CITY DEPT. OF WATER RESOURCES. INDUSTRIAL WASTES CONTROL SECTION.
Sources of Metals in New York City Wastewater,
W75-04805 5B

NEW YORK STATE COLL. OF AGRICULTURE AND LIFE SCIENCES, ITHACA, N.Y. DEPT. OF AGRICULTURAL ECONOMICS.
Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

NIPPON PRECISION OPTICAL INSTRUMENT, CO. LTD., TOKOYO (JAPAN).
Sphere Method Turbidimeter,
W75-04819 5A

NORWEGIAN WATER RESOURCES AND ELECTRICITY BOARD, OSLO (NORWAY).
Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

OCCIDENTAL PETROLEUM CORP., LOS ANGELES, CALIF. (ASSIGNEE).
Removal of Boron From Water,
W75-04462 5D

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WASHINGTON, D.C.
Acid Mine Water, A Bibliography,
W75-04625 5G

OHIO STATE UNIV., COLUMBUS.
Coprology: A Pollution Solution,
W75-04545 5D

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF AGRICULTURAL ENGINEERING.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

OKLAHOMA UNIV., NORMAN. SCHOOL OF CIVIL ENGINEERING AND ENVIRONMENTAL SCIENCE.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

OREGON STATE OF ENVIRONMENTAL QUALITY, PORTLAND. WATER QUALITY DIV.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

OREGON STATE UNIV., CORVALLIS. DEPT. OF AGRICULTURAL ENGINEERING.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

OSLO UNIV. (NORWAY). DEPT. OF LIMNOLOGY.
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

OSLO UNIV. (NORWAY). INST. OF GEOPHYSICS.
Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Orographic Influences on Distribution of Precipitation,
W75-04664 2B

OXFORD UNIV. (ENGLAND). DEPT. OF AGRICULTURAL SCIENCE.
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, OREG.
Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

PAKISTAN METEOROLOGICAL DEPT., KARACHI.
Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

PAPUA AND NEW GUINEA UNIV., PORT MORESBY (NEW GUINEA). DEPT. OF PHYSICS.
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ENGINEERING.
Dewatering Bovine Animal Manure,
W75-04627 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
Bacterial Zoogloea Formation,
W75-04572 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. INST. FOR RESEARCH ON LAND AND WATER RESOURCES.
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

PENNSYLVANIA UNIV., PHILADELPHIA. INST. FOR ENVIRONMENTAL STUDIES.
The Brandywine: Five Years After,
W75-04360 6B

Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

PETROLITE CORP., WILMINGTON, DEL. (ASSIGNEE).
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

PNEUMATIQUES, CAOUTCHOUC MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES (FRANCE). (ASSIGNEE)
Inflatable Barriers for Watercourses,
W75-04467 8A

PRESIDENT'S WATER POLLUTION CONTROL ADVISORY BOARD, WASHINGTON, D.C.
The Relationship Between Animal Wastes and Water Quality.
W75-04840 5G

PROCTOR, REDFERN, BOUSFIELD AND BACON, SAINT JOHN (NEW BRUNSWICK).
The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

PUNJAB AGRICULTURAL UNIV., LUDHIANA (INDIA).
Stress-Strain Response for Sand,
W75-04696 8D

PUNJAB AGRICULTURAL UNIV., LUDHIANA (INDIA). DEPT. OF SOILS.
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

PURDUE UNIV., LAFAYETTE, IND.
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRICULTURAL ENGINEERING.
Swine Waste Management Systems,
W75-04629 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

RHODE ISLAND UNIV., KINGSTON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Electrochemical Process for Nutrient Removal,
W75-04446 5D

RICHARD B. RUSSELL AGRICULTURAL RESEARCH CENTER, ATHENS, GA.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

ROBERT S. KERR WATER RESEARCH CENTER, ADA, OKLA.
Methods of Removing Nitrates From Water,
W75-04626 5D

ROFE, KENNARD AND LAPWORTH, LONDON(ENGLAND).
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE, MIAMI, FLA.
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. INST. OF MICROBIOLOGY.
Microbiological Production of Geosmin,
W75-04561 5D

S.K.N. COLL. OF AGRICULTURE, JOBNER (INDIA). DEPT. OF AGRICULTURAL CHEMISTRY AND SOIL SCIENCE.
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

SAN BERNADINO COUNTY AGRICULTURAL EXTENSION SERVICE, CALIF.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SAO PAULO UNIV. (BRAZIL). INSTITUTO OCEANOGRAFICO.
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

SARGENT AND LUNDY, CHICAGO, ILL.
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

SHELL DEVELOPMENT COMPANY, HOUSTON, TEX. BELLAIRE RESEARCH CENTER.
Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

SILVESTON (B AND P), KITCHENER (ONTARIO).
Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

SOCIETE GENERAL D'ENTREPRISES, PARIS (FRANCE). (ASSIGNEE).
Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

SOCIETE GRENOBLOISE D'ETUDE ET D'APPLICATIONS HYDRAULIQUES (FRANCE).
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

SOCIETE LYONNAISE DES EAUX ET DE L'ECLAIRAGE (FRANCE). LABORATOIRE.
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

SOIL CONSERVATION SERVICE, GRAND RAPIDS, MICH.
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

SOIL CONSERVATION SERVICE, INDIANAPOLIS, IND.
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

SOIL CONSERVATION SERVICE, PHOENIX, ARIZ.; AND BUREAU OF LAND MANAGEMENT, PHOENIX, ARIZ.
Spy Mesa Yields Better Understanding of Pinyon-Juniper in Range Ecosystem,
W75-04375 2I

OUTH DAKOTA STATE UNIV., BROOKINGS. VATER RESOURCES INST.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

OUTHEASTERN MASSACHUSETTS UNIV., ORTH DARTMOUTH. DEPT. OF CIVIL NGINEERING.
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

OUTHERN REGIONAL RESEARCH LAB., EW ORLEANS, LA.; AND ALABAMA GRICULTURAL EXPERIMENT STATION, UBURN.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

OUTHWESTERN GREAT PLAINS RESEARCH ENTER, BUSHLAND, TEX.
Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

T. LOUIS METROPOLITAN SEWER ISTRICT, MO.
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

TANFORD RESEARCH INST., MENLO PARK, ALIF.
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

TANFORD UNIV., PACIFIC GROVE, CALIF. OPKINS MARINE STATION.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

TATE UNIV. OF NEW YORK, ALBANY. TMOSPHERIC SCIENCES RESEARCH ENTER.
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

TATE UNIV. OF NEW YORK, BUFFALO. EPT. OF CIVIL ENGINEERING.
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

VISS FOREST RESEARCH INST., RMENSDORF.
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

YDNEY UNIV. (AUSTRALIA). DEPT. OF SOIL CIENCE.
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

TAYLOR (JOHN) AND SONS (ENGLAND).
Sewage Treatment in the Potteries,
W75-04823 5D

TECHISCHE UNIVERSITAET, BRUNSWICK (WEST GERMANY). LEICHTWEISS INST. FOR WATER RESEARCH.
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

TECHNION--ISRAEL INST. OF TECH., HAIFA.
Water Management Systems,
W75-04538 3F

TECHNION - ISRAEL INST. OF TECH., HAIFA. SOILS AND FERTILIZERS LAB.
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

TEL AVIV UNIV. (ISRAEL). DEPT. OF ENVIRONMENTAL SCIENCES.
The Coalescence of Water Drops,
W75-04728 1A

TEL-AVIV UNIV. (ISRAEL), DEPT. OF MATHEMATICAL SCIENCES.
Frontal Motion in the Atmosphere,
W75-04792 2B

TEXAS A AND M UNIV., COLLEGE STATION.
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF AGRICULTURAL ENGINEERING.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF BIOLOGY.
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

TEXAS AGRICULTURAL EXTENSION SERVICE, COLLEGE STATION.
Future Developments in Feedlot Waste Management,
W75-04836 5D

TEXAS TECH UNIV. CENTER AT AMARILLO, PANTEX.
Effect of Ration on Manure Salt Content,
W75-04834 5D

TEXAS TECH UNIV., LUBBOCK. DEPT OF RANGE AND WILDLIFE MANAGEMENT.
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

TEXAS TECH UNIV., LUBBOCK. WATER RESOURCES CENTER.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

THESSALONIKI UNIV., SALONIKA (GREECE).
Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

TOKYO UNIV. (JAPAN). DEPT. OF PARASITOLOGY.
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

TURKU UNIV. (FINLAND). ARCHIPELAGO RESEARCH INST.
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

TURKU UNIV. (FINLAND). DEPT. OF ZOOLOGY.
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

UNION CARBIDE CORP., SOUTH CHARLESTON, W. VA.
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. DEPT. OF ELECTRICAL ENGINEERING, AND MATERIALS SCIENCE.
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. ENVIRONMENTAL ENGINEERIG PROGRAM.
Trace Metals in Wastewater Effluents,
W75-04806 5B

UPPSALA UNIV. (SWEDEN). DEPT. OF METEOROLOGY.
A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

UPPSALA UNIV. (SWEDEN). INST. OF ZOOLOGY.
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

UPPSALA UNIVERSITY, UPPSALA (SWEDEN), DEPT. OF PHYSICAL GEOGRAPHY.
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

UTAH STATE UNIV., LOGAN.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

UTAH STATE UNIV., LOGAN. DEPT. OF PLANT SCIENCE.
Control of Gambel Oak with Three Herbicides,
W75-04366 3B

UTAH STATE UNIV., LOGAN. DEPT. OF RANGE SCIENCE.
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

UTAH WATER RESEARCH LAB., LOGAN.
A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF ECONOMICS.
Enforcement Economics in Air Pollution Control,
W75-04569 5G

VOLCANI INST. OF AGRICULTURAL RESEARCH, BET-DAGAN (ISRAEL). DEPT. OF SOIL PHYSICS.
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

WAITE AGRICULTURAL RESEARCH INST., GLEN OSMOND (AUSTRALIA).
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

WASHINGTON D.C., COMMITTEE ON INTERIOR AND INSULAR AFFAIRS (U. S. SENATE).
Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF AGRICULTURAL ENGINEERING.
Management of Swine Waste by a Lagoon System,
W75-04632 5D

WATER RESOURCES BULLETIN, VOL 10, NO 5, P 942-951, OCTOBER, 1974. 4 TAB, 6 REF.
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

WATERLOO UNIV. (ONTARIO). DEPT. OF CHEMICAL ENGINEERING.
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

WHITSTABLE URBAN DISTRICT COUNCIL(ENGLAND).
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

WINDSOR UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

WISCONSIN UNIV., MADISON.
An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

He Solved His Manure Handling Problem,
W75-04634 5D

Water Quality by Photographic Analysis,
W75-04814 5A

WISCONSIN UNIV., MADISON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

WISCONSIN UNIV.-STEVENS POINT.
The Classification of Some Nigerian Soils,
W75-04390 2G

WISCONSION UNIV., MADISON. DEPT. OF GEOLOGY AND GEOPHYSICS.
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS. DEPT. OF CHEMISTRY.
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASSACHUSETTS.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

WYOMING UNIV., LARAMIE.
Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

Y-T-O AND ASSOCIATES, WALNUT CREEK, CALIF.
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

ZENTRALANSTALT FUER METEOROLOGIE UND GEODYNAMIK, VIENNA (AUSTRIA).
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

ACCESSION NUMBER INDEX

W75-04351 3F
W75-04352 5D
W75-04353 5C
W75-04354 5C
W75-04355 5A
W75-04356 4D
W75-04357 4D
W75-04358 4D
W75-04359 6B
W75-04360 6B
W75-04361 6E
W75-04362 4D
W75-04363 4B
W75-04364 2H
W75-04365 2I
W75-04366 3B
W75-04367 5B
W75-04368 6B
W75-04369 3F
W75-04370 5G
W75-04371 5B
W75-04372 2B
W75-04373 2G
W75-04374 2G
W75-04375 2I
W75-04376 2I
W75-04377 2G
W75-04378 2I
W75-04379 3B
W75-04380 3B
W75-04381 2I
W75-04382 5G
W75-04383 2I
W75-04384 3F
W75-04385 2I
W75-04386 8I
W75-04387 5C
W75-04388 2I
W75-04389 2G
W75-04390 2G
W75-04391 2C
W75-04392 2G
W75-04393 5A
W75-04394 5A
W75-04395 5G
W75-04396 5G
W75-04397 5G
W75-04398 5C
W75-04399 3F
W75-04400 2H
W75-04401 5D
W75-04402 5D
W75-04403 5D
W75-04404 5D
W75-04405 5D
W75-04406 5D
W75-04407 5D
W75-04408 5D
W75-04409 5D
W75-04410 5C
W75-04411 5A
W75-04412 5A
W75-04413 5C
W75-04414 5C
W75-04415 5C
W75-04416 5C
W75-04417 5C
W75-04418 5C
W75-04419 5C
W75-04420 5C
W75-04421 5A
W75-04422 3A
W75-04423 3A
W75-04424 2I
W75-04425 5G
W75-04426 5D
W75-04427 5D
W75-04428 5D
W75-04429 5D
W75-04430 3A
W75-04431 5G
W75-04432 4A
W75-04433 4D
W75-04434 5F
W75-04435 2I
W75-04436 5A
W75-04437 5D
W75-04438 5B
W75-04439 6B
W75-04440 4A
W75-04441 2F
W75-04442 2B
W75-04443 2H
W75-04444 6A
W75-04445 6E
W75-04446 5D
W75-04447 5C
W75-04448 4C
W75-04449 5D
W75-04450 2I
W75-04451 3A
W75-04452 3F
W75-04453 8A
W75-04454 5D
W75-04455 5G
W75-04456 5D
W75-04457 5D
W75-04458 5D
W75-04459 3A
W75-04460 5D
W75-04461 5D
W75-04462 5D
W75-04463 5D
W75-04464 5D
W75-04465 3A
W75-04466 3A
W75-04467 8A
W75-04468 6G
W75-04469 5C
W75-04470 5C
W75-04471 2K
W75-04472 5C
W75-04473 5B
W75-04474 5G
W75-04475 5B
W75-04476 5D
W75-04477 5B
W75-04478 5B
W75-04479 5C
W75-04480 5C
W75-04481 5C
W75-04482 3F
W75-04483 3F
W75-04484 2D
W75-04485 5C
W75-04486 2I
W75-04487 5C
W75-04488 2I
W75-04489 5C
W75-04490 2H
W75-04491 5C
W75-04492 2L
W75-04493 2I
W75-04494 2I
W75-04495 2E
W75-04496 5C
W75-04497 2L
W75-04498 5C
W75-04499 5C
W75-04500 2H
W75-04501 2J
W75-04502 5A
W75-04503 5C
W75-04504 5B
W75-04505 5G
W75-04506 2G
W75-04507 2G
W75-04508 3B
W75-04509 2J
W75-04510 5G
W75-04511 2I
W75-04512 3C
W75-04513 2B
W75-04514 6G
W75-04515 2G
W75-04516 2G
W75-04517 2G
W75-04518 5D
W75-04519 6B
W75-04520 6A
W75-04521 5C
W75-04522 5B
W75-04523 4A
W75-04524 5C
W75-04525 4A
W75-04526 5G
W75-04527 3F
W75-04528 5D
W75-04529 6D
W75-04530 5G
W75-04531 4A
W75-04532 4A
W75-04533 3F
W75-04534 4A
W75-04535 5F
W75-04536 5D
W75-04537 3F
W75-04538 3F
W75-04539 6A
W75-04540 6A
W75-04541 6D
W75-04542 5D
W75-04543 5D
W75-04544 5G
W75-04545 5D
W75-04546 5D
W75-04547 5B
W75-04548 5B
W75-04549 2G
W75-04550 5D
W75-04551 5B
W75-04552 5D
W75-04553 5D
W75-04554 5D
W75-04555 5D
W75-04556 5D
W75-04557 5G
W75-04558 6A
W75-04559 8B
W75-04560 5B
W75-04561 5D
W75-04562 5D
W75-04563 5C
W75-04564 5D
W75-04565 5D
W75-04566 5D
W75-04567 5G
W75-04568 5G
W75-04569 5G
W75-04570 5B
W75-04571 5G
W75-04572 5D
W75-04573 5B
W75-04574 5B
W75-04575 5G
W75-04576 5G
W75-04577 5D
W75-04578 5C
W75-04579 5C
W75-04580 6E
W75-04581 5G
W75-04582 6E
W75-04583 2L
W75-04584 5G
W75-04585 5G
W75-04586 5G
W75-04587 5G
W75-04588 6E
W75-04589 5G
W75-04590 5G
W75-04591 5G
W75-04592 5G
W75-04593 5G
W75-04594 6G
W75-04595 5G
W75-04596 5G
W75-04597 6E
W75-04598 5G
W75-04599 6E
W75-04600 6F
W75-04601 2H
W75-04602 2G
W75-04603 6B
W75-04604 2C
W75-04605 2G
W75-04606 2G
W75-04607 2G
W75-04608 2G
W75-04609 2I
W75-04610 3B
W75-04611 3F
W75-04612 2I
W75-04613 2I
W75-04614 5B
W75-04615 5D
W75-04616 5D
W75-04617 5D
W75-04618 5D
W75-04619 5D
W75-04620 5D
W75-04621 5D
W75-04622 5D
W75-04623 5D
W75-04624 5D
W75-04625 5G
W75-04626 5D
W75-04627 5D
W75-04628 3F
W75-04629 5D
W75-04630 5D
W75-04631 5G
W75-04632 5D
W75-04633 5A
W75-04634 5D
W75-04635 5D
W75-04636 5D
W75-04637 5D
W75-04638 5D
W75-04639 5G
W75-04640 5D
W75-04641 5D
W75-04642 5D
W75-04643 5D
W75-04644 5D
W75-04645 5B
W75-04646 5D
W75-04647 7B
W75-04648 6E
W75-04649 6E
W75-04650 6E
W75-04651 6E
W75-04652 6E
W75-04653 5D
W75-04654 9D
W75-04655 7B
W75-04656 7B
W75-04657 7B
W75-04658 7B
W75-04659 2C
W75-04660 2B
W75-04661 2B
W75-04662 2B

W75-04663 2B
W75-04664 2B
W75-04665 2B
W75-04666 2B
W75-04667 2C
W75-04668 2B
W75-04669 2B
W75-04670 2
W75-04671 2B
W75-04672 2B
W75-04673 2B
W75-04674 2B
W75-04675 2B
W75-04676 2B
W75-04677 2B
W75-04678 2B
W75-04679 2B
W75-04680 2B
W75-04681 7A
W75-04682 7A
W75-04683 2B
W75-04684 2C
W75-04685 2B
W75-04686 2B
W75-04687 7C
W75-04688 7C
W75-04689 2B
W75-04690 2B
W75-04691 7B
W75-04692 2B
W75-04693 7C
W75-04694 4A
W75-04695 2G
W75-04696 8D
W75-04697 7B
W75-04698 2D
W75-04699 5B
W75-04700 2G
W75-04701 2G
W75-04702 2J
W75-04703 2B
W75-04704 2B
W75-04705 2H
W75-04706 2E
W75-04707 2J
W75-04708 5D
W75-04709 5A
W75-04710 2F
W75-04711 2B
W75-04712 2E
W75-04713 2B
W75-04714 5B
W75-04715 8B
W75-04716 2L
W75-04717 2B
W75-04718 5A
W75-04719 5D
W75-04720 5G
W75-04721 3B
W75-04722 5A
W75-04723 5A
W75-04724 2B
W75-04725 2D
W75-04726 7C
W75-04727 4B
W75-04728 1A
W75-04729 2B
W75-04730 7C
W75-04731 7C
W75-04732 7C
W75-04733 7C
W75-04734 7A
W75-04735 7B
W75-04736 7C
W75-04737 7C
W75-04738 2L
W75-04739 2L
W75-04740 2B
W75-04741 2B
W75-04742 4A
W75-04743 4A
W75-04744 4A
W75-04745 4A
W75-04746 4A
W75-04747 4A
W75-04748 4A
W75-04749 4A
W75-04750 4A
W75-04751 4A
W75-04752 4A
W75-04753 4A
W75-04754 4A
W75-04755 6G
W75-04756 6B
W75-04757 5G
W75-04758 5C
W75-04759 5D
W75-04760 3D
W75-04761 5D
W75-04762 3D
W75-04763 6B
W75-04764 3E
W75-04765 5D
W75-04766 6E
W75-04767 6E
W75-04768 6E
W75-04769 6E
W75-04770 6E
W75-04771 6E
W75-04772 6E
W75-04773 6E
W75-04774 6E
W75-04775 6E
W75-04776 6E
W75-04777 5G
W75-04778 6E
W75-04779 5G
W75-04780 6E
W75-04781 6E
W75-04782 6E
W75-04783 6E
W75-04784 6E
W75-04785 6E
W75-04786 6E
W75-04787 6E
W75-04788 6E
W75-04789 6E
W75-04790 6E
W75-04791 2B
W75-04792 2B
W75-04793 8B
W75-04794 2C
W75-04795 7B
W75-04796 7B
W75-04797 8B
W75-04798 5B
W75-04799 5B
W75-04800 5B
W75-04801 5D
W75-04802 8B
W75-04803 5A
W75-04804 5D
W75-04805 5B
W75-04806 5B
W75-04807 5D
W75-04808 8C
W75-04809 8A
W75-04810 5D
W75-04811 5D
W75-04812 5D
W75-04813 5D
W75-04814 5A
W75-04815 5A
W75-04816 5C
W75-04817 5A
W75-04818 5A
W75-04819 5A
W75-04820 5F
W75-04821 5F
W75-04822 5D
W75-04823 5D
W75-04824 5D
W75-04825 5D
W75-04826 5D
W75-04827 5D
W75-04828 5D
W75-04829 5D
W75-04830 5G
W75-04831 5D
W75-04832 5D
W75-04833 5D
W75-04834 5D
W75-04835 5D
W75-04836 5D
W75-04837 2I
W75-04838 5G
W75-04839 5G
W75-04840 5G
W75-04841 5D
W75-04842 5A
W75-04843 5B
W75-04844 6E
W75-04845 6G
W75-04846 5G
W75-04847 2E
W75-04848 5C
W75-04849 5B
W75-04850 3A

ABSTRACT SOURCES

OURCE	ACCESSION NUMBER	TOTAL
. CENTERS OF COMPETENCE		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-04393--04398 04400--04421	28
Cornell University, Policy Models for Water Resources Systems	W75-04518--04523 04525--04541 04614	24
East Central State College, Agricultural Livestock Wastes	W75-04542--04548 04550 04552--04556 04615--04622 04626--04627 04629--04646 04653 04832--04836 04838--04843	53
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-04422--04423 04426--04434 04436--04437 04469--04470 04472--04474 04808 04810--04815 04817--04831 04846 04848--04849	43
Illinois State Water Survey, Hydrology	W75-04654--04741 04791--04807	105
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-04476	1

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE (Continued)		
University of Arizona, Arid Land Water Resources	W75-04351, 04363 04365--04370 04372--04381 04383 04385--04392 04508--04517 04602--04610 04612--04613 04647	4
University of Florida, Eastern U. S. Water Law	W75-04580--04601 04648--04652 04766--04790 04844--04845	5
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-04359--04362 04742--04765	2
B. STATE WATER RESOURCES RESEARCH INSTITUTES		
Georgia Environmental Resources Center	W75-04356--04358	
Hawaii Water Resources Research Center	W75-04441--04442	
Kansas Water Resources Research Institute	W75-04623--04624	
Missouri Water Resources Research Center	W75-04443	
Nevada Center for Water Resources Research	W75-04444	
New York Water Resources and Marine Sciences Center	W75-04445	
Pennsylvania Institute for Research on Land and Water Resources	W75-04355	

RCE	ACCESSION NUMBER	TOTAL
STATE WATER RESOURCES RESEARCH INSTITUTES (Continued)		
Rhode Island Water Resources Center	W75-04446	1
South Carolina Water Resources Research Institute	W75-04447--04448	2
Texas Water Resources Institute	W75-04449	1
Wyoming Water Resources Research Institute	W75-04450	1
OTHER		
BioSciences Information Service	W75-04364, 04371 04382, 04384 04399 04424--04425 04435, 04438 04471, 04475 04477--04507 04524, 04549 04551, 04557 04574 04578--04579 04611, 04628 04809, 04816 04837, 04847	55
Environmental Protection Agency	W75-04560--04573 04575--04577	17
Ocean Engineering Information Service (Patents)	W75-04451--04467	17
Office of Water Research and Technology	W75-04352--04354 04439--04440 04558--04559 04625, 04850	9

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
- WATER QUALITY MANAGEMENT AND PROTECTION
- WATER RESOURCES PLANNING
- RESOURCES DATA
- ENGINEERING WORKS
- MANPOWER, GRANTS, AND FACILITIES
- SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

- SUBJECT INDEX
- AUTHOR INDEX
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- ABSTRACT SOURCES

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 10
MAY 15, 1975

W75-04851 -- W75-05350

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

WATER AND AQUEOUS SOLUTIONS: INTRODUCTION TO A MOLECULAR THEORY,
Hebrew Univ., Jerusalem (Israel). Inst. of Chemistry.
A. Ben-Naim.
Plenum Press (New York and London), 1974. 474 p.

Descriptors: *Molecular structure, *Aqueous solutions, *Water structure, Thermodynamic behavior, Water properties, Theoretical analysis, Mathematical studies, Solutes, Liquids, Statistical methods, Equations, Mathematics, Numerical analysis, Water chemistry.
Identifiers: Molecular distribution functions.

The molecular theory of water and aqueous fluids, based on the general theory of liquids and mixtures is discussed. Rudiments of statistical mechanics needed for understanding the rest of the book are described. Chapters 2-4 develop molecular distribution functions and thermodynamic behavior, with emphasis on fluids consisting of nonspherical particles. Chapter 5 connects the formal theory of fluids, including the mixture-model approach, with its applications to water and complex aqueous solutions. Properties of pure water and of water containing 1 or 2 solutes are discussed in Chapters 6-8, including hydrophobic interactions. Mathematical derivations, a glossary of abbreviations, literature citations, and an index are appended. (Brown-IPC)
W75-04970

CONTINUOUS RANDOM NETWORK MODEL FOR AMORPHOUS SOLID WATER,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Magnetisme.
R. Alben, and P. Boutron.
Science, Vol 187, No 4175, p 430-432, February 7, 1975. 3 fig, 14 ref.

Descriptors: *Model studies, *Structural models, *Water structure, *Ice, *Water properties, Structure, X-rays, Hydrates, Testing, Chemical properties, Physical properties, Water, Heavy water, Chemical analysis, X-ray analysis, Physical properties, Model studies.
Identifiers: *Continuous random network, *Amorphous solid water, Coordination relationships, Metal tetrahedral units, Plastic tetrahedral units, Scattering.

Continuous random network models representing amorphous solid water were constructed. The x-ray and neutron scattering predictions for one type of model agree quite well with experimental results. (Henley-ISWS)
W75-05161

AMORPHOUS SOLID WATER: A NEUTRON DIFFRACTION STUDY,
Atomic Energy Research Establishment, Harwell (England).
J. Wenzel, C. U. Linderstrom-Lang, and S. A. Rice.
Science, Vol 187, N0 4175, p 428-430, February 7, 1975. 4 fig, 10 ref.

Descriptors: *Heavy water, *Ice, *Water structure, *Radioactivity techniques, *Water properties, Analytical techniques, Spectroscopy, Chemical properties, Physical properties, Radioactivity, Water quality, X-ray diffraction, Hydrogen bonding, Crystals, Deuterium, Spectrometers.
Identifiers: *Neutron diffraction, *Structure factor, *Amorphous solid D20, Intramolecular separation, Scattered neutron intensity, Wave vector transfer, DR-3 reactor.

The structure factor of amorphous solid D20 deposited from the vapor at 10K was obtained by measuring the neutron diffraction spectrum in the wave vector transfer from 0.8 to 12.3 reciprocal angstroms. The results indicated that the phase investigated is amorphous and has a liquid-like structure factor. The Fourier-transformed structure factor yielded a real space pair distribution function consistent with local tetrahedral coordination and hydrogen bonding, as in other condensed phases of water. The intra-molecular OD separation is 1.00 angstrom; the lack of data for very large wave vector transfer and the expected near equality of the intramolecular DD separation and inter-molecular O ... D separation made it impossible to determine the intramolecular DOD angle with precision. The neutron scattering data presented were complementary to the x-ray diffraction studies of Venkatesh, Rice, and Narten. (Henley-ISWS)
W75-05169

2. WATER CYCLE

2A. General

EXTENSION OF HYDROLOGIC PROCESS MODELING TO TOTAL WATERSHED MODELING,
Agricultural Research Services, Beltsville, Md. Hydrograph Lab.
C. B. England.
In: Biological Effects in The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 240-247. 4 fig, 10 ref.

Descriptors: *Model studies, *Synthetic hydrology, *Evapotranspiration, *Infiltration, Percolation, Analytical techniques, Lysimeters, Soils, Land use, Hydrologic data, Streamflow, *Ohio.
Identifiers: *Coshocton(Ohio).

In modeling the performance of watersheds, especially for agricultural research purposes, it is important to simulate not only the outflow hydrograph but also the internal hydrologic processes. This requires the use of comprehensive distributed-parameter models which permit consideration of storage distribution, paths, and rates of flow. One such model USDAHL-70 Model of Watershed Hydrology, has been developed at the USDA Hydrograph Laboratory. The digital computer program of this model includes separate and distinct subroutines, one for each hydrologic process, such as percolation and infiltration, evapotranspiration, partitioning of watersheds into soil-landform zones by grouping units similar soil and land use, and cascading of flows from zone to zone. The model was applied to synthesize monthly flows for the watershed W-97, Coshocton, Ohio. The observed and synthesized monthly flows were generally in good agreement. (See also W75-03023) (Singh-ISWS)
W75-04924

STORMFLOW PRODUCTION FROM PERMEABLE UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
W. L. Nutter, and J. D. Hewlett.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 248-258. 6 fig, 19 ref.

Descriptors: *Model studies, *Storm runoff, *Hydrologic systems, *Subsurface runoff, Demonstration watersheds, *Watersheds(Basins), Hydrologic data, Small watersheds, Subsurface drainage, Humid areas, Hydrology, Rainfall-runoff relationships, Infiltration, Hydrologic equation, Discharge(Water), Floodwater.
Identifiers: Conceptual models.

A conceptual source area model was proposed which indicated that subsurface storm flow is the dominant source of flood waters from most non-urban watersheds in humid regions. The model was based on the assumption that infiltration is not usually a limiting process and overland flow exists only to the extent implied in the term 'over-water flow' or 'channel precipation.' The advantage of the variable source area concept is that it represents the actual physical processes occurring on the basin. The concept should produce a more generally applicable explanation of storm flow production than a traditional overland flow model. Data from demonstration watersheds were presented to show substantial subsurface storm flow in the average flood hydrograph. (See also W75-03023) (Humphreys-ISWS)
W75-04925

MULTIDIMENSIONAL CHARACTERIZATION OF THE RAINFALL PROCESS, PART I: SYNTHETIC GENERATION OF HYDROLOGIC SPATIAL PROCESSES, PART II: ON THE TRANSFORMATION OF POINT RAINFALL TO AREAL RAINFALL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-04930

ON THE COLLECTION, THE ANALYSIS AND THE SYNTHESIS OF SPATIAL RAINFALL DATA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-04931

BIDIMENSIONAL SPECTRAL ANALYSIS OF RAINFALL EVENTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-04932

A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME I: SUMMARY REPORT.
IBM Federal Systems Div., Huntsville, Ala.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-27813, $4.25 in paper copy, $2.25 in microfiche. IBM Report No 74W-00175, June 1974. 40 p, 13 fig, 6 tab, 15 ref, 1 append. NASA Contract No. NAS5-21942.

Descriptors: *Small watersheds, *Regional analysis, *Remote sensing, *Hydrologic models, *Watersheds(Basins), Streamflow, Simulation analysis, Analytical techniques, Computer models, Measurement, Hydrology, Rainfall-runoff relationships, Model studies.
Identifiers: Sensitivity analysis.

A study was conducted to determine how accurate remotely sensed measurements must be to provide inputs to hydrologic models of watersheds, within the tolerances needed for acceptably accurate synthesis of streamflow by the models. At present, remote sensing from space is directly applicable to determination of model parameters related to prominent surface features such as land use vegetation, overland distances, snow coverage, and water and impervious surfaces. Permissible tolerances in the parameters associated with these features are large enough not to impose stringent

resolution requirements. Eight of the parameters can be quantified from Skylab and ERTS image data. A sensitivity analysis quantified permissible tolerances for several other inputs and parameters, and their corresponding image resolutions. This information will be applicable in the future to systems and techniques that are presently under study. (See also W75-05109) (Sims-ISWS)
W75-05108

A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME II: SUPPORTING TECHNICAL DETAILS.
IBM Federal Systems Div., Huntsville, Ala.
Available from the National Technical Information Service, Springfield, Va as N74-30833, $10.50 in paper copy, $2.25 in microfiche. IBM Report No 74W-00176, 1974. 438 p, 50 fig, 159 tab, 21 ref, 4 append.

Descriptors: *Small watersheds, *Regional analysis, *Remote sensing, *Hydrologic models, *Watersheds(Basins), Model studies, Data collections, Hydrology, Simulation analysis, Computer models, Streamflow, Analytical techniques, Rainfall-runoff relationships.
Identifiers: Sensitivity analysis.

Volume II contains detailed technical material that supplements and supports the study presented in Volume I on the application of remote sensing to regional and small watersheds. Described in detail were the watershed simulation models, and the sensitivity analysis procedures, which showed quantitatively how variations in each of the 46 model inputs and parameters affect simulation accuracy. Portions of watershed model simulation run outputs were contained in appendixes. Abstracts of related technical articles were also presented in an appendix. (See also W75-05108) (Sims-ISWS)
W75-05109

APPLICATION OF REMOTE SENSING TO HYDROLOGY.
IBM Federal Systems Div., Huntsville, Ala.
Available from the National Technical Information Service, Springfield, Va. 22161, as N74-27811, $5.25 in paper copy, $2.25 in microfiche. IBM Report No. 73W-00387, September 1973. 99 p, 32 fig, 17 tab, 18 ref, 3 append. NASA NAS8-14000/SA 2171.

Descriptors: *Feasibility studies, *Remote sensing, *Hydrologic models, Simulation analysis, Hydrology, Computer models, Watersheds(Basins), Rainfall-runoff relationships, Model studies.

A study was conducted to assess the feasibility of using the data produced by remote observation from space and/or aircraft to reduce the time and expense normally involved in achieving the ability to predict the hydrological behavior of an ungaged watershed. Such a capability will enhance effective planning for urban and industrial development, flood control, hydroelectric power, navigation, and water resources management. Traditionally, the ability to predict streamflow rates, in response to given precipitation, is attainable only after installation of extensive instrumentation and collection of data for several years to estimate the operating parameters of a model of the basin or watershed system. A simulation model was developed by using historical data from gaged watersheds which predicts the hydrological behavior of an ungaged watershed. Input to this model consists of standard climatological data and parameters describing the watershed's physical characteristics as obtained from aerial photography. (Sims-ISWS)
W75-05131

PERMAFROST HYDROLOGY.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
For primary bibliographic entry see Field 2C.
W75-05138

GEOLOGY AND PERMAFROST IN RELATION TO HYDROLOGY AND GEOPHYSICS,
Geological Survey of Canada, Calgary(Alberta).
For primary bibliographic entry see Field 2C.
W75-05141

PERMAFROST-HYDROLOGY STUDIES AT BOOT CREEK AND PETER LAKE WATERSHEDS, N.W.T.,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 2C.
W75-05143

RUNOFF FROM A SMALL ARCTIC WATERSHED,
Water Survey of Canada, Halifax (Nova Scotia).
For primary bibliographic entry see Field 2C.
W75-05144

ENERGY BALANCE CONSIDERATIONS IN PERMAFROST HYDROLOGY,
National Research Council of Canada, Ottawa (Ontario). Div. of Building Research.
For primary bibliographic entry see Field 2C.
W75-05147

BIBLIOGRAPHIES PERTINENT TO WILDLAND HYDROLOGY,
Utah State Univ., Logan. Dept. of Range Science.
For primary bibliographic entry see Field 10C.
W75-05153

CONTINUOUS HYDROLOGICAL TIME-SERIES DISCRETIZATION,
Technical Univ. of Lisbon (Portugal). Instituto Superior Tecnico.
L. V. Tavares.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings paper 11063, p 49-63, January 1975. 7 fig, 1 tab, 3 ref, 2 append.

Descriptors: *Hydrology, *Hydrologic data, *Hydraulics, *Time series analysis, Estimating equations, Optimization, Parametric hydrology.
Identifiers: Discrete distribution functions.

The available information about many continuous hydrological time series X sub t is often given by continuous time records with given finite duration and in many cases (i.e., rainfall and runoff records) the autocovariance function of X sub t can be approximated by a function of exponential type. Once the data have been deseasonalized, stationarity is usually assumed. A discretization technique is required to estimate the mean and the variance of X sub t which implies setting a value for the lag of time, L, between any two successive observations taken from the continuous record. The greater the time lag, the smaller is the number of used X sub t values, the weaker is the dependence between them, and the shorter is the required computing time. The three effects were studied to make possible the selection of an optimal value for L. Numerical results of general use were derived and presented. These conclusions also can be applied to any nonhydrological time series providing the assumed statistical assumptions are acceptable. (Dawes-ISWS)
W75-05165

SOIL-WATER PRESSURE DURING INTERMITTENT SIMULATED RAIN APPLICATION MEASURED WITH A NEW RAPID-RESPONSE TENSIOMETRIC TECHNIQUE,
Agricultural Research Service, Morris, Minn. North-Central Soil Conservation Research Center.
For primary bibliographic entry see Field 2G.
W75-05181

MODELING THE HYDROLOGIC EFFECTS RESULTING FROM LAND MODIFICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
M. M. Fogel, L. Duckstein, and C. C. Kisiel.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 6, p 1006-1010, November-December 1974. 3 fig, 1 tab, 23 ref.

Descriptors: *Model studies, *Land management, *Hydrologic aspects, *Erosion rates, *Rainfall disposition, *Rainfall-runoff relationships, *Sediment load, Synthetic hydrology, Runoff forecasting, Simulation analysis, Urbanization, Watersheds(Basins).
Identifiers: Event-based approach, Bivariate gamma probability function.

A methodology was presented for predicting the long-term hydrologic effects of land modification in ungaged watersheds. The essential components of this procedure are an event-based stochastic model of precipitation as input and a deterministic watershed model that transforms the input into such desired hydrologic variables as water yield, peak runoff rate, and sediment yield. Land use can cause changes in water yields, flood probabilities, erosion rates, and sediment transport. Commonly used procedures for estimating runoff from watersheds are engineering design approaches, statistical approaches, regional analysis, and simulation. Simulation provides a continuous hydrograph, and allowances for changes in precipitation, land use, etc., can be made in the model. The proposed procedure uses Soil Conservation Service methods for relating runoff to rainfall and estimating the peak rate of surface runoff. The distribution of peak runoff considers all possible combinations of rainfall and storm duration. Sediment yield is considered as a function of both peak flow rate and the volume of runoff. The proposed procedures can be used to determine the effect of watershed treatment as the optimum size of floodwater retarding structures. (Singh-ISWS)
W75-05189

INVESTIGATION OF ALTERNATIVE PROCEDURES FOR ESTIMATING GROUNDWATER PARAMETERS,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 4B.
W75-05263

GTWS: GEORGIA TECH WATERSHED SIMULATION MODEL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
A. M. Lumb, F. Currie, T. D. Hassett, and J. Zorich.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 937 $00.00 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No. ERC-0175, January 1975. 241 p, 30 fig, 44 tab, 42 ref, 8 append. OWRT A-047-GA(1). 14-31-0001-4010.

Descriptors: *Parametric hydrology, Hydrologic budget, Streamflow, *Surface runoff, Low flow, *Model studies, *Synthetic hydrology, Precipitation(Atmospheric), Hydrologic data, Optimization, Georgia, Interflow, Baseflow, Computer programs, *Watershed management.
Identifiers: *Stanford Watershed Model, *Pattern search, Computerized optimization, Continuous streamflow simulation.

The Georgia Tech Watershed Simulation Model provides a continuous deterministic simulation of streamflow from precipitation data and was specifically developed to help students better comprehend the complex interaction of flow processes and storages in the land phase of the hydrologic cycle. The total program contains two options: (1) direct use of the Stanford Watershed Model, and (2) use of supplemental features developed at Georgia Tech and representing additional storages and processes. Detailed documentation of the equations and listings of the program and the input data are provided. Required input to the model includes values for parameters representing watershed characteristics, and precipitation and evaporation amounts by time increments chosen for the simulation. Streamflow data can be entered in order to print or plot comparisons between simulated and recorded flows. The watershed parameters may be estimated by trial and error or by an outlined and illustrated self-calibrating pattern search optimization routine. Studies are described in which the Model was used (1) to analyze the effects of raingage density, type, and location on the accuracy of simulated streamflow and (2) to compare simulated streamflows with those estimated by regression analysis for a study of low-flow frequency. The sensitivity of estimated parameter values to precipitation, evaporation, and streamflow data errors is also examined. (James-GeoTech)
W75-05271

2B. Precipitation

A WATER BALANCE RECORDER FOR HYDROCLIMATIC AND AGROCLIMATIC MEASUREMENT OF PRECIPITATION AND EVAPORATION,
For primary bibliographic entry see Field 2D.
W75-04914

MULTIDIMENSIONAL CHARACTERIZATION OF THE RAINFALL PROCESS, PART I: SYNTHETIC GENERATION OF HYDROLOGIC SPATIAL PROCESSES, PART II: ON THE TRANSFORMATION OF POINT RAINFALL TO AREAL RAINFALL,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
J. M. Mejia, and I. Rodriguez-Iturbe.
Available from National Technical Information Service Springfield, Va. 22161, as PB-239 855, $4.25 in paper copy, $2.25 in microfiche. Report No. 177, November 1973. 53 p, 8 fig, 3 tab, 6 ref. OWRT C-4118 (No. 9021)(6).

Descriptors: *Model studies, *Spatial distribution, *Synthesis, Estimating, Areal, *Rainfall, *Temporal distribution, Hydrologic data, Rainfall-runoff relationships, Methodology.
Identifiers: *Synthetic rainfall generation.

Part I: A procedure for the synthesis of processes exhibiting temporal and spatial variability is presented. The method involves the addition of harcsnics of random frequencies which are sampled from the spectral density function or the readial spectral density function. The process obtained is asymptotically Gaussian and ergodic. An estimate of the error in time or space averages due to the non-ergodicity of the process as function of the number of harmonics is also included. Part II: A general methodology is developed for the transformation of point rainfall to areal rainfall. The reduction factor is shown to depend solely on the expected correlation coefficient between the point rainfall at two randomly chosen points in the area in consideration. The methodology can be used to characterize the input to rainfall-runoff models and it includes the case in which multiple inputs are used in the model in the form of a subdivision in modules of the whole catchment. An example is worked out discussing the different methodologies for the estimation of total mean volume of rainfall over an area.
W75-04930

ON THE COLLECTION, THE ANALYSIS AND THE SYNTHESIS OF SPATIAL RAINFALL DATA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
R. L. Lenton, and I. Rodriguez-Iturbe.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 856, $7.25 in paper copy, 2.25 in microfiche. Report No 194, October 1974. 218 p, 25 fig, 22 tab, 52 ref, 7 append.

Descriptors: *Data collections, Areal, *Model studies, Synthesis, Spatial distribution, Stochastic process, Climatic data, *Rainfall disposition, Hydrologic data, *Rainfall intensity.
Identifiers: Data analysis(Rainfall), *Data synthesis(Rainfall).

This study is concerned with developing a systematic approach to the design of programs of rainfall data management, which include the collection, the analysis and the synthesis of rainfall data. The collection and analysis of data, processed for the purpose of estimating areal averages of rainfall, is formulated as as mathematical programming problem whose objective function is the minimization of the cost and mean square error of the network, and whose decision variables are the total number of raingages, the coordinates of each of them, and the estimator weights. A two-stage methodology is proposed, wherein the optimal configuration of the network is determined first, followed by the optimal estimator weights. The synthesis of processes of areal averages of rainfall is treated by proposing an extension to a previous model of point rainfall synthesis. The proposed model generates sample functions of a random process of areal rainfall averages that preserve its areal covariance structure. The possibility of using point and areal rainfall models as an aid to decision making in network design problems is considered. The problem of inferring the characteristics of extreme values of areal rainfall is also studied. The distribution of the annual areal rainfall maximum per event is derived.
W75-04931

BIDIMENSIONAL SPECTRAL ANALYSIS OF RAINFALL EVENTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
A. E. Rhenals-Figueredo, I. Rodriguez-Iturbe, and J. C. Schaake, Jr.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 797, $7.25 in paper copy, 2.25 in microfiche. Report No 193, November 1974. 214 p, 47 fig, 14 tab, 60 ref, 3 append. OWRT C-4118(No.9021)(7).

Descriptors: *Storms, *Model studies, *Stochastic processes, Numerical analysis, Fourier Analysis, *Rainfall, *Correlation analysis.
Identifiers: *Spectral analysis(Bidimensional), Double Fourier analysis.

In order to study the characteristics of the regional component, a number of storms over a given area are analyzed. For each storm, a double Fourier analysis of the total storm depths is performed, and the principal harmonics of the storm are determined. This analysis is aimed to investigate whether or not there exists a persistent pattern in total storm depths over a given area. The local component, or storm residuals, is obtained by subtracting the periodic component of the storm from the total storm depths. It is assumed that the residuals of each storm are a sample function of a homogeneous random field, which, in principle, may be different for each storm. The characteristics of each underlying random field are analyzed by using the bidimensional autocorrelation function of the residuals of each storm. The observation of these functions has led to the conclusion that it is reasonable to assume that the random fields are also isotropic, and therefore, each one can be characterized by an isotropic one-dimensional autocorrelation function or its corresponding spectral density function. A theoretical model for the isotropic normalized autocorrelation function is proposed and discussed. The corresponding spectral density function and the radial spectral density function are analytically determined, and a comparison is made of the empirical spectral density function and the theoretical one for several storm residuals.
W75-04932

OPTIMIZING THE MEASUREMENT OF CONVECTIVE RAINFALL IN FLORIDA,
National Oceanic and Atmospheric Administration, Boulder, Colo. Weather Modification Program Office.
W. L. Woodley, A. Olsen, A. Herndon, and V. Wiggert.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11554, $5.25 in paper copy, $2.25 in microfiche. NOAA Technical Memorandum ERL WMPO-18, July 1974. 99 p, 21 fig, 10 tab, 23 ref, 3 append.

Descriptors: *Precipitation(Atmospheric), *Radar, *Rain gages, Correlation analysis, Measurement, Cloud seeding, *Florida, Convection, Rainfall, Optimization.
Identifiers: Radar-derived rainfall, Gaging requirements, Radar digitizer, Beam filling, Anomalous propagation.

The optimum methods of convective precipitation measurement as a function of specified accuracy and area size over which the measurements are to be made were discussed. These methods involve gages or S-band radar or a combination of the two. The various methods were compared in the context of the continuing multiple cloud seeding experiment of the Experimental Meteorology Laboratory. The combined accuracy of the WSR-57 radar in 1972 and 1973 in estimating convective rainfall approximated the accuracy that would be obtained with a gage density of 25 sq mi/gage over an area the size of the measonetwork. When the radar estimate of rainfall was adjusted by comparison to precipitation gages, the radar estimates had an approximate gage density equivalence of 10 sq mi/gage. The gage and radar comparisons were compiled in their entirety for use by other scientists. (Jones-ISWS)
W75-05097

MICROSTRUCTURE OF PRECIPITATION DEPOSITED ON HORIZONTAL SURFACES IN FOG,
L. Z. Prokh.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 742, $3.25 in paper copy, $2.25 in microfiche. April 15, 1974, 12 p, 2 fig, 3 tab, 9 ref. Translated from Trudy Nauch.-Issled. Gidrometeorol. Inst. (Kiev), No 42, p 36-41, 1964.

Descriptors: *Fog, *Water balance, *Precipitation(Atmospheric), Air masses, Topography, Terrain analysis, On-site investigations, Drop(Fluids), Distribution patterns, Measurement.
Identifiers: *Fog deposition, Soils, Thermal regime, Microphotographs, *USSR(Ukraine).

Microphotographs of fog droplet deposition on a horizontal surface were obtained in the Ukraine under a number of conditions of wind speed and direction and air mass. The droplet size was largest during the daylight hours and decreased to median size toward the hours of darkness. However, the depth of deposition was four times less during the day than the depth at night because of the decrease in the total number of settling drops. When southerly winds prevail, the rate of fog deposition on a horizontal service can be ten times the

average rate, and on the windward side of obstacles it can be one hundred times greater. (Jones-ISWS)
W75-05101

DISTRIBUTION OF MEAN MONTHLY PRECIPITATION AND RAINFALL INTENSITIES,
Army Engineer Topographic Lab., Fort Belvoir Va. Geographic Sciences Lab.
T. E. Niedringhaus.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-781 951, $4.25 in paper copy, $2.25 in microfiche. Special Report ETL-SR-72-5, November 1972. 30 p, 18 fig, 11 ref.

Descriptors: *Precipitation intensity, Rainfall intensity, Precipitation(Atmospheric), Probable maximum precipitation, Rainfall, Rainfall disposition, Probability, Isohyets, *Distribution patterns.
Identifiers: Mean monthly precipitation, Precipitation belts.

The best available information concerning the worldwide distribution of monthly precipitation amounts and rainfall intensities was presented in order to provide an improved basis for the establishment of environmental criteria for the design and testing of Army Aviation (V/STOL) aircraft. The data were presented in a series of maps, including: mean monthly precipitation for January, April, July, and October; rainfall intensities equalled or exceeded 1.0, 0.5, and 0.1% of the time during January, April, July, and October in Eurasia; and rainfall amounts for 30-minute durations with a 10-year return period in Canada, conterminous United States, the Hawaiian Islands, and Puerto Rico. The areas of minimum and maximum values were discussed. The maximum precipitation amounts and intensities were found in the tropics, especially in South and Southeast Asia. (Jones-ISWS)
W75-05105

PRECIPITATION MECHANISMS IN SUMMERTIME CONVECTIVE CLOUDS,
Meteorology Research, Inc., Altadena, Calif.
For primary bibliographic entry see Field 3B.
W75-05111

NUMERICAL MODELS FOR PRECIPITATION SCAVENGING,
Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
For primary bibliographic entry see Field 5B.
W75-05112

JEMEZ ATMOSPHERIC WATER RESOURCES RESEARCH PROJECT, VOLUME I: SUMMARY AND ACCOMPLISHMENTS,
New Mexico State Univ., University Park. Engineering Experiment Station.
For primary bibliographic entry see Field 3B.
W75-05121

JEMEZ ATMOSPHERIC WATER RESOURCES RESEARCH PROJECT, VOLUME II: SPECIAL ASPECTS OF THE PROGRAM,
New Mexico State Univ., University Park. Engineering Experiment Station.
For primary bibliographic entry see Field 3B.
W75-05122

A STUDY OF RAINFALLS RECORDED AT THE CHERRAPUNJI OBSERVATORY,
Institute of Tropical Meteorology, Poona (India).
O. N. Dhar, and S. M. T. Farooqui.
Hydrological Sciences Bulletin, Vol 18, No 4, p 441-450, December 1973. 3 fig, 4 tab, 19 ref.

Descriptors: *Precipitation(Atmospheric), *Rainfall, *Rain gages, Monsoons, Winds, Probable maximum precipitation, Statistical methods, Regression analysis, Correlation analysis, Orography.
Identifiers: *India(Cherrapunji Observatory).

The maximum rainfalls recorded at the Cherrapunji Observatory raingage during various periods within the 57 years from 1903 to 1959 were studied and the equation of the enveloping line was found to be R = 49 D to the 0.485 power where R is the rainfall in inches and D is duration in days. One-day maximum rainfalls for different periods from 2 to 100 years were also worked out and the 100-year value was found to be 2.1 times the 2-year value. The daily probable maximum precipitation, estimated by the Hershfield technique was 78 inches. A study of annual and monsoon rainfalls did not show any general linear trend, but there was a gradual increase in amounts from 1944 to 1954. (Jones-ISWS)
W75-05158

RAINFALL TEMPORAL PATTERNS FOR DESIGN FLOODS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. H. Pilgrim, and I. Cordery.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No NY1, Proceedings paper 11057, p 81-95, January 1975. 4 fig, 4 tab, 38 ref, 1 append.

Descriptors: *Rainfall, *Storms, *Antecedent precipitation, *Hydraulics, Hydrology, Rainfall intensity, Temporal distribution, Floods, Frequency, Flood control, Design storm, Design flood, Design, Australia.

The rainfalls used in the practical estimation of design floods are generally based on frequency-duration relationships derived from recorded intense burst of rainfall of various durations rather than from complete storms. These recorded intense bursts were therefore used in the derivation of the temporal patterns. The method produced patterns that incorporate average variability of intense rainfall and also the most likely sequence of intensities. Use of these patterns should minimize the introduction of joint probabilities into the design flood model and aid in estimation of a flood with the same frequency as the design rainfall. The method provides patterns with average or typical variations in intensity, in contrast to simple averaging which was shown to be generally unlikely to yield satisfactory patterns. Frequency distributions of rainfall during various periods immediately antecedent to the recorded intense bursts were also derived, and these antecedent rainfalls in flood estimation were considered. (Dawes-ISWS)
W75-05166

ANALYSES OF THE EFFECT OF URBANIZATION ON RAINFALL CHARACTERISTICS I,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 4C.
W75-05172

PROBABILISTIC ANALYSIS AND SIMULATION OF THE SHORT TIME INCREMENT RAINFALL PROCESS,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
R. A. Rao, and B. T. Chenchayya.
Available from the National Technical Information Service, Springfield Va. 22161, as BP-239 872, $5.75 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center, Technical Report No 55. 1974. 102 p, 40 fig, 21 tab, 23 ref, 1 append. OWRT B-025-IND (1).

Descriptors: *Rainfall, *Propability, Precipitation(Atmospheric), Hyetographs, Time Lag, Storms, Correlation analysis, Model studies, Regression analysis, Time series analysis.
Identifiers: *Wet and Dry Sequence, Rainfall probability.

This study analyzes the characteristics of short time increment (10 minutes and hourly) rainfall sequences. The objectives were (1) to investigate the probability distribution which best fit the durations of wet and dry sequences, (2) to investigate the models proposed for storm depths and durations and for the time distribution of rainfall, (3) to investigate the characteristics of short time increment rainfall in different climatic zones and (4) to investigate the effect of different time scales on modelling the process. Results obtained were that the Weibull distribution best fit the distributions of the duration of wet and dry sequences, although the exponential distribution was also adequate. The regression models for storm depth-duration relationship were found adequate when they were used with appropriately classified storms. Significant differneces and some surprising similarities were found in the characteristics of short time increment, rainfall processes in different climatic regions. Finally, the characteristics of the 10 minute and hourly data are quite similar to each other.
W75-05173

EXPERIMENTAL STUDY OF RILL EROSION,
Colorado State Univ., Fort Collins. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W75-05178

AIR PRESSURES OVER SURFACES EXPOSED TO WIND - I. WATER HARVESTING CATCHMENTS,
Agricultural Research Service, Water Conservation Lab. Phoenix, Ariz.
For primary bibliographic entry see Field 3B.
W75-05179

SECOND ANNUAL REPORT, DOT-CIAP PROGRAM,
California Univ., Livermore. Lawrence Livermore Lab.
M. C. MacCracken.
Available from NTIS, Springfield, Va. 22161 as Report No UCRL-51336-74, $7.60 in paper copy, $2.25 in microfiche. Report UCRL-51336-74, p 172, July 1974. 8 append.

Descriptors: *Transportation, *Aircraft, *Climatology, *Atmosphere, Pressure, *Meteorology, *Winds, *Model studies, Dispersion, Computer models, Climatic data, Radioactivity, Kinetics, Movement, Transfer, Energy, Zoning, Regions.
Identifiers: Transport, Global, Stratosphere, Monographs.

The Department of Transportation (DOT) through its Climatic Impact Assessment Program (CIAP) is seeking to determine the effects on global climate that would result from large numbers of aircraft operating in the stratosphere. The results of these studies will be published in a series of monographs in 1974. As a contributor to this program, Lawrence Livermore Laboratory (LLL) has undertaken a number of studies emphasizing numerical model development and application. Activities for the past year are summarized and projections for the next year are presented. Summary discussions of each of the numerical models and of participation in preparing input for the monographs are included. Appendices contain detailed descriptions of activities in these same areas. (Houser-ORNL)
W75-05349

2C. Snow, Ice, and Frost

RESEARCH PROJECTS IN GLACIOLOGY - 1974,
Department of the Environment, Ottawa, Ontario). Inland Water Directorate.
Water Resources Branch, Report No 36, 1974, 130 p.

Descriptors: *Glaciology, *Research facilities, Arctic, Hydrology, Remote sensing, Instrumentation, Snow cover, Ice cover, Avalanches, Glaciers, Mapping, Bibliographies, Cryogenics, Crystalography, *Canada, Projects.
Identifiers: *Ice properties, Mackenzie Valley(Canada), Northwest Territories(Canada).

This report is the fifth in a series outlining the Glaciological Research Program of the Water Resources Branch of the Department of the Environment. The first section summarizes the objectives and organization of the group, while the second provides a catalogue of individual research projects. Project descriptions include the name of the investigator, the objectives of the research, the location of the research, the work underway, and the future program. A list of the publications by members of the glaciology division is also presented. (Environment Canada)
W75-04884

SNOW INTERCEPTION AND REDISTRIBUTION IN THE FOREST,
Forest Service(USDA), Fort Collins, Colo., Rocky Mountain Forest and Range Experimental Station.
J. D. Hoover.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 114-122. 1 fig, 1 tab, 21 ref.

Descriptors: *Snow cover, *Snow surveys, Snow, *Colorado, Precipitation(Atmospheric), Forests, Snow management, Snowfall, Watersheds(Basins).
Identifiers: Snow interception, Snow redistribution in forests, Fool Creek Watershed(Col), Fraser(Col).

Conventional methods for determining snow interception are similar to those used with rain. The difference between forest and open land is attributed to interception loss. The treatment of the Fool Creek watershed near Fraser, Colorado, gave an excellant opportunity to measure the effect of opening a uniform forest stand. Careful snow surveys were made for 11 years before cutting was done. The treatment was an alternate-strip clear-cutting that removed the trees from 39% of the 414-acre watershed. Both cut and leave strips were of widths of 1,2,3, and 6 tree heights with an average length of about 8 tree heights. Comparison of snow survey values before and after cutting showed that total snowpack on the watershed was not changed by the cutting. Because of the layout of these strips, the different strip widths are not independent, and comparisons of the effect of strip width are doubtful. Careful study of the processes involved in snow interception and transport is recommended before new snow interception studies are undertaken. There is a real need to reconsider the interpretation of earlier work in view of present knowledge of the pertinent physical processes. (See also W75-03023) (Humphreys-ISWS)
W75-04917

PERMAFROST HYDROLOGY.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada). 102 p, 2 append. J. Gemers, editor.

Descriptors: *Permafrost, *Hydrology, *International hydrological decade, *Conferences, Environmental effects, Vegetation effects, Climates, Arctic, *Canada, *North America, Alaska, Hydrogeology, Groundwater, Hydrologic aspects, Streamflow, Runoff, Watersheds(Basins), Surface waters, Water, Movement, Energy budget, Specific heat, Geology, Rivers, Cold regions, Frozen ground, Hydrologic cycle.

The effects of permafrost on the various components of the hydrologic cycle were discussed at a workshop held at Calgary (Canada) in 1974. The subject areas discussed included: (1)environmental relationships, (2)hydrology, (3)geophysics, (4)runoff, (5))watersheds, (6)energy balance, (7)water movement, (8)specific heat, and (9)groundwater. (See W75-05139 thru W75-05150) (Humphreys-ISWS)
W75-05138

DISTRIBUTION AND ENVIRONMENTAL RELATIONSHIPS OF PERMAFROST,
National Research Council of Canada, Ottawa (Ontario). Div. of Building Research.
R. J. E. Brown.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 1-5. 3 ref.

Descriptors: *Permafrost, *Environmental effects, Vegetation effects, Hydrologic aspects, Topography, Climates, Forest fires, Soil types, Rocks, Glaciers, Cold regions, Frozen ground, Canada.

Permafrost was defined and its extent, thickness, and other characteristics such as ground ice and temperature regime were examined. The effects of climatic and terrain factors on permafrost, including relief, vegetation, hydrology, and snow cover were discussed. Special problems in permafrost regions, as well as past and present investigations were reviewed. Fluctuations have occurred through time in the extent, thickness, and temperature of the permafrost in response to changes in climate and terrain. Since its initial formation, the permafrost in any area may have dissipated and re-formed several times during periods of climatic warming and cooling. Glacial history has had a marked effect on permafrost. Changes in vegetation caused by fire, climatic succession, encroachment in water basins, or by the permafrost itself all have pronounced local effects. The regime of the fall and accumulation of snow influences the ground thermal regime, as does the geothermal gradient, which varies in different types of soil and rock, with changes in geological structure and with time. Thus, the environment in which permafrost exists constitutes a complex dynamic system, the product of past and present climate and terrain features, which are in turn influenced by the permafrost. The thermal sensitivity of permafrost is such that even small changes in climate and/or terrain will produce changes in the extent, thickness, and temperature of the permafrost. The interactions of permafrost with these factors in northern Canada are varied and very complex. Even a slight change in one factor produces a change in another or several others. (See also W75-05138) (Sims-ISWS)
W75-05139

HYDROLOGY AND PERMAFROST WITH REFERENCE TO NORTH AMERICA,
British Columbia Univ., Vancouver. Dept. of Geography.
M. Church.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 7-20. 5 fig, 4 tab, 57 ref.

Descriptors: *Permafrost, *Hydrology, *Water balance, *Surface waters, *Groundwater, Hydrologic cycle, Runoff, Lakes, Bogs, Muskeg, Seepage, Cold regions, *North America.

Summary information about the water balance in northern North America was presented and features of hydrology characteristic of northern regions were introduced. The terrestrial portion of the hydrologic cycle in country underlain by permafrost possesses several peculiarities that are qualified by ground thermal conditions. The chief contributions to runoff are from seasonal rainfall and snowmelt by direct surface flow, or by interflow through the active layer: permafrost restricts exchanges between surface water and deep groundwater. Four runoff regimes typical of northern rivers (subarctic nival, arctic nival, muskeg, proplacial) were illustrated. Permafrost presents an effectively impermeable stratum near the surface. However, it is perforated to a greater or lesser extent where it is discontinuous, where taliks occur, and below sufficiently large water bodies. These features mediate groundwater occurrence. Standing water in lakes and in muskeg may be retained by frost phenomena: some morphological features of northern lakes and bogs derive from this effect. Seasonal freezeback may trap water under pressure in unfrozen sediments, which may lead to 'icing.' (See also W75-05138) (Sims-ISWS)
W75-05140

GEOLOGY AND PERMAFROST IN RELATION TO HYDROLOGY AND GEOPHYSICS,
Geological Survey of Canada, Calgary(Alberta).
O. L. Hughes.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 21-28. 2 fig, 11 ref.

Descriptors: *Permafrost, *Hydrology, *Geology, *Geophysics, Ice, Frozen ground, Cold regions, Resistivity, Seismic studies, Glacial drift.

The complexity of the geologic framework within which the hydrologist and the geophysicist work is greatly enhanced in permafrost regions by the diversity of soil-water-ice conditions embraced by the term 'permafrost,' by the complex distribution of permafrost, and by the complex distribution of ground ice within the permafrost. The high costs of drilling in unsettled northern regions will necessitate heavy dependence on geophysical techniques in any regional inventories of geology, the distribution of permafrost and ground ice, and hydrology. Emphasis will be on light, portable, or airborne instrumentation. The selection of geophysical techniques and the design of instrumentation must be based on valid conceptual models of the distribution of geological materials, permafrost, and ground ice, and the models will vary greatly according to geological, climatic, and hydrologic history of the particular area concerned. Hydrologic studies in the permafrost regions of northern Canada are still in the preliminary stages. Integrated studies of the surface, active layer, and subpermafrost hydrologic regime have scarcely begun. Paleohydrology study of the changing hydrology regime during development of permafrost is an important key to understanding the distribution of permafrost and ground ice, but remains an underexploited field of research. (See also W75-05138) (Sims-ISWS)
W75-05141

RIVER HYDROLOGY IN PERMAFROST AREAS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
R. W. Newbury.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 31-37. 3 fig, 1 tab, 14 ref.

Descriptors: *Permafrost, *Hydrology, *Rivers, *Rainfall-runoff relationships, River flow, River basins, Watersheds(Basins), Arctic, Subarctic, Hydrologic cycle, Surface waters, Runoff, Streamflow, Cold regions.

An examination of permeable, relatively impermeable, and permafrost basins indicated that rainfall/runoff relationships are generally of the same order of magnitude and variability under all basin conditions. However, highest yields were observed in permafrost basins. Data dealing with bank stability, sediment transport, annual ice regime, and incidence of river icings are extremely limited in permafrost regions. The operation of a small number of index basins to investigate subsurface conditions, the development of standard river behavior surveys, and the establishment of a central agency for the compilation and exchange of hydrologic data from permafrost areas were recommended. In addition, the question of professional responsibility for the development of northern waters was raised. (See also W75-05138) (Sims-ISWS)
W75-05142

PERMAFROST-HYDROLOGY STUDIES AT BOOT CREEK AND PETER LAKE WATERSHEDS, N.W.T.,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
J. C. Anderson.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 39-44. 3 fig, 2 tab, 4 ref.

Descriptors: *Permafrost, *Hydrology, *Watersheds(Basins), Precipitation(Atmospheric), Runoff, Snowmelt, Cold regions, Storms, *Canada, Streamflow, Surface waters.
Identifiers: Northwest Territory.

Two small drainage basins on the east side of the Mackenzie Delta, Northwest Territory, are being studied as research watersheds. The basins lie within the continuous permafrost zone. Boot Creek basin drains an area of 31 sq km and flows into the East Channel of the Mackenzie Delta at the town of Inuvik. Peter Lake basin encompasses an area of 46 sq km to the north of Reindeer Station, and it drains northward via the Wolverine Lakes into the East Channel, below Tununuk. Some aspects of the precipitation and runoff regimes at these watersheds were noted. As data collection and analysis continue, a more complete understanding of the hydrology of these basins will be achieved. (See also W75-05138) (Sims-ISWS)
W75-05143

RUNOFF FROM A SMALL ARCTIC WATERSHED,
Water Survey of Canada, Halifax (Nova Scotia).
D. C. Ambler.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 45-49. 3 fig, 1 tab, 3 ref.

Descriptors: *Watersheds(Basins), *Arctic, *Hydrograph analysis, Hydrographs, Precipitation(Atmospheric), Runoff, On-site data collections, Weirs, Cold regions, Canada.
Identifiers: Ellesmere Island.

Hydrometric data collected from a small watershed on northern Ellesmere Island in 1973 were presented. Climatically, the area experiences long cold winters for nine to ten months each year with temperatures recorded at -30C or less. During the short summer period of approximately three months, daily temperatures may rise to only 10-15C. The mean annual precipitation amounts to about 140 mm with about 50% of this precipitation occurring as rain between June and September. In early June prior to the start of runoff, a control was constructed in the stream cross-section. A 120 degree V-notch weir was fabricated on site. From the runoff hydrograph, the greatest volume of runoff can be seen to occur within 10 days of the beginning of runoff. The peak has two high points, the second one corresponding to a rainfall event of June 24th. The 1973 runoff was equivalent to a yield of 4.63 inches over the basin. The short response time of the basin emphasizes the requirement for continuous measurement. The daily mean discharges presented, when analyzed on an hourly basis, illustrate a marked diurnal variation. The basin was oriented in relation to the sun path to produce peak daily flows between 2400 hours and 0230 hours and minimum daily flows between 1200 hours and 1600 hours. (See also W75-05138) (Sims-ISWS)
W75-05144

PERMAFROST HYDROLOGY: AN ALASKAN'S EXPERIENCE,
Alaska Univ., College. Inst. of Water Resources.
R. F. Carlson.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 51-57. 2 fig, 12 ref.

Descriptors: *Permafrost, *Hydrology, *Cold regions, *Streamflow, Runoff, Model studies, Floods, Snowmelt, Precipitation(Atmospheric), Bridges, Cold weather construction, Hydrologic cycle, Frozen ground, Rivers, Arctic, *Alaska.

Impending development in the north, particularly in permafrost regions, points to a need for a more extensive understanding of permafrost hydrology. Although the occurrence of permafrost itself is important to an understanding of hydrologic processes of northern regions, other important factors are low temperature, high latitude, large elevation differences, and an extremely sparse data network. When one is constructing models to understand the northern hydrologic systems, these factors must be kept in mind in conjunction with the particular problems of a region; whether they be of a mean value, extreme value, or time history nature. These considerations affect the understanding or modeling of each of the components of the hydrologic system: atmospheric, surface, soil, groundwater, and channel network. Major problems appear to deal with stream crossings of northern rivers, both in terms of flow magnitude and of water level, and of a more complete understanding of bottom mechanics. Another important need is for a more complete understanding of mass and energy transport in engineered and natural soils. Some examples of research on a particular phenomenon can be shown in the areas of sparse data flood design, the design of stream crossings in the vicinity of large overflow icings, and a more complete understanding of soil-water movement in frozen soils. Many features of the north must be kept in mind, certainly permafrost, but also other collaborative effects. But most importantly, the understanding of northern hydrologic problems must depend on input of a coordinated research development and design effort undertaken with the ultimate user in mind. (See also W75-05138) (Sims-ISWS)
W75-05145

PERMAFROST-RUNOFF: THE CONSULTING ENGINEER'S EXPERIENCE,
Bolter Parish Trimble Ltd., Edmonton (Alberta).
G. C. Seagel, and R. P. Parish.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 59-61. 1 ref.

Descriptors: *Permafrost, *Runoff, *Engineering, *Bridges, *Culverts, Hydrologic aspects, Peak discharge, Design criteria, Floods, Flow characteristics, Maximum probable flood, Arctic, Canada, Cold regions, Ice jams, Channel erosion.
Identifiers: Mackenzie Valley, North Slope.

The engineer is primarily interested in the consequences of permafrost as it affects the runoff regime of a given area. The effects may range from channel dynamics, through river behavioral components, to magnitude and rate of runoff contribution to the channel. The effect may influence the engineer's use of tools normally relied upon to evaluate the large variety of possible hydrologic components encountered at a crossing, thus adding another component for consideration. Observations of hydrology in permafrost regions, primarily in the Mackenzie Valley, as related to the engineering assessment for bridge and culvert crossings were outlined. Basic topics included: (1)effect of permafrost on magnitude and rate of runoff to the channel section-waterway opening requirements; (2)channel properties related to runoff in permafrost areas; (3)effects of extent of permafrost on the channel (with special reference to the north slope)-conceptual problems. The observations discussed were related to field and design work in northern Canada. (See also W75-05138) (Sims-ISWS)
W75-05146

ENERGY BALANCE CONSIDERATIONS IN PERMAFROST HYDROLOGY,
National Research Council of Canada, Ottawa (Ontario). Div. of Building Research.
G. P. Williams.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 63-67. 2 tab, 16 ref.

Descriptors: *Permafrost, *Energy budget, *Hydrology, *Water supply, Energy transfer, Heat balance, Heat flow, Solar radiation, Evaporation, Evapotranspiration, Snow cover, Snowmelt, Runoff, Energy loss.
Identifiers: Surface cover.

Surface heat exchange processes affect movement and supply of water in permafrost regions. Several hydrological problem areas were discussed from an energy balance point of view. These included: snow cover and snow melt, evaporation and evapotranspiration losses, and the hydrological significance of surface features (thermokarst, icings, etc.), which are partly determined by energy exchange processes. An overview was given of the general subject matter. (See also W75-05138) (Sims-ISWS)
W75-05147

DYNAMICS OF WATER MOVEMENT IN PERMAFROST: A REVIEW,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
R. L. Harlan.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta (Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 69-77. 5 fig, 29 ref.

Descriptors: *Permafrost, *Groundwater movement, *Hydrodynamics, *Fluid mechanics, Heat flow, Soil temperature, Soil moisture, Groundwater, Subsurface waters, Flow, Solutes, Salts, Thermodynamics, Water vapor, Frozen ground, Cold regions, Physical properties, Physicochemical properties, *Reviews.

Coupled heat-fluid transport processes in porous earth materials that are subject to freezing and thawing are highly complex and at present imperfectly understood. As a consequence, in most engineering and hydrologic studies permafrost is regarded as an impermeable barrier to all water movement. The theoretical and experimental evidence suggesting the mobility of water in

Frozen earth materials and the various heat and mass transport mechanisms operative above, within, and below the permafrost zone was examined from a hydrodynamic point of view. The effects of seasonal and long-term temperature changes on the surface and basal configurations of the permafrost layer and on the groundwater flow regime were also discussed. In particular the effects of convective heat transport associated with groundwater flow and water migration within the permafrost zone itself were examined. (See also W75-05138) (Sims-ISWS)
W75-05148

SPECIFIC HEATS OF COMPONENTS OF FROZEN SOIL,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
B. D. Kay.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 79-82. 2 fig, 9 ref.

Descriptors: *Permafrost, *Frozen soils, *Specific heat, Water, Movement, Ice, Organic matter, Clays, Soil temperature, Groundwater.

Water movement in frozen terrain is controlled, in part, by the thermal characteristics of the materials that are present. The coupling between mass and heat transport arises because hydraulic potentials and hydraulic conductivity of frozen soil materials are particularly temperature dependent. Predictions of the rates of water and heat movement by computer-based models subsequently require predictions of the thermal properties (heat capacity and thermal conductivity) of the frozen terrain. The assumption that the specific heats of components of frozen soil do not vary with temperature is not valid; however, the assumption introduces substantial error only at low temperatures where there is a negligible amount of unfrozen water. The use of linear temperature functions could eliminate this error. (See also W75-05138) (Sims-ISWS)
W75-05149

GROUNDWATER IN PERMAFROST REGIONS OF CANADA,
Department of the Environment, Calgary Alberta). Water Resources Branch.
R. O. van Everdingen.
In: Permafrost Hydrology; Proceedings of Workshop Seminar, 1974, Calgary, Alberta Canada), February 26-28, 1974. Environment Canada, Ottawa (Canada), p 83-93. 1 fig, 4 tab, 13 ref.

Descriptors: *Permafrost, *Groundwater, *Water supply, *Water chemistry, *Water analysis, Water supply development, Groundwater movement, Groundwater resources, Ice jams, Aquifers, Dissolved solids, Spring waters, Hot springs, Thermal springs, Discharge(Water), Cold regions, Hydrogeology, Engineering, *Canada.

Evidence of groundwater flow systems is found in Canada's permafrost regions in the form of springs thermal, non-thermal, mineral, and non-mineral), associated icings or aufeis, open-water reaches in rivers in winter, contributions to baseflow and to dissolved mineral content of streams, and concentrations of halophytic vegetation. Little use is made of groundwater for either domestic or industrial supply in northern Canada at present, and its potential in this respect has hardly been explored. Reliable supplies are available in a number of areas from unconsolidated gravels or sands, or from sandstones, carbonates, or fractured crystalline rocks where these are not frozen. Water obtained from the active layer usually has an appreciable organic content; water from unfrozen karst systems, in or near the mountains, and from unfrozen gravels often is of good quality; deeper groundwater may range in quality from fresh to salt. Apart from its water-supply potential, groundwater has an essential role in enabling fish populations to survive in northern streams; as well, groundwater discharge areas are often a source of trouble in construction and maintenance of engineering projects. Quick conditions, frost heaving, slope failures, active formation of ice lenses, and buildup of aufeis may all occur naturally, or they may be induced through changes in groundwater flow patterns caused by engineering development. The water-supply, engineering, and fisheries aspects of groundwater in the permafrost region all need further study, not only in terms of inventory, but also to gain a better understanding of the interaction between groundwater systems and engineering developments. (See also W75-05138) (Sims-ISWS)
W75-05150

CONTINUOUS RANDOM NETWORK MODEL FOR AMORPHOUS SOLID WATER,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Magnetisme.
For primary bibliographic entry see Field 1B.
W75-05161

AMORPHOUS SOLID WATER: A NEUTRON DIFFRACTION STUDY,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 1B.
W75-05169

MICROWAVE MAPS OF THE POLAR ICE OF THE EARTH,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
P. Gloersen, T. T. Wilheit, T. C. Chang, and W. Nordberg.
Bulletin of the American Meteorological Society, Vol 55, No 12, p 1442-1448, December 1974. 8 fig, 13 ref.

Descriptors: *Remote sensing, Microwaves, *Ice cover, *Ice-water interfaces, Ice, Arctic, Antarctic, Satellites(Artificial), Data collections, Maps, Mapping.
Identifiers: Pack ice, Continental ice, Ice morphology, Greenland, *Microwave maps.

Synoptic views of the entire polar regions of Earth were obtained free of the usual persistent cloud cover by using a scanning microwave radiometer operating at a wavelength of 1.55 cm on board the Nimbus-5 satellite. Three different views at each pole were presented utilizing data obtained at approximately one-month intervals during December 1972 to February 1973. The major discoveries resulting from an analysis of these data were as follows: (1) Large discrepancies exist between the long-term ice cover depicted in various atlases and the actual extent of the canopies. (2) The distribution of multiyear ice in the north polar region is markedly different from that predicted by existing ice dynamics models. (3) Irregularities in the edge of the Antarctic sea ice pack occur that have neither been observed previously nor anticipated. (4) The brightness temperatures of the Greenland and Antarctic glaciers show interesting contours probably related to the ice and snow morphologic structure. (Sims-ISWS)
W75-05170

2D. Evaporation and Transpiration

A WATER BALANCE RECORDER FOR HYDROCLIMATIC AND AGROCLIMATIC MEASUREMENT OF PRECIPITATION AND EVAPORATION,
O. Klausing.
In: Plant Response to Climatic Factors, Proceedings of The Uppsala Symposium, 1970, Uppsala, Sweden, United Nations Educational, Scientific and Cultural Organization, Paris, p 489-495, 1973. 5 fig, 3 tab, 6 ref.

Descriptors: *Water balance, *Soil-water-plant relationships, Precipitation Gages, Soils, Water, Rainfall, *Evaporation, Agroclimatology, Meteorological data, Measurement, Precipitation(Atmospheric).
Identifiers: *Filter disc, *Piche filter disc, Sensors, Psychrometer, Evaporation gage, Recorders.

A continuously recording field water balance instrument, sensitive to both rainfall and evaporation, was described. The rainfall sensor consists of a funnel leading to a collector where water level changes are transmitted to a chart by a float-activited pen. The evaporation element consists of a 5 cm Piche filter disc wetted on both sides so that it vaporizes water piped from the rainfall container. The recorder chart can show a positive water balance denoting a rainfall preponderance or a negative water balance when evaporation predominates. Two recording curves demonstrated contrasting negative and positive types of hydroclimatic water balance obtained during the 1969 summer. Data were collected from the southern part of Germany and, under tropical conditions, at El Salvador. The instrument indicated the water balance under conditions of rainfall and maximum potential evaporation. The agro-climatic value of such data is to supply information about water conditions for plant cover and soil. Also, comparison of recording curves from different stands may show differences in hydroclimatic conditions of life for cultivated plants. (Roberts-ISWS)
W75-04914

RELATIVE SIGNIFICANCE OF SOIL AND PLANT EVAPORATION IN ESTIMATING EVAPOTRANSPIRATION,
Commonwealth Scientific and Industrial Research Organization, Canberra(Australia). Div. of Plant Industry.
O. T. Denmead.
In: Plant Response to Climatic Factors, Proceedings of The Uppsala Symposium, September 15-20, 1970, Uppsala, Sweden. United Nations Educational, Scientific and Cultural Organization, Paris, p 505-511, 1973. 7 fig, 15 ref.

Descriptors: *Evapotranspiration, *Evaporation, Soils, Soil temperature, Vegetation, Canopy, Energy transfer, Soil surfaces, Soil physics, Soil investigations, Soil density, Soil moisture.
Identifiers: *Soil evaporation, *Plant evaporation, Foliage, Evaporation rate, Flux density.

The determination of the soil surface temperature from relatively simple observations of the weather above plant stands, and knowledge of the structure of the canopy and the moisture and thermal properties of the soil was discussed. An examination of the effects of surface temperature on energy exchange at the soil surface, on the canopy microclimate, and on the consequent exchanges of heat and water vapor at foliage surfaces follows. It was shown that the two components, soil evaporation and transpiration, can be regarded as virtually independent and therefore additive. The reported research was an attempt to quantify a complete crop cover. Comparison was made with work done by Penman, and was close for evapotranspiration when the soil was wet. When the surface was dry, evapotranspiration from common agricultural crops was as much as 60% less. Soil moisture states intermediate between the wet and dry were not accounted for. No predictions were made on the distribution of leaf resistances in the canopy, noting that the complete model of evapotranspiration is complicated. (Roberts-ISWS)
W75-04915

FACTORS AFFECTING POTENTIAL EVAPOTRANSPIRATION,
California Univ., Davis. Dept. of Water Science and Engineering.

W. O. Pruitt.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 82-102. 10 fig, 34 ref.

Descriptors: *Evapotranspiration, *Solar radiation, *Vegetation effects, Energy budget, Climatology, Hydrolocic cycle, Air temperature, Winds, Humidity, Diurnal distribution, Spring, Summer, Autumn, Soil temperature.
Identifiers: *Potential evapotranspiration, *McIlroy equation, Energy balance, Radiation balance.

Basic factors affecting potential evapotranspiration were considered. Radiation balance was discussed briefly. Considerable attention was given to the energy balance and the effect of various climatic factors on the portioning of net radiation into latent and sensible heat fluxes. Evapotranspiration studies where for the most part, full cover, vegetative surfaces with low stomatal characteristics were involved showed heat losses to the soil from mid-March until mid-September, with heat gained from the soil during the other months. The McIlroy energy balance-aerodynamic equation illustrated the reasons there can be no simple answer to a question like 'What is the effect on evapotranspiration of doubling the wind speed.' The evaporation process is a highly complicated process with many interrelated factors. Wind may quite drastically affect evapotranspiration percentagewise under dry, low-radiation conditions, while under high-radiation, high-humidity conditions the effect of wind may be considerably less important. Under calm conditions with a given amount of radiation, the effect of humidity levels may be relatively unimportant, especially with high radiation levels. The importance of temperature differences of even 10-15 F should be relatively unimportant under calm humid conditions but would be very significant under dry windy conditions. (See also W75-03023) (Humphreys-ISWS)
W75-04916

2E. Streamflow and Runoff

A REVIEW OF FISHERIES MINIMUM FLOW METHODOLOGIES FROM THE VIEWPOINT OF WATER AVAILABILITY,
Washington State Dept. of Ecology, Olympia.
For primary bibliographic entry see Field 3B.
W75-04861

STREAM PROGRAMMER'S MANUAL.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W75-04874

FLOOD FREQUENCY AND RISK,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4A.
W75-04876

HYDROLOGIC FORECASTING IN THE WATER RESOURCES BRANCH,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 4A.
W75-04881

MECHANICS OF SURFACE RUNOFF ON HILLSLOPES,
Agricultural Research Service, Athens, Ga. Soil and Water Conservation Research Div.
D. E. Overton.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 186-210. 9 fig, 2 tab, 13 ref.

Descriptors: *Surface runoff, *Overland flow, *Rainfall-runoff relationships, *Agricultural runoff, Runoff, Surface drainage, Sheet flow, Rain water, Hydrology, Running waters, Drainage water, Shallow water, Urban runoff, Storm runoff, Storm water, Slopes, Sediment transport, Analytical techniques.
Identifiers: *Kinematic wave equations, Hillslopes, Hills, Mechanics, Rills.

Mechanics of overland flow on hillslopes was examined by use of kinematic wave equations. In applying these equations to overland flow on hillslopes, it was concluded that the transition of viscous flow to turbulent flow was indeterminent. The results from computing equilibrium depth profiles on hillslopes for a purely viscous and a purely turbulent flow with uniform roughness were (1) the velocity and boundary shear stress distribution along the hills were influenced considerably by curvature of the symmetrical hillslopes studied, while (2) equilibrium storage and hydrologic response time were influenced very little by hillslope curvature. No simple all-inclusive relation between the hillslope hydraulics parameters and the overland flow was found. The results from this study showed clearly that the curvature of a hillslope influences the velocity, depth and boundary shear distributions of the hill, but not the total water stored or the hydrologic response time. However, in turbulent flow, the roughness distribution of the hill significantly increased or decreased water storage and response time relative to a plane. (See also W75-03023) (Roberts-ISWS)
W75-04921

EFFECT OF VEGETATION ON STORM HYDROGRAPHS,
Agricultural Research Service, Coshocton, Ohio. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 4C.
W75-04926

DEVELOPMENT OF A TWO-CHANNEL LINEAR DISCRIMINANT FUNCTION FOR DETECTING AND IDENTIFYING SURFACE WATER USING ERTS-1 DATA.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05103

EVALUATION OF COMPUTER-AIDED PROCEDURE FOR DETECTING SURFACE WATER.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05104

TO DEVELOP A LAND USE-PEAK RUNOFF CLASSIFICATION SYSTEM FOR HIGHWAY ENGINEERING PURPOSES,
Maine Dept. of Transportation, Augusta. Bureau of Highways.
For primary bibliographic entry see Field 4A.
W75-05130

HYDROLOGICAL BASIS FOR FORECASTING AND CALCULATING RUNOFF BY SPACE IMAGES OF THE EARTH'S SURFACE,
Kanner (Leo), Associates, Redwood City, Calif.
For primary bibliographic entry see Field 4A.
W75-05135

DISCHARGE OF SELECTED RIVERS OF CANADA.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
Information Canada, Ottawa, 1972. 338 p, 3 fig, 1 append.

Descriptors: *Data collections, *International Hydrological Decade, *Canada, *Stream-flow, Basin data collections, Gaging stations, Rivers, Discharge(Water), Surface waters, Hydrologic data, Drainage area, Watersheds(Basins), Sites, Altitude, Peak discharge, Annual, Monthly, Average.
Identifiers: Maximum mean daily discharge, Latitude, Longitude, Minimum mean daily discharge.

Yearly discharge data up to 1970 for each of 72 Decade stations were duplicated in two sections. The metric system of units was used in the first section and the English system of units in the second section. Data for each station comprised 3 parts: (1) basic station data, including the station index number (the GEOREP index system was used in the metric unit portion of the report whereas the index system followed the Canadian data collection agencies was used in the English unit portion. An explanation of the GEOREP system is given in an appendix), the river and station name, the drainage basin, the latitude and longitude of the station, the altitude above MSL, and the drainage area; (2) the yearly discharge data, including the monthly, yearly, maximum mean daily, minimum mean daily, and maximum instantaneous discharges where available; and (3) the long term average monthly and yearly discharge data. The discharges in both sections were tabulated to three significant figures. (See also W75-05137) (Humphreys-ISWS)
W75-05136

DISCHARGE OF SELECTED RIVERS OF CANADA, SUPPLEMENT 1.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
Information Canada, Ottawa, 1974. 23 p.

Descriptors: *Data collections, *International Hydrological Decade, *Canada, *Streamflow, Basic data collections, Gaging stations, Rivers, Discharge(Water), Surface waters, Hydrologic data, Drainage area, Watersheds(Basins), Sites, Altitude, Peak discharge, Annual, Monthly, Average.
Identifiers: *Canadian National Committee, Maximum mean daily discharge, Minimum mean daily discharge, Latitude, Longitude.

In 1972 the Canadian National Committee of the International Hydrological Decade published 'Discharge of selected rivers of Canada,' a collection of data on 72 river discharge stations given in the metric and North American systems of units. The 1972 publication reported basic station data, yearly discharge data, and long term average monthly and yearly discharge data up to 1970 for the 72 stations, giving continuous year records, in some instances, of more than 100 years. Supplement 1 provides discharge data for 1971 and 1972. It introduces one new station into the records, which replaces a station that was abandoned in 1972. (See also W75-05136) (Humphreys-ISWS)
W75-05137

HYDROLOGY AND PERMAFROST WITH REFERENCE TO NORTH AMERICA,
British Columbia Univ., Vancouver. Dept. of Geography.
For primary bibliographic entry see Field 2C.
W75-05140

RIVER HYDROLOGY IN PERMAFROST AREAS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.

For primary bibliographic entry see Field 2C.
W75-05142

PERMAFROST HYDROLOGY: AN ALASKAN'S EXPERIENCE,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 2C.
W75-05145

PERMAFROST-RUNOFF: THE CONSULTING ENGINEER'S EXPERIENCE,
Bolter Parish Trimble Ltd., Edmonton (Alberta).
For primary bibliographic entry see Field 2C.
W75-05146

SOFAR CHANNEL AXIAL SOUND SPEED AND DEPTH IN THE ATLANTIC OCEAN,
Naval Undersea Center, San Diego, Calif.
For primary bibliographic entry see Field 8B.
W75-05156

CONTINUOUS HYDROLOGICAL TIME-SERIES DISCRETIZATION,
Technical Univ. of Lisbon (Portugal). Instituto Superior Tecnico.
For primary bibliographic entry see Field 2A.
W75-05165

RAINFALL TEMPORAL PATTERNS FOR DESIGN FLOODS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-05166

INTERNAL GRAVITY WAVES IN A SLOWLY VARYING, DISSAPATIVE MEDIUM,
Melbourne Univ., Parkville (Australia).
R. Grimshaw.
Geophysical Fluid Dynamics, Vol 6, No 2, 131-148, 1974. 7 ref.

Descriptors: *Gravity waves, *Compressible flow, *Viscosity, Water circulation, *Internal waves, Momentum equation, Energy equation, Continuity equation, Mathematical studies, Frequency.
Identifiers: *Transport equations, Two-timing technique, Dissipative medium.

Fluid transport equations were derived for the propagation of internal gravity waves in a nonuniform, slightly compressible fluid containing a small amount of dissipation. Because of the presence of the dissipative terms, an averaged Lagrangian could not be used. The field variables were assumed to possess a two-time-scale structure in both the time and space variables. The transport equations were then formulated with the requirement that the two-time-scale structure be well ordered (In this case, periodic in the phase), at least on the time and length scales associated with the basic stratification and mean flow. The transport equations described the changes in amplitude, phase, and mean flow of a wave packet. Various solutions of these transport equations were discussed, with relevance to critical layer absorption. (Singh-ISWS)
W75-05188

FLOW RESISTANCE IN SAND BED CHANNELS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05220

FLOW AND RESISTANCE CHARACTERISTICS OF SAND BED CHANNELS,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 8B.
W75-05221

THE HISTORY OF SEDIMENT YIELD AND DEPOSITION OF THE JUBONES RIVER, ECUADOR, AND ITS RELATION TO ENGINEERING PROJECTS,
For primary bibliographic entry see Field 2J.
W75-05257

FLOOD FLOW FREQUENCY TECHNIQUES,
Texas Univ. at Austin. Center for Research in Water Resources.
L. R. Beard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 951, $7.25 in paper copy, $2.25 in microfiche. Technical Report CRWR-119, October 1, 1974. 216 p, 4 fig, 22 tab, 92 ref, 6 append. OWRT C-5340(No. 9088)(1).

Descriptors: *Flood frequency, *Flood forecasting, *Statistical methods, *Frequency analysis, *Statistical models, *Stochastic processes, *Regression analysis, Stochastic hydrology, Flood flow, Maximum probable flood, Historic floods, Streamflow forecasting, Streamflow, Runoff, Frequency distribution, Runoff forecasting.
Identifiers: Log Pearson III with regional skew, Log Pearson III, Log Normal, Gumbel, Log Gumbel, 2-Parameter Gamma, 3-Parameter Gamma, Best Linear Invariant Estimates, Computer analysis, Outlier techniques, Zero flows, Split-record testing, Partial duration.

Through the use of computer analysis, techniques were developed that will yield greater reliability and consistency than has heretofore been available in flood flow frequency determinations from data on natural streamflows available at the location for which each frequency estimate is to be computed. 300 U.S. Geological Survey streamflow stations with records 40 years or longer and unregulated flow were selected and analyzed using Log Pearson III, Log Normal, Gumbel, Log Gumbel, Two-Parameter Gamma, Three-Parameter Gamma, Log Pearson III with regional skew and Best Linear Invariant Gumbel distribution techniques. Zero-flow and outlier techniques were also considered. The results indicate the Log Pearson III method with regional skew coefficients will produce unbiased estimates when the adjustments to expected probability is employed and will reduce uncertainty as much or more than the other methods tested. (Smith-Texas)
W75-05262

GTWS: GEORGIA TECH WATERSHED SIMULATION MODEL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05271

2F. Groundwater

DIGITAL SIMULATION OF HORIZONTAL SALT-WATER ENCROACHMENT INDUCED BY FRESH-WATER PUMPING,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2L.
W75-04875

THREE-DIMENSIONAL SUBSURFACE DELINEATION VIA A NOVEL METHOD FOR DETERMINING THE SUBSURFACE ELECTRICAL PROFILE,
California Univ., Livermore. Lawrence Livermore Lab.
R. J. Lytle, R. M. Bevensee, and D. L. Lager.
Available from the National Technical Information Service, Springfield, Va 22161 as UCRL-51685, $4.00 in paper copy, $2.25 in microfiche. Report No. UCRL-51685, 1974. 17 p, 8 fig, 15 ref. AEC Contract No. W-7405-ENG-48.

Descriptors: *Resistivity, *Subsurface investigations, *Stratistical methods, Geophysics, Conductivity, Laplaces equation, Homogeneity, Analytical techniques.
Identifiers: *Probabilistic potential theory, Subsurface anomalies.

The combination of a standard experimental procedure (four-probe electrical resistivity), a novel analytical technique (probabilistic potential theory), and a powerful inversion algorithm (optimization/generalized linear inverse) was proposed as a method for determining the subsurface electrical profile. Four-probe electrical measurements can yield electrical profiles which, in the light of known geologic information about the site, can be related directly to subsurface structure. However, the reduction of field data from such measurements heretofore has generally been successful only for the mathematically nice situations (e.g., horizontal or vertical stratification). For the more complicated case of general subsurface structure, the presently available analytical methods rapidly become unwidely, computer-limited, or cost-ineffective. The proposed analytical procedure should overcome these limitations and permit the efficient solution of complicated problems of subsurface structure. It was proposed that the feasibility of the procedure be tested by analysis of field experiments in conjunction with scale-model laboratory experiments to validate the algorithms for general structure. The procedure should have great practical value in a wide variety of applications: hydrology, location and definition of the shape and extent of underground resources, faultline definition, and monitoring of changes in subsurface conditions. (Schicht-ISWS)
W75-05116

GEOHYDROLOGIC RELATIONSHIPS IN WATER POLLUTION,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
For primary bibliographic entry see Field 5G.
W75-05128

PERMAFROST HYDROLOGY.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
For primary bibliographic entry see Field 2C.
W75-05138

HYDROLOGY AND PERMAFROST WITH REFERENCE TO NORTH AMERICA,
British Columbia Univ., Vancouver. Dept. of Geography.
For primary bibliographic entry see Field 2C.
W75-05140

DYNAMICS OF WATER MOVEMENT IN PERMAFROST: A REVIEW,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 2C.
W75-05148

GROUNDWATER IN PERMAFROST REGIONS OF CANADA,
Department of the Environment, Calgary (Alberta). Water Resources Branch.
For primary bibliographic entry see Field 2C.
W75-05150

HYDROGEOLOGY OF THE LETHBRIDGE-FERNIE AREA, ALBERTA,
Alberta Research, Edmonton.
O. Tokarsky.
Report 74-1, p 18, 1974. 45 ref.

Descriptors: *Hydrogeology, *Geologic control, *Geochemistry, Alluvial aquifers, Detritus, Faults(Geologic), Groundwater, Dissolved solids, Groundwater movement, Water yield, Permeability, Potentiometric level, Topography, Springs, Bicarbonates, Sulfates, Canada.
Identifiers: *Alberta, Buried river valleys, Well yields.

Clastic rocks, largely non-marine, of Upper Cretaceous age and some of Tertiary age underlie the plains in the Lethbridge-Fernie map area. The regional dip is westward, ranging from 20 to 200 feet per mile. Closely spaced, high-angle thrust faulting has deformed the Upper and Lower Cretaceous clastics of the foothills belt. Mesozoic clastics, Paleozoic carbonates, and Precambrian clastic and carbonate rocks in the mountain areas have been affected by low- to moderate-angle thrusting. The interpretation of the hydrogeology has certain limitations due to the low reliability of data over large areas, thus yield values were based on a number of assumptions related to geology and topography. The highest expected well yields are to be found in present-day alluvial gravels and in sands and gravels of buried river valleys. Bedrock formations are expected to give generally very low to moderate yields, although there are some major exceptions. Groundwater of over 1000 ppm in total dissolved solids of either sodium sulfate or mixed cation sulfate-bicarbonate type is common over much of the plains part of the area, while better quality potable water of the calcium-magnesium bicarbonate type predominates in the foothills and mountain areas. (Visocky-ISWS)
W75-05151

REGIONAL CHEMISTRY AND WATER LEVEL DISTRIBUTION OF THE NEAR-SURFACE GROUNDWATERS OF THE EDMONTON AREA (NORTHWEST SEGMENT), ALBERTA,
Alberta Research, Edmonton.
R. Bibby.
Report 74-6, p 76, 1974. 51 fig, 8 ref.

Descriptors: *Hydrogeology, *Geochemistry, *Water levels, *Groundwater, Alluvial aquifers, Geologic control, Bedrock, Water chemistry, Maps, Permeability, Infiltration, Ion .exchange, Potentiometric level, Topography, Soils, Dissolved solids, Groundwater movement, Chemistry, Chemical reactions, *Canada.
Identifiers: *Alberta(Canada), Buried river valleys, Regional studies.

The chemistry and water level distribution of the near-surface groundwaters were described and interpreted on a regional basis. To facilitate description and interpretation the available basic data were sorted into three groups. These groups were data from the drift, data from the upper 75 feet of bedrock, and data from the bedrock from 75 to 250 feet. The data for each of these layers were then automatically contoured. These contour maps of chemistry and water levels for each layer were presented. Interpretation of the contoured data led to the following major conclusions: the water level distribution closely resembles surface topography; over most of the area flow has a downward component relative to the water table; buried channel sands and gravels act as high permeability linesinks and are a major influence on water level distribution; soils and drift lithology are the major influence on groundwater chemistry, flow direction is a minor influence; Stony Plain and Gladu Peak are major areas of infiltration to groundwater; ion exchange occurs from the drift to bedrock quickly and completely; and some sulfate reduction takes place from drift to bedrock. (Visocky-ISWS)
W75-05152

HYDROGEOCHEMISTRY OF CARBONATE GROUNDWATERS OF AN URBAN AREA,
Illinois Univ., Chicago. Dept. of Geological Sciences.
D. T. Long, and Z. A. Saleem.
Water Resources Research, Vol 10, No 6, p 1229-1238, December 1974. 4 fig, 5 tab, 29 ref.

Descriptors: *Geochemistry, *Hydrogeology, *Dolomite, *Urban hydrology, Geologic control, Saturation, Supersaturation, Groundwater, Equilibrium, Carbon dioxide, Glacial drift, River basins, Aquifers, Water table, Groundwater movement, Illinois, Carbonates.
Identifiers: *Northeastern Illinois Metropolitan Area (NIMA), *Salt Creek(Ill), Cook County(Ill), DuPage County(Ill), Ion pairing.

A comparison of the groundwater chemical data from the shallow dolomite aquifer of North-eastern Illinois Metropolitan Area (NIMA) from August 1972 through April 1973 with data collected 12-40 years earlier indicated that concentrations of all ions have increased, the greatest increase occurring in the southeastern part of the area where the overburden is thinnest. The largest increases are 843, 142, and 91% in Cl(-), SO4(2-), and Na(+), respectively. However, the spatial distribution of the groundwater chemical types has remained the same with time. The groundwater was apparently supersaturated with respect to calcite and dolomite; however, the two saturation indices were reduced by 20 and 30%, respectively, after considering the effect of ion pairings. The chemical character of the groundwater is controlled, among other factors, by the change of the carbon dioxide content of the water along the groundwater flow path. A model for the solution of dolomite based on the standard equations for carbonate equilibrium was presented. The application of the model to the study area indicates that a variety of geologic conditions between the dolomite aquifer and the overlying glacial drift prevail in the area. (Visocky-ISWS)
W75-05163

THE GEOLOGY AND HYDROGEOLOGY OF THE NEW LEAD BELG, MISSOURI,
Missouri Univ., Rolla. Dept. of Geological Engineering.
C. S. Fletcher.
Available from the National Technical Information Serivce, Springfield Va. 22161, as PB-239 613, $4.75 in paper copy, $2.25 in microfiche. Ms Thesis, 1974. 83 p, 2 fig, 2 tab, 27 ref. OWRR A-060-MO (1).

Descriptors: *Mine water, *Groundwater resources, Geologic formations, Geologic mapping, Hydrogeology, Potentiometric level, Groundwater, Pumping, Drillers logs, Lithologic logs, Water wells, Aquifers, Aquicludes, Facies(Sedimentary), Leakage, *Missouri.
Identifiers: *New Lead Belt area(Mo), Lead mines, Davis formation, Clastic-to-carbonate ratio.

In order to analyze the effects of pumping groundwater from underground lead mines upon present groundwater resources of the New Lead Belt area, the geology and hydrogeology of that area must first be determined. This analysis was achieved through interpretation of geologic and hydrogeologic data taken from water well logs and mineral exploration well logs, supplemented by the literature. From all these sources of data, structural contour maps, isopachous maps, a generalized clastic-to-carbonate ratio map, and a shallow aquifer potentiometric surface map were constructed. The surface map, when compared to the structural contour maps, illustrates tha the regional hydrogeologic gradient within the Black River basin is at an oblique angle to the regional geologic gradient. Three hydrogeologic groups were established to qualitatively evaluate the recharge of groundwater into mines: the shallow aquifer, the Davis Formation, and the deep aquifer. Three primary methods of recharge to the deep aquifer are: vertical leakage through the Davis Formation 'leaky aquiclude facies' which include both intergranular leakage and leakage through faults and fractures; migration of groundwater from the deep aquifer outcrop area; and migration of groundwater down the shallow aquifer gradient to the Davis Formation 'aquifer facies.' (Visocky-ISWS)
W75-05175

AQUATHERMAL FLUID MIGRATION,
Imperial Oil Ltd., Calgary (Alberta).
For primary bibliographic entry see Field 4B.
W75-05182

SEDIMENT TRANSPORT THROUGH A POROUS COLUMN,
Madras Univ., Guindy (India). Coll. of Engineering.
For primary bibliographic entry see Field 2J.
W75-05231

INVESTIGATION OF ALTERNATIVE PROCEDURES FOR ESTIMATING GROUNDWATER PARAMETERS,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 4B.
W75-05263

FLOW PATTERNS OF STEADY RAINFALL SEEPING THROUGH BEDDED LAND OR A HILLSIDE WITH A BARRIER AT GREAT DEPTH,
Virginia Polytechnic/Inst. and State Univ., Blacksburg. Dept. of Agronomy.
N. L. Powell, and D. Kirkham.
Journal of Hydrology, Vol 23, No 3/4, p 203-217, 1974. 6 fig, 2 tab, 11 ref. OWRT A-044-IA(2).

Descriptors: *Flow nets, *Groundwater movement, *Recharge, *Rainfall, *Boundaries(Surfaces), Beds, Infiltration, Laplaces equation, Percolation, *Seepage, Soil water movement, Potential flow, Natural recharge, Aquifers, Equations, Mathematical studies, Flow rates, Steady flow, *Surface-groundwater relationships.
Identifiers: Hillside recharge, Flow patterns, Impermeable barriers.

The problem of the steady seepage of rainfall or other recharge through bedded fields underlain by an impermeable barrier at a great depth was solved for finite depths of water in the bedding furrows. The problem solution applies to soil bedding, hillside seepage as a river, and closely spaced furrows and ridges as in row cropping. Two basic geometries were considered: a rectilinear bedding and an elliptic bedding for homogeneous soil. The rainfall rate needed to keep the bedding saturated, the average quantity per unit area per unit time of water flowing through the soil, and the ratio between the two were calculated. By changing the shape of the soil surface from rectilinear to elliptic, the ratio for the geometries increased about 400%. Flow nets for several soil-bedding geometries were presented and it was seen that water enters the soil upslope above a critical point and, after flowing through the soil, resurfaces again downslope and enters surface runoff. The critical point was located farther downslope for a finite depth of barrier than for an infinite depth. This in-and-out seepage of water illustrated how soluble material may be removed from the soil and added to surface runoff. The flow nets also showed how seepage spots on a hillside may develop and how a type of base flow may occur. When rain or other applied recharge ceases, the soil water itself may be considered to supply the recharge in quasi-steady flow for a limited time. This quasi-steady recharge drains downward over a larger percentage of the surface area of elliptic bedding than of rectilinear and thus indicated that elliptic is better than rectilinear for removal of soil water. (Prickett-ISWS)
W75-05339

2G. Water In Soils

RELATIVE SIGNIFICANCE OF SOIL AND PLANT EVAPORATION IN ESTIMATING EVAPOTRANSPIRATION,
Commonwealth Scientific and Industrial Research Organization, Canberra(Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 2D.
W75-04915

INFILTRATION OF WATER INTO THE SOIL PROFILE,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering; and North Carolina State Univ., Raleigh. Dept. of Soil Science.
R. W. Skaggs.
In: Biological Effects in The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 123-135. 5 fig, 47 ref.

Descriptors: *Soil water movement, *Infiltration, Soil physical properties, Unsaturated flow, Saturated flow, Diffusion, Hydraulic conductivity, Porous media, Hysteresis.
Identifiers: Buckingham-Darcy equation, Richards equation.

The equations governing the movement of water into and through the soil profile were presented and numerical techniques for their solutions were cited. Solutions to the Richards equation for various boundary and initial conditions were used as a basis for discussion of the effects of initial water content, depth of surface ponding, rainfall application rate, surface sealing and stratified soil profiles on vertical infiltration. The sensitivity of solutions of Richards equation to errors made in measuring the hydraulic properties of soil was also discussed. Difficulties in applying soil-water movement theory to field conditions were described. (See also W75-03023) (Schict-ISWS)
W75-04918

INFILTRATION ROLE OF LARGE SOIL PORES: A CHANNEL SYSTEM CONCEPT,
Nevada Agricultural Experiment Station, Reno.
R. M. Dixon.
In: Biological Effects in The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 136-147. 4 fig, 11 ref.

Descriptors: *Infiltration, *Soil physical properties, *Soil water movement, *Soil structure, *Soil management, *Soil surfaces, *Pores, Soil water, Capillary water, Soil bacteria, Cultivation, Soil compaction, Hydraulic conductivity.
Identifiers: *Channel system concept, *Soil pores, Soil surface roughness, Soil tillage practices, Physical models.

The infiltration role of large soil pores was detailed by the channel system concept. Seven points describing this concept were summarized. The channel system concept embodies six physical representing two degrees of surface roughness and three degrees of channel openness. These models can guide practical application of the concept since they represent naturally occurring soil surface conditions that can be readily identified and easily created in the field. Further research is needed to adapt existing mathematical models to the channel system concept. (See also W75-03023) (Schict-ISWS)
W75-04919

A FORMULATION FOR QUANTIFYING THE INFLUENCE OF SOIL POROSITY AND VEGETATION ON INFILTRATION,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
H. N. Holtan.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 228-239. 10 fig, 2 tab, 6 ref.

Descriptors: *Soils, *Infiltration, *Infiltrometers, *Soil physical properties, *Soil physics, Soil texture, Soil structure, Pores, Land use, Permeability, Porosity, Saturated flow.
Identifiers: *Sprinkler infiltrometer data, *Infiltration equation, Crop water consumption, Land cover, Vegetative density, Capillary flow system, Channel flow system.

An infiltration equation was derived empirically from sprinkler infiltrometer data and parameters were empirically related to dimensions of soil and vegetation. The derived relationships appear rational through comparison with laboratory tests of applied soil physics by various researchers. The advantages of the exhaustion equation presented lie mainly in the availability of input data and in the security derived from dependence upon determinate volumes of soil porosity as a ceiling on applications of the highly nebulous and erratic rates of permeability. (See also W75-03023) (Schict-ISWS)
W75-04923

NITRATE AND CHLORIDE MOVEMENT IN THE PLAINFIELD LOAMY SAND UNDER INTENSIVE IRRIGATION,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-04997

EFFECT OF TIME OF IRRIGATION ON THE DISTRIBUTION OF 1,2-DIBROMO-3-CHLOROPROPANE IN SOIL AFTER SHALLOW INJECTION,
California Univ., Davis. Dept. of Nematology.
For primary bibliographic entry see Field 5B.
W75-05065

VOLATILIZATION LOSSES OF PESTICIDES FROM SOILS,
California Univ., Riverside.
For primary bibliographic entry see Field 5B.
W75-05075

LOSSES OF FERTILIZERS AND PESTICIDES FROM CLAYPAN SOIL,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-05081

UTILIZING ERTS IMAGERY TO DETECT PLANT DISEASES AND NUTRIENT DEFICIENCIES, SOIL TYPES AND SOIL MOISTURE LEVELS,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 3F.
W75-05133

SPECIFIC HEATS OF COMPONENTS OF FROZEN SOIL,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2C.
W75-05149

PROPOSED INDICES FOR ESTIMATING THE INHERENT WIND ERODIBILITY OF SOILS,
Colorado State Univ., Fort Collins. Dept. of Agronomy.
For primary bibliographic entry see Field 2J.
W75-05168

NOMOGRAPHIC INTERPRETATION OF WATER ABSORPTION DATA IN TERMS OF A TWO-PARAMETRIC DIFFUSIVITY-WATER CONTENT FUNCTION,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
L. Stroosnijder, and G. H. Bolt.
Soil Science Society of America Proceedings, Vol 38, No 6, p 876-880, November-December 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Diffusivity, *Absorption, Soil water movement, *Sorption, Saturation, Bulk density, Hysteresis, Wetting, Moisture content, Equations, Data collections.
Identifiers: Nomograms, Absorption curves, Pore-size distribution.

An exponential extrapolation of a set of experimentally determined diffusivities, as a function of water content, into the region near saturation led to an underestimate of the water absorption. A two-parametric expression for the diffusivity as a function of water content, as proposed by Ahuja et al. (1972), was used to construct a nomogram. This provided a connection between the standardized diffusivity-water content relationships according to Ahuja el al. and certain 'integral' properties of the absorption wetting process, namely, the sorptivity and a shape factor of the wetting front. Good agreement was obtained between experimentally determined diffusivity values and the values derived from the nomographical interpretation of water absorption data. The present approach also lends itself to the construction of families of scaled wetting curves. Thus, absorption behavior for different (uniform) initial moisture contents could be predicted adequately. Schicht-ISWS
W75-05180

SOIL-WATER PRESSURE DURING INTERMITTENT SIMULATED RAIN APPLICATION MEASURED WITH A NEW RAPID-RESPONSE TENSIOMETRIC TECHNIQUE,
Agricultural Research Service, Morris, Minn. North-Central Soil Conservation Research Center.
L. L. Sloneker, T. C. Olson, and W. C. Moldenhauer.
Soil Science Society of America Proceedings, Vol 38, No 6, p 985-987, November-December 1974. 4 fig, 2 tab, 1 ref.

Descriptors: *Soil water, *Soil pressure, *Tensiometers, *Simulated rainfall, Simulation analysis, Runoff, Puddling, Saturated soils, Irrigation, Measurement.
Identifiers: *Soil-water pressure, *Simulated runoff, Pressure transducers.

A method was described for measuring instantaneous changes in soil-water pressure in soil beds during intermittent application of simulated rainfall. Differences in soil water pressure do occur in soil beds, depending on nozzle off time. Intermittent off periods between nozzle on times affected soil-water pressure which influenced the accumulated rainfall energy required to initiate runoff. (Schicht-ISWS)
W75-05181

EFFECT OF WASH LOAD ON SEDIMENT TRANSPORTATION,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W75-05227

SEEPAGE FLOWS - GROUNDWATER POLLUTION INVESTIGATIONS,
Rutgers - The State Univ., New Burnswick, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-05273

PRELIMINARY DETERMINATIONS OF TRACE METALS IN HI-VOL PADS AND SOILS AROUND THE SOUTH END OF LAKE MICHIGAN,
Metropolitan Sanitary District of Greater Chicago, Ill. Research and Development Dept.
For primary bibliographic entry see Field 5A.
W75-05291

FLOW PATTERNS OF STEADY RAINFALL SEEPING THROUGH BEDDED LAND OR A HILLSIDE WITH A BARRIER AT GREAT DEPTH,
Virginia Polytechnic/Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 2F.
W75-05339

2H. Lakes

CONTINUOUS-FLOW STUDIES OF PHOSPHORUS AS A LIMITING NUTRIENT FOR CAYUGA LAKE PHYTOPLANKTON.
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 5C.
W75-04891

CHLOROPHYLL A DISTRIBUTION IN LAKE HURON AND ITS RELATIONSHIP TO PRIMARY PRODUCTIVITY,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-04892

ENVIRONMENTAL TESTING OF CITRATE: BIOASSAYS FOR ALGAL STIMULATION,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
For primary bibliographic entry see Field 5C.
W75-04893

WATER QUALITY RELATIONSHIPS IN THE GREAT LAKES: ANALYSIS OF A SURVEY QUESTIONNAIRE,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 5C.
W75-04894

MICROBIOLOGICAL EXAMINATION OF LAKE ONTARIO SEDIMENTS: I. DISTRIBUTION OF AEROBIC AND ANAEROBIC HETEROTROPHS IN SEVERAL LAKE ONTARIO SEDIMENTS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-04896

MICROBIOLOGICAL EXAMINATION OF LAKE ONTARIO SEDIMENTS: II. HETEROTROPH METHODOLOGY COMPARISON.
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-04897

EFFECT OF PAPER PLANT POLLUTION AND SUBSEQUENT ABATEMENT ON A LITTORAL MACROINVERTEBRATE COMMUNITY IN LAKE ONTARIO: PRELIMINARY SURVEY,
State Univ., Coll., Oswego, N.Y. Lake Ontario Environmental Lab.
For primary bibliographic entry see Field 5C.
W75-04898

THE DISTRIBUTION OF DIATOMS ON THE SUPERFICIAL SEDIMENTS OF LAKE ONTARIO,
Waterloo Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-04899

DISTRIBUTION OF CHLOROPHYLL A AND RELATED VARIABLES IN ONTARIO WATERS OF LAKE ST. CLAIR,
Lake Erie Fisheries Research Station, Wheatley (Ontario).
For primary bibliographic entry see Field 5C.
W75-04900

METHANE PRODUCTION IN LAKE ERIE SEDIMENTS: TEMPERATURE AND SUBSTRATE EFFECTS,
Ohio State Univ., Columbus. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W75-04901

BACTERIA-PHYTOPLANKTON RELATIONSHIPS IN LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-04902

BENTHIC MACROFAUNA IN THE COASTAL ZONE OF SOUTHEASTERN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W75-04903

NUTRIENT DISCHARGES TO GREEN BAY, LAKE MICHIGAN FROM THE LOWER FOX RIVER,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
For primary bibliographic entry see Field 5C.
W75-04904

NUTRIENT ENRICHMENT AND ITS EFFECT ON PHYTOPLANKTON PRODUCTION AND SPECIES COMPOSITION IN LAKE SUPERIOR,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W75-04905

CHEMICAL CONTROL OF AQUATIC WEEDS AND ITS EFFECT ON THE NUTRIENT AND REDOX STATUS OF WATER AND SEDIMENT,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5C.
W75-04906

BACTERIAL AND PHYSICAL CHARACTERISTICS OF LAKE ONTARIO SEDIMENT DURING SEVERAL MONTHS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W75-04908

VARIATIONS IN THE PHYSICO-CHEMICAL PROPERTIES OF LAKE SUPERIOR,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 5C.
W75-04909

TRACE ELEMENT DETERMINATIONS ON LAKE MICHIGAN TRIBUTARY WATER SAMPLES USING SPARK SOURCE MASS SPECTROMETRY.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5C.
W75-04910

REGIONAL CHARACTERIZATIONS OF THE THERMAL PROPERTIES OF LAKE ONTARIO,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
A. H. Lee.
In: Proceeding 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 625-634. 8 fig, 6 ref.

Descriptors: *Regions, *Thermal properties, *Lake Ontario, Depth, Spatial distribution, Bathythermographs, Seasonal, Advection, Winds, Water temperature.

The bathythermograph data collected on the Great Lakes Institute's Lake Ontario synoptic surveys of 1960-1969 were used in this analysis of horizontal temperature variations. At the time of the surveys, the surface temperature distributions were such that several regions, each having its more or less distinct temperature characteristics, could be delineated; a region with very cold waters in the outlet basin, a region with cold waters near the south shore, regions of intermediate temperature waters near the north shore and two regions with relatively warm waters in the offshore areas. Because of the obvious influence of water depth upon the thermal characteristics of a region, the lake was first divided into an inshore ring and an offshore core, with the 100 m depth contour arbitrarily used as the 'boundary.' Dividing Lake Ontario into seven regions has proved to be a fruitful approach in studying the observed horizontal temperature variations. It has been possible to explain the regional differences in thermal characteristics mainly in terms of two factors--the depth differences between regions and the advective heat flux resulting from the horizontal and vertical water movements. (Jones-Wisconsin)
W75-04911

DELINEATION OF GREAT LAKES ESTUARIES,
Ohio River Valley Sanitation Commission, Cincinnati.
R. A. Brant, and C. E. Herdendorf.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 710-718. 3 fig, 2 tab, 15 ref.

Descriptors: *Classification, *Estuaries, *Great Lakes, *Ohio, *Lake Erie, Water law, Lakes, Limnology, Dredging, Hydraulic properties, Lake shores, Lake morphology, Legal aspects, Riparian rights, Water levels.
Identifiers: *Lake estuaries, Cuyahoga River(Ohio), Maumee River (Ohio).

Whether or not dredging was on state property, i.e., submerged lands, or in the river with attendant riparian rights prompted study by the Ohio Geological Survey which took the position that the area was an arm of Lake Erie, thus an estuary. Consequently the State of Ohio possessed the submerged lands and minerals in trust for the people and proceeded accordingly. The Lake Erie estuaries extend as far as 25 km from what may be termed the estuary mouth. Common denominator

in defining estuaries is morphology, morphometry, and hydraulic relation of water level therein contained to the entering stream. Where land mass and stream profile rise above selected datum, the estuary begins and the river debouches. The concept can be useful in modeling water quality and physical attributes in connection with biotic, physical, limnologic, pollutional, and sedimentary and present geological processes. It can be usefully applied to identify and demonstrate margins of lakes, thus clarifying ownership disputes and clouded issues where demarkation of a lake and river arise. The judicial decisions should have general application in similar situations in the other Great Lakes and other large lakes. (Jones-Wisconsin)
W75-04912

RECREATIONAL USES OF GREEN BAY: BAY/NON-BAY USERS COMPARED,
Wisconsin Univ., Green Bay. Leisure Sciences Collateral.
For primary bibliographic entry see Field 6B.
W75-04913

THE UPPER NILE SWAMPS, A TROPICAL WETLAND STUDY,
J. Rzoska.
Freshwater Biol. Vol 4, No 1, p 1-30, 1974, Illus.
Identifiers: Birds, Cyperus-papyrus, Desmids, Ethiopia, Fauna, Mammals, *Nile River, Pistia-stratiotes, Plankton, Rivers, Sudan, *Swamps, Tropical areas, Uganda, Vegetation, Vertebrates, *Wetlands(Tropical).

The Upper Nile swamps lie in a flat featureless expanse of territory surrounded by a semi-circle of hills and mountains. Rivers enter this area from Ethiopia, Uganda and the Nile-Congo divide and have for thousands of years deposited sediments, mainly heavy clays. The rivers with a very slight slope are subject to heavy water losses by spill and evaporation. Three zones can be distinguished: permanent swamps which fringe rivers and standing water bodies; lands seasonally inundated by a combination of rising river levels and rainfall; and some dry ridges emerging a few meters above the flooded land. Rivers, standing waters and temporal inundations have different characteristics both in their chemico-physical make-up and their biological intensity. The most conspicuous difference is in the plankton; though the species are the same the densities in standing waters are much higher. The Bahr el Ghazal region shows a character of its own where richness of desmids indicates a peculiar limnological character. The role of currents in rivers is discussed, their complex differentiation creating varying opportunities for biological development. The region is inhabited by a number of Nilotic tribes whose annual life and migrations are dictated by the layout of the country and its hydrological regime. The higher vertebrate fauna is also adapted to the swamp conditions by composition (birds) or by migrations (mammals) as in humans. Two specific sections deal with the remarkable fauna of the floating plant Pistia stratiotes and the terrestrial fauna of umbels of Cyperus papyrus showing a succession from fresh to dry stage of the umbels.--Copyright 1974, Biological Abstracts, Inc.
W75-04996

'HUMAN-ACCELERATED EUTROPHICATION OF FRESH-WATER LAKES,' PROCEEDINGS OF A CONFERENCE,
Brooklyn Botanic Garden, Ossining, N.Y. Teatown Lake Reservation.
For primary bibliographic entry see Field 5C.
W75-05037

'EUTROPHICATION'--ITS CAUSES AND EFFECTS IN FRESH WATER LAKES,
New York State Dept. of Environmental Conservation, New Paltz.
For primary bibliographic entry see Field 5C.
W75-05038

LAKE FORMATION, SEDIMENTATION, CONTROL OF ALGAE, QUESTIONS,
Soil Conservation Service, New City, N.Y.
For primary bibliographic entry see Field 5C.
W75-05039

THE REGISTRATION STATUS OF SIMAZINE FOR SUBMERGED VASCULAR WEEDS AND ALGAE CONTROL IN PONDS,
Ciba-Geigy Corp., Greensboro, N.C.
For primary bibliographic entry see Field 5G.
W75-05040

LAKE DREDGING OPTIONS AND MECHANICAL WATER WEED HARVESTERS,
Folsom Marine Service Corp., Plymouth, N.H.
For primary bibliographic entry see Field 5G.
W75-05042

RESTORATION OF EUTROPHIC LAKES BY ARTIFICIAL HYPOLIMNETIC OXYGENATION,
Union Carbide Corp., Tarrytown, N.Y. Aquatic Environmental Sciences.
For primary bibliographic entry see Field 5C.
W75-05043

PUBLIC HEALTH REQUIREMENTS, SEWAGE DISPOSAL SYSTEMS, PERMITS REQUIRED FOR CHEMICAL TREATMENT OF AQUATIC VEGETATION, AUTHORIZED CHEMICALS, DREDGING PERMITS, SOURCES OF LAKE ENRICHMENT, BUILDING REGULATIONS,
Westchester County Dept. of Health, White Plains, N.Y. Div. of Environmental Health Services.
For primary bibliographic entry see Field 5G.
W75-05044

LAND USE AND ZONING, SEPTIC EFFLUENTS AND THE RESPONSIBILITY FOR ADEQUATE CONTROL,
Yorktown School System, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 5G.
W75-05045

AN AUTOMATIC UNDERWATER CAMERA SYSTEM,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W75-05048

A SUBMERSIBLE AUTOMATIC DISSOLVED OXYGEN-TEMPERATURE MONITORING SYSTEM,
Environmental Protection Agency, Fairview Park, Ohio. Ohio District Basin Office.
For primary bibliographic entry see Field 5A.
W75-05049

PHOSPHORUS AND HYPOLIMNIAL DISSOLVED OXYGEN IN LAKE ERIE,
Canadian Wildlife Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5C.
W75-05050

SURFACE NITROGEN AND PLANKTON IN SKAHA LAKE, BRITISH COLUMBIA (CANADA),
British Columbia Univ., Vancouver. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-05053

EXPERIMENTAL LAKES AREA: WHOLE-LAKE EXPERIMENTS IN EUTROPHICATION,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W75-05057

HYDROBIOLOGICAL OBSERVATIONS ON THREE RHODESIAN RESERVOIRS,
Rhodesia Univ., Salisbury. Div. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-05059

EXPERIMENTAL DREDGING TO CONVERT LAKE BOTTOM FROM ABIOTIC MUCK TO PRODUCTIVE SAND,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
For primary bibliographic entry see Field 5G.
W75-05060

OCCURRENCE OF MORPHOLOGICALLY ABNORMAL SYNEDRA POPULATIONS IN LAKE SUPERIOR PHYTOPLANKTON,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W75-05062

THE 'OLIGOTROPHICATION' OF LITTLE OTTER LAKE, PARRY SOUND DISTRICT,
Ministry of Environment, Rexdale (Ontario). Limnology and Toxicity Branch.
For primary bibliographic entry see Field 5C.
W75-05063

ANAEROBIC METABOLISM IN LAKE WASHINGTON SEDIMENTS,
Washington Univ., Seattle, Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W75-05064

PHOSPHATE, ALGAE AND TACONITE TAILINGS IN THE WESTERN ARM OF LAKE SUPERIOR,
Texas Univ. at Dallas, Richardson. Inst. of Environmental Sciences.
For primary bibliographic entry see Field 5C.
W75-05067

SEDIMENTS AND SEDIMENT-WATER NUTRIENT INTERCHANGE IN UPPER KLAMATH LAKE, OREGON,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-05079

ESTIMATING NUTRIENT LOADINGS OF LAKES FROM NON-POINT SOURCES,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 5C.
W75-05082

EVALUATION OF THE POTENTIAL FISH PRODUCTIVITY OF A RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. A. Gordeev, A. G. Poddubnyi, and L. K. Il'ina.
Vopr Ikhtiol. 14(1): 20-25. 1974.
Identifiers: Burbot, Carp, Crucian, Dace, Ecosystem, Energy, *Fish productivity, Loach, Perch, Pike, *Productivity, Reservoirs, Rivers, Roach, Rudd, Ruff, Tench, *USSR(Rybinsk reservoir), Volga River.

A study of the potential productivity of fish (roach, perch, ruff, dace, crucian carp, pike, rudd, tench, loach, burbot, etc.) of the Rybinsk Reservoir on the Volga (USSR) showed that by conducting standard fishery measures it is possible to increase the specific yield of fish production by not more than twofold. An analysis of the balance between replenishment and loss in populations of mass fish species showed that it is possible to increase fish productivity if a thorough study is made of the structure and energy balance of the natural communities to determine the most viable equilbria and interactions with man which will enable complete utilization of the potential production capabilities of these ecosystems.--Copyright 1974, Biological Abstracts, Inc.
W75-05094

ECOLOGY OF THE BUCHARAN ROACH RUTILUS RUTILUS BUCHARENSIS G. NIKOLSKIJ OF THE UCHKYZYL RESERVOIR OF THE SURKHAN-DARYA RIVER BASIN, (IN RUSSIAN),
Karshinskii Gosudarstvennyi Pedagogicheskii Institut (USSR).
A. A. Amanov.
Vopr Ikhtiol. 14(1): 50-56. 1974.
Identifiers: Algae, Chironomidae, *Distribution(Fish), Ecology, Fecundity, *Morphology, Plankton, Reservoir, River basins, *Roach, Rutilus-rutilus-bucharensis, *USSR(Uchkyzyl reservoir), Uzbek-SSR, Zooplankton.

Data are presented on the distribution, morphology, and age and sex variability of the Bucharan roach Rutilus rutilus bucharensis in waters of the Surkhan-Darva River basin in the Uzbek SSR (USSR) and information on the spawning season, fecundity, growth and commercial value of the roach in the Uchkyzyl reservoir, where the roach becomes sexually mature at an age of 2-3 yr at a length of 10-14 cm. In the reservoir the mature roach feed mainly on algae and Chironomidae larvae and the juveniles on zooplankton.--Copyright 1974, Biological Abstracts, Inc.
W75-05102

KANSAS ENVIRONMENTAL AND RESOURCE STUDY: A GREAT PLAINS MODEL,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W75-05110

THE FATE OF NITRATE IN LAKE SEDIMENT COLUMNS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-05155

PLANKTON POPULATIONS OF LAKE LEAKE AND TOOMS LAKE: OLIGOTROPHIC TASMANIAN LAKES,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-05183

MERCURY LEVELS IN LAKE POWELL: BIOAMPLIFICATION OF MERCURY IN MAN-MADE DESERT RESERVOIR,
New Mexico Univ., Albuquerque.
For primary bibliographic entry see Field 5A.
W75-05185

INTERNAL GRAVITY WAVES IN A SLOWLY VARYING, DISSAPATIVE MEDIUM,
Melbourne Univ., Parkville (Australia).
For primary bibliographic entry see Field 2E.
W75-05188

POSSIBILITIES OF CONVERTING PART OF THE PIRITU LAGOON (STATE OF ANZOATEGUI) INTO AN ARTIFICIAL SALT PIT, (IN SPANISH),
Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
For primary bibliographic entry see Field 3E.
W75-05276

PRELIMINARY DETERMINATIONS OF TRACE METALS IN HI-VOL PADS AND SOILS AROUND THE SOUTH END OF LAKE MICHIGAN,
Metropolitan Sanitary District of Greater Chicago, Ill. Research and Development Dept.
For primary bibliographic entry see Field 5A.
W75-05291

DYNAMIC REDISTRIBUTION OF METHYLMERCURY IN A POND ECOSYSTEM,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-05295

PHOSPHORUS INPUTS AND ALGAL BLOOMS IN LAKES,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
For primary bibliographic entry see Field 5C.
W75-05337

2I. Water In Plants

FEEDING IN THE PORCELAIN CRAB, PETROLISTHES CINCTIPES (RANDALL) (ANOMURA: PORCELLANIDAE),
University of Southern California, Los Angeles. Allan Hancock Foundation.
M. K. Wicksten.
Bull South Calif Acad Sci, Vol 72, No 3, p 161-163. 1973. Illus.
Identifiers: *Absorption, Anomura, *Crabs(Porcelain), Digestion, Feeding, Petrolisthes-Cinctipes, Porcellanidae, *Predator-prey relationships.

The feeding process in P. CINCTIPES IS DESCRIBED FROM THE CAPTURE OF PREY TO ITS ABSORPTION IN THE MIDGUT. Foods accepted by animals in the laboratory and found in the stomachs of field specimens are listed. Means by which the porcelain crab rejects particles unsuitable for digestion are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04907

METHODS FOR STUDIES OF PLANKTON (IN SWEDISH),
For primary bibliographic entry see Field 7B.
W75-05061

THE USE OF COLOR INFRARED AERIAL PHOTOGRAPHY IN DETERMINING SALT MARSH VEGETATION AND DELIMITING MAN-MADE STRUCTURES OF LYNNHAVEN BAY, VIRGINIA,
Old Dominion Univ., Norfolk, Va. Dept. of Biology.
For primary bibliographic entry see Field 2L.
W75-05126

UTILIZING ERTS IMAGERY TO DETECT PLANT DISEASES AND NUTRIENT DEFICIENCIES, SOIL TYPES AND SOIL MOISTURE LEVELS,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 3F.
W75-05133

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: I. YIELDS AND NUTRIENT COMPOSITION,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
A. P. Draycott, M. J. Durrant, and D. J. Webb.
J Agric Sci Vol 82, No 2, p 251-159, 1974. Illus.

Descriptors: *Plant growth, *Nutrients, Potassium compounds, *Fertilizers, Sodium compounds, *Irrigation effects, *Vegetable crops.
Identifiers: *Beets, *Sugar beets.

Three experiments (1970-2) on calcareous sandy loam tested all combinations of 4 plant densities (18,500-124,000 plants/ha), 2 amounts of K (0, 156 kg/K/ha) and Na (0, 247 kg/Na/ha) fertilizer and 2 watering treatments on yield and chemical composition of sugar beet. The main effects of the treatments in all 3 experiments confirmed that at least 75,000 plants/ha were needed for maximum sugar yield, that Na fertilizer increased sugar yield more than K (+0.76 and +0.29 t(tons)/ha respectively) and that the crop responded to irrigation in some years (+1.35 t sugar/ha in 1970 and +1.67 t/ha in 1972). Analysis of the growth of the crop showed that increasing the plant density increased leaf growth per unit area from singling onwards and giving irrigation increased it from July; the effects persisted until harvest and were reflected in increased sugar yields. Fertilizer increased leaf growth early in the season but the effect disappeared later, although sugar yield was still increased. Interactions between plant density, fertilizer treatment and irrigation were small every year but there were some consistent effects on sugar yield. The results suggest that in commercial practice the optimum density is 75,000 plants/ha; where irrigation is not practiced, 247 kg/ha of Na and 70 kg/ha of K fertilizer should be given. Where irrigation is applied, only 247 kg/ha of Na needs to be given as the extra water increases the uptake of soil K.--Copyright 1974, Biological Abstracts, Inc.
W75-05265

THE UPTAKE AND SOME PHYSIOLOGICAL EFFECTS OF CADMIUM ON CORN,
Illinois Univ., Urbana. Dept. of Agromony.
For primary bibliographic entry see Field 5C.
W75-05290

PATTERNS OF TRACE-ELEMENT DISTRIBUTION IN A FORESTED WATERSHED,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-05296

ROOT DEVELOPMENT AND NUTRIENT UPTAKE BY CORN GROWN IN SOLUTION CULTURE,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-05305

2J. Erosion and Sedimentation

SEDIMENT LOADS IN CANADIAN RIVERS,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
W. Stichling.
Water Resources Branch. Technical Bulletin No 74, 27 p, 1974, 7 ref, 25 fig.

Descriptors: *Rivers, *Sediment load, *Sediment transport, *Equipment, Erosion, Sedimentation, Suspended solids, Data collections, Surveys, Sediment yield, Sampling, Bed load, Hydrologic data, *Canada.
Identifiers: River morphology.

The history of sediment data program initiated in Canada in 1961 is reviewed, the equipment in use

for measuring suspended sediment and bed load is described and the methods used by the Water Survey of Canada for collecting and processing the data are outlined. Data collection techniques used in Canada are compared with those in other countries. An attempt is made to summarize the data available for the 10 year period 1960-1970 and to interpret these data in terms of Canadian watersheds. Maps illustrating the average suspended sediment concentration and the average annual sediment yield per square mile are printed. The usefulness of sediment transport data for water resource planning and erosion control is pointed out. (Environment Canada)
W75-04886

TECHNIQUES FOR TRACING SEDIMENT MOVEMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
D. E. Nelson, and J. P. Coakley.
Canada Centre for Inland Waters, Scientific Series, No 32, 1974, 40 p, 2 fig, and 3 tab, 411 ref.

Descriptors: *Sediment transport, *Tracking techniques, Sedimentation, Fluorometry, Fluorescent dye, Instrumentation, Analytical techniques, *Bibliographies, Neutron, Activation analysis, Radioisotopes, Pollutant identification, Spectrophotometry.
Identifiers: *Radioactive tracers, Thermoluminescence, Atomic absorption.

A comprehensive review is presented of methods and concepts applied to determining sediment movement using artificial tracers. Conventional techniques such as radioactive and fluorescent tracing, as well as the less developed techniques involving neutron activation and thermoluminescence are examined and assessed for possible use in Great Lakes Studies. (Environment Canada)
W75-04889

FURTHER STUDIES ON THE HEAVY METAL LEVELS IN OTTAWA AND RIDEAU RIVER SEDIMENTS,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 5A.
W75-04890

THE OVERLAND FLOW PROCESS UNDER NATURAL CONDITIONS,
Purdue Univ., Lafayette, Ind., Agricultural Experiment Station.
For primary bibliographic entry see Field 4A.
W75-04920

SEDIMENT YIELD AS RELATED TO VEGETATION ON SEMIARID WATERSHEDS,
Geological Survey, Denver, Colo.
L. M. Shown.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p347-354. 2 tab, 8 ref.

Descriptors: *Sediment yield, *Vegetation, *Erosion control, Runoff, Watershed management, Sediments, Watersheds(Basins), Slopes, Soil types, Drainage density, Overland flow.
Identifiers: *Semiarid watersheds, Watershed slope, Channel density, Mulch, Cornfield Wash Watersheds(N Mex), Boco Mountain Watersheds(Col).

Amount of vegetation plus mulch cover was found to explain 79 percent of the variance in sediment yield for a set of eight watersheds that represented the full range of hydrologic, geologic, and biotic conditions in the Cornfield Wash area of New Mexico. Vegetation amounts appeared to be the result of the integrated effects of slopes, soil types, and drainage densities. Because these same variables also affect runoff and sediment yield, a high degree of correlation existed between vegetation cover and runoff and sediment yield. A short record at the Boco Mountain watersheds in Colorado indicated that sediment yield was greatly reduced when big sagebrush cover was converted to beardless bluebunch wheatgrass cover. This was attributed to a significant increase in vegetation plus mulch cover on the grassed watersheds which reduced runoff during the April-to-October period, and which appeared to retard overland flow, decrease soil detachment, and decrease rilling. (See also W75-03023) (Yang-ISWS)
W75-04927

THE INFLUENCE OF VEGETATION AND VEGETATIVE MULCHES ON SOIL EROSION,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04928

TRANSPORT PROCESSES OF PARTICLES IN DILUTE SUSPENSIONS IN TURBULENT WATER FLOW--PHASE III,
Illinois Univ., Urbana. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5B.
W75-04933

ENGINEERING AND ECOLOGICAL EVALUATION OF ARTIFICIAL-ISLAND DESIGN, RINCON ISLAND, PUNTA GORDA, CALIFORNIA,
Blume (John A.) and Associates, Engineers, San Francisco, Calif.
For primary bibliographic entry see Field 8D.
W75-05117

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEMS STUDIES, VOLUME III,
Tennessee Univ., Knoxville. Dept. of Geology.
For primary bibliographic entry see Field 7B.
W75-05125

THE FATE OF NITRATE IN LAKE SEDIMENT COLUMNS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-05155

DISPERSION OF DREDGE SPOIL DUMPED IN NEAR-SHORE WATERS,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W75-05167

PROPOSED INDICES FOR ESTIMATING THE INHERENT WIND ERODIBILITY OF SOILS,
Colorado State Univ., Fort Collins. Dept. of Agronomy.
S. R. Simmons, and A. D. Dotzenko.
Journal of Soil and Water Conservation, Vol 29, No 5, p 275-276, November-December 1974. 2 fig, 1 tab, 9 ref.

Descriptors: *Soil physical properties, *Wind erosion, Erosion rates, Winds, Soil moisture, Soil erosion, Cation exchange, Soil stability, Indicators.

Highly significant correlations of percentages of erodible dry soil fractions and the resistance of nonerodible aggregates to breakdown, as determined by rotary dry sieving, were found among several properties of some erodible eastern Colorado soils. Cation exchange capacity (CEC) and 15-bar moisture percentage, as indicators of the nature of the soil inorganic-organic colloidal complex, gave comparable or higher correlation coefficients than either soil texture or organic matter determinations. CEC and 15-bar soil moisture percentage as indexes of a soil's inherent erodibility were proposed. (Jess-ISWS)
W75-05168

EXPERIMENTAL STUDY OF RILL EROSION,
Colorado State Univ., Fort Collins. Dept. of Geology.
M. P. Mosley.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 5, p 909-916, September-October 1974. 7 fig, 20 ref.

Descriptors: *Rill erosion, *Soil erosion, *Erosion, Surface runoff, Gully erosion, Sheet erosion, Overland flow, Geomorphology, Geology, Raindrops, Sediment yield, Slopes.
Identifiers: *Fluvial morphology, Rainsplash, Microrilling, Rill cutting.

A rainfall-runoff facility 15.3 m long by 9.2 m wide by 2 m deep filled with a siltsand mixture to which artificial precipitation could be applied was used for an experimental study of rill erosion. The mixture was shaped into four plane, two convergent, and two divergent surfaces with different inclinations. Sediment yields from 112 rill systems were significantly affected by slope shape, and were positively related to slope angle, slope length, and rill density per unit area. Most sediment discharged from a given rill system was apparently detached by the rill itself, the amount of material detached by the other processes observed (Rainsplash, overland flow, and microrilling) relatively small. (Jess-ISWS)
W75-05178

SEDIMENT TRANSPORTATION, VOLUME I.
International Association for Hydraulic Research, Delft (Netherlands).
Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand. p 849.

Descriptors: *Conferences, *Sediment transport, *Sediment yield, *Sediment control, *Depositionsediments), *Scour, Bed load, Suspended load, Sediment distribution, Channels, Stream erosion, Hydraulic structures, Rivers, Movement, Porous media, Meanders, Flow, Streams, Dams, Streamflow, River beds, Foreign countries.
Identifiers: *River mechanics.

River mechanics was discussed at a symposium held at Bangkok in 1973. The four broad topics discussed in Volume I were: (1) sediment yield and deposition, (2) sediment control and scour, (3) sediment transportation, and (4) river bed form. (See also W75-05193 thru W75-05259) (Humphreys-ISWS)
W75-05192

TWO DIMENSIONAL JET DIFFUSION ON SLOPING FLOORS UNDER FINITE SUBMERGENCE,
Alberta Dept. of Environment, Edmonton. Water Resources Div.
For primary bibliographic entry see Field 8B.
W75-05193

ANALYSIS OF AGGRADATION UPSTREAM OF A DAM,
Roorkee Univ. (India). Dept. of Hydraulic Engineering.
For primary bibliographic entry see Field 8B.
W75-05194

BHUMIBOL RESERVOIR-SEDIMENT STATUS AFTER EIGHT YEARS OF OPERATION,
Electricity Generating Authority of Thailand, Nonthaburi.
S. Chitchob, and J. E. Cowley.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 35-45, 3 fig, 2 tab.

Descriptors: Reservoir silting, *Sediment yield, *Sedimentation rates, *Trap efficiency, *Bottom sediments, Silting, Sedimentation, Silts, Sediments, Reservoirs, Impounded waters, Impoundments, Electric power, Reservoir operation, Lakes, Measurement, Surveys, Mapping.
Identifiers: *Thailand(Bhumibol Reservoir), Ping River.

In 1970 a survey of the 13,000-mcm Bhumibol Reservoir in northern Thailand was carried out to provide initial reference maps at a number of index stations, which will be used in monitoring changes in reservoir geometry. Comparisons of the bottom contours and sediment samples observed in this survey with records of surveys made before impoundment of water in 1963 provided enough information to identify the dominant mechanisms of sediment movement in the reservoir. The total sediment yield of the watershed in the intervening years was estimated at 175 mcm, corresponding to an average rate of delivery of sediments of about 0.5 mm per year from the entire basin. These estimates confirm that the time when the usefulness of the resevoir will be seriously restricted by the buildup of sediment is very remote. (See also W75-05192) (Sanderson-ISWS)
W75-05195

DEBRIS SLOPES ABOVE SAND BARRIERS,
Tokushima Univ. (Japan). Dept. of Hydraulic Engineering.
S. Sugio, M. Hashino, and E. Sasaki.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 47-58, 8 fig, 1 tab, 6 ref, 2 append.

Descriptors: *Sediments, *Sediment yield, *Deposition(Sediments), *Sediment transport, *Bed load, Sands, Barriers, Mannings equation, Basins,, Rivers, Rainfall, Runoff, Channels, Slopes, Equations.
Identifiers: *Debris slopes, *Slope ratio, Japan.

The anticipated debris slopes above sand barriers constructed in the extreme upstream reaches of sediment-yielding streams were described. Many more variable affecting the debris slope than those used by previous investigators were taken into account and discussed. A modified Murano's formula was derived to estimate the ultimate debris slope. For preliminary design purposes, the relationship between the debris slope, S, and the original bed slope, So, was discussed for field data collected in Japan. It appeared that as the original bed slope increases, the slope ratio tends to increase slightly. (See also W75-05192) (Schicht-ISWS)
W75-05196

AN APPROACH TO THE SEDIMENT YIELD ESTIMATION BY SPECTRAL ANALYSIS OF MOUNTAIN RELIEF,
Gifu Univ. (Japan). Dept. of Civil Engineering.
S. Komura, and M. Kubota.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 59-70, 17 fig, 3 tab, 1 ref, 1 append.

Descriptors: *Landslides, *Topography, Drainage density, Streams, Basins, *Sediment yield, Forecasting.
Identifiers: *Power spectral density, *Wavelength region, Radial lines, Japan.

Landslides may occur as a reciprocal action of many factors and occasions. These factors and occasions can be considered to be changing in time and space, making it very difficult to forecast landslides. Previous studies on the relationship between the landslide and topographical factors conducted only measurements of the landslide area that occurred in a basin and could not predict the direction where a landslide may occur. The results of spectral analysis of the steepest gradient in the basins were described. It was indicated that there was a possibility of forecasting the direction of a landslide. (See also W75-05192) (Schicht-ISWS)
W75-05197

TECHNIQUES OF MEASUREMENT OF SILT DEPOSITION IN VICTORIAN RESERVOIRS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
R. E. Holmes.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 71-79. 3 fig.

Descriptors: *Reservoir silting, *Sediment yield, *Sedimentation rates, *Trap efficiency, *Bottom sediments, Silting, Sedimentation, Deposition(Sediments), Silts, Reservoirs, Impoundments, Australia, Surveying instruments, Measurement, Surveys, Sounding, Mapping.
Identifiers: *Silt survey lines, *Victorian reservoirs.

The system of establishment and subsequent resurvey techniques of silt lines as used to determine the rate of sediment accretion in Victorian reservoirs was outlined. The total volume of silt was computed by determining a mean depth of silt deposition along each silt survey line which was applied to a specific area of the reservoir. The probable accuracy of determination of mean depth of silt on each line was considered to be about 1-2 cm because of the large number of samples obtained. The validity of applying this mean depth to a large area of the reservoir is questionable, and depends heavily on the proper selection of location for the silt lines. (See also W75-05192) (Sanderson-ISWS)
W75-05198

SCOUR IN RIVER BASIN AND IN ITS BED MECHANISM, FORECAST,
Gruzinskii Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Tiflis (USSR).
T. E. Mirtskhoulava.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 81-91, 9 ref.

Descriptors: *Scour, *Erosion, *Watersheds(Basins), *Sediment discharge, Soil erosion, Sheet erosion, Cohesionless soils, Cohesive soils, River beds, Alluvial channels, Depth, Forecasting.

The amount of washout from watershed slopes as a result of soil water erosion can be determined by suggested equations relating the slope and length, properties and initial humidity of soils composing the slope, intensity and duration of precipitation, kind of vegetation, and man's economic activity on the slopes. Bedside velocity of sheet and bed flow at which the scour starts was determined withdue regard for characteristics of soils composing the slope, the bed, and sheet, and bed flows and flow transporting capacity. A technique was suggested for estimation of general scour of separate sections of bed for changing hydrological regime. When beds are composed of cohesive soils, a relationship was given to allow determination of the scour process with time, taking into account physico-technical indices of soil resistance to rupture and hydraulic parameters of scouring flow. An equation was given for calculation of flow influence time with regard for the non-eroding velocities of non-cohesive soils. Equations resulting from investigations were given, however, no data were presented.(See also W75-05192) (Humphreys-ISWS)
W75-05199

ESTIMATING AVERAGE SEDIMENT YIELDS FROM ANNUAL STREAMFLOW AND SEDIMENT RECORDS,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 4A.
W75-05200

STUDY ON LOCALISED SCOUR AROUND A BRIDGE PIER AND ITS PREVENTION,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05201

DEFORMED PIERS TO CONTROL THE DOWNSTREAM EROSION,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05202

INCIPIENT MOTION OF BED MATERIAL,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05203

SCOUR AT DOWNSTREAM END OF DAMS IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05204

SEDIMENTATION DAMAGE OF HYDRAULIC STRUCTURES IN TAIWAN,
Taiwan Water Resources Planning Commission, Taipei. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W75-05205

MODELING OF LOCAL SCOUR AROUND SPUR DIKES IN STREAMS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 8B.
W75-05206

THE EFFECT OF SILLS ON RIVER BED,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 8B.
W75-05207

THEORY OF VISCOUS FLOW IN WIDE CURVED OPEN CHANNELS,
Technische Hogeschool, Delft (Netherlands). Lab. of Fluid Mechanics.
For primary bibliographic entry see Field 8B.
W75-05208

SECONDARY CURRENTS IN SUBSEQUENT MODEL BENDS,
Karlsruhe Univ., (West Germany). Theodor-Rehbock-Lab. for River Improvement.
For primary bibliographic entry see Field 8B.
W75-05209

ECONOMIC REVETMENTS FOR PROTECTING THE BANKS OF MERIC AND ERGENE RIVERS FLOOD CANALS AGAINST WAVE EROSION,
State Hydraulic Works, Ankara (Turkey). Dept. of Research.
For primary bibliographic entry see Field 8B.
W75-05210

SEDIMENT CONTROL AND REMEDIAL WORKS IN THE BRANTAS RIVER, JAVA, INDONESIA,
Ministry of Public Works, Djakarta (Indonesia). Directorate General of Water Resources.
For primary bibliographic entry see Field 4D.
W75-05211

LANG LANG RIVER, VICTORIA ATTEMPTS TO CONTROL SEDIMENT, EROSION AND FLOODS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
For primary bibliographic entry see Field 4D.
W75-05212

CHAO PHYA RIVER TRAINING WORKS,
Royal Irrigation Dept., Bangkok (Thailand).
For primary bibliographic entry see Field 8A.
W75-05213

STABILITY OF TIDAL RIVERS AND METHODS FOR DETERMINATION OF THE CORRECTIVE WORKS,
Calcutta Port Commissioners (India).
For primary bibliographic entry see Field 8B.
W75-05214

SETTLING CUM FLUSHING TANK ON TRISULI POWER CHANNEL,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 8B.
W75-05215

INFLUENCE OF SUSPENDED SEDIMENT DISTRIBUTION ON SETTLING BASIN DESIGNS,
Mahaweli Development Board, Colombo (Sri Lanka).
For primary bibliographic entry see Field 8B.
W75-05216

WATER INTAKE PROBLEMS IN TORRENTS,
Technical Univ., of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
For primary bibliographic entry see Field 8B.
W75-05217

THE VELOCITY DEFECT LAW AND THE SEDIMENT TRANSFER COEFFICIENT IN AN OPEN CHANNEL,
Africultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 8B.
W75-05218

TURBULENCE MEASUREMENTS OVER SAND BEDS,
California State Univ., Sacramento. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05219

FLOW RESISTANCE IN SAND BED CHANNELS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05220

FLOW AND RESISTANCE CHARACTERISTICS OF SAND BED CHANNELS,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 8B.
W75-05221

THE INFLUENCE OF THE RELATIVE DEPTH ON THRESHOLD OF GRAIN MOTION,
State Hydraulic Works, Ankara (Turkey). Dept. of Research.
S. Aksoy.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 359-370. 5 fig, 8 ref.

Descriptors: *Alluvial channels, *Movement, *Sediments, *Theoretical analysis, Cohesionless soils, Particle size, Coarse sediments, Sediment transport, Flow, Tractive forces, Drag, Beds, Saltation.
Identifiers: Incipient motion, Shields equation.

A number of experimental and theoretical studies on the threshold of grain motion were made in terms of the properties of particles and fluid, and character of the flow. The history of these investigations primarily represent two methods based on critical mean velocity and critical tractive force. The influence of the relative flow depth on the threshold condition was not specifically considered. The effect of the ratio of hydraulic radius/grain diameter (R/D) was discussed. An equation for the equilibrium condition at the time of incipient motion was derived. The general functional relationship implied that the critical condition is a function of R/D. With the experimental curve determined by Shields, the derived relationship was plotted on a diagram for various values of the parameter R/D. It was shown that for natural sediment and water at 20C, the critical slope, J, becomes independent of grain diameter D if D is approximately greater than 6 mm. The critical slope is then only a function of D/R and the value of J was given as $J = 0.10(D/R)$. (See also W75-05192) (Humphreys-ISWS)
W75-05222

INSTANTANEOUS TURBULENT FLOW ACTS ON THE SAND PARTICLE TO START THE ROTATION ON THE BED,
Kobe Univ. (Japan). Dept. of Civil Engineering.
M. Yano.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 371-382. 9 fig, 4 ref.

Descriptors: *Alluvial channels, *Saltation, *Laboratory tests, *Flow characteristics, Tractive forces, Boundary layers, Turbulent boundary layers, Bottom sediments, Movement, Turbulent flow, Velocity, Profiles, Turbulence, Sands, Sediments, Drag.
Identifiers: River mechanics.

The characteristics of the turbulent flow above and below the surface of the bed in a channel were measured by using a coated hot wire. The characteristics of the turbulence and mean flow above the bed were similar to those of turbulent boundary layer flow with the mean velocity on the bed surface. The instantaneous turbulence behind the sand particle had a sharp peak form and strong intensity when the particle began rotating on the bed. The intensity of the instantaneous peak turbulence, turbulent vorticity, and the scale of the turbulent eddy seemed to be related with the trigger flow that starts the rotation of the sand particle. The tractive mechanism of the rough sand particle of the bed was considered the same as the drag of an immersed body. The basic mechanics of the movement of the rough sand particle also seemed to be the same as that of an immersed body in the flow. (See also W75-05192) (Humphreys-ISWS)
W75-05223

A PROBABILISTIC APPROACH TO THE INITIATION OF MOVEMENT OF NONCOHESIVE SEDIMENTS,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
A. J. Sutherland, and H. M. Irvine.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 383-393. 4 fig, 10 ref.

Descriptors: *Alluvial channels, *Saltation, *Laboratory tests, *Flow characteristics, Statistical models, Probability, Sediments, Cohesionless soils, Movement, Theoretical analysis, Entrainment, Dimensional analysis, Stability, Evaluation, Turbulent flow, Bottom sediments.
Identifiers: *River mechanics.

A probabilistic model of a grain's instability due to fluctuations in lift pressure and shear stress was proposed. This yields a relationship from which critical values of shear stress can be determined by experiment. Results for grain mixtures (sizes from 0.4 to 4.7 mm) were interpreted in terms of a dimensional analysis. A functional relationship, consisting of an entrainment parameter, the particle Reynolds number, and the geometric standard deviation, sigma, of the grain mixture described the initiation of motion from mixtures with grain sizes greater than 1.2 mm and sigma less than 1.4. For these mixtures an effective diameter could be used, the probability being independent of grain size. With larger values of sigma the individual grain size became important, the probability decreasing as grain size increased. (See also W75-05192) (Humphreys-ISWS)
W75-05224

BEHAVIOR OF SEDIMENT MIXTURES IN RIVERS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. Gessler.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 395-405. 2 fig, 14 ref.

Descriptors: *Sediment sorting, *Alluvial channels, *Statistical models, *Sediment transport, Gradation, Theoretical analysis, Sediments, Rivers, Bottom sediments, Cohesionless soils, Stochastic processes, Movement, River beds, Shear stress, Channels.
Identifiers: *River mechanics, Channel armoring.

The behavior of sediment mixtures in rivers is very different from the behavior of uniform material. A stochastic model, describing the removal process of grains, which appears to be most realistic remains useless because the joint distribution function of the two random variables, shear stress and critical shear stress, is yet unknown. The process is unsteady and under final conditions of an armor development the two random variables are certainly dependent. A simplified model based on the shear stress as the only

random variable together with some similarity considerations led to a prediction equation for the critical shear stress of a mixture in a river bed. Experimental evidence was used to verify the concept. Prolonged periods of time with bottom shear stresses higher than the critical shear stress would eventually lead to a change in slope of the river bed. (See also W75-05192) (Humphreys-ISWS)
W75-05225

STUDIES ON BED-LOAD TRANSPORT RATE IN OPEN CHANNEL FLOWS,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
For primary bibliographic entry see Field 8B.
W75-05226

EFFECT OF WASH LOAD ON SEDIMENT TRANSPORTATION,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
K. Subramanya, and A. J. Valsangkar.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 419-430. 4 fig, 2 tab, 5 ref.

Descriptors: *Settling velocity, *Suspended load, *Laboratory tests, *Sedimentology, Particle size, Suspension, Viscosity, Velocity, Sedimentation rates, Movement, Suspended solids, Methodology, Measurement, Water properties, Clays, Kaolinite, Montmorillonite, Bentonite, Silts.

An experimental study on the settling of silt size particles in clay suspensions under static condition was presented. Study of the statical settling behaviour of silt size particles in clay suspensions indicated that: (1) clay content less than 0.5% by weight in suspension does not have any effect on the settling of silt size particles. (2) Concentrations greater than 0.5% cause the fluid properties to be different from that of pure water. Bentonite clay caused a gradual change in relative viscosity with respect to the suspension concentration while montmorillonite gave a rapid change at about 1.5% concentration level. (3) The increase in relative viscosity of a clay suspension affecting the settling of silt size particles was also dependent upon the amount of clay size particles already present in the settling particles. The relative viscosities of various clay suspensions, as affecting the settling of silt size particles, were presented. (See also W75-05192) (Humphreys-ISWS)
W75-05227

A NUMERICAL STUDY OF THE SUSPENSION OF A NON-BUOYANT PARTICLE WITHIN A TURBULENT FLOW,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
I. R. Wood, and B. S. Jenkins.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 431-442. 4 fig, 6 ref.

Descriptors: *Suspension, *Suspended solids, *Mathematical models, *Turbulent flow, Numerical analysis, Model studies, Settling velocity, Velocity, Movement, Hydrodynamics, Eddies, Equations, Laboratory tests, Energy transfer, Flow characteristics, Computer models.
Identifiers: Non-bouyant particle, Trajectory, Two-dimensional flow, Eddy model.

The little-understood process of the suspension of a non-buoyant particle within a turbulent flow was examined. The basis of the investigation was the determination of the trajectory of an individual particle within the flow. Particle trajectories were computed by digital computer. The flow modeled was a two-dimensional array of eddies. The computed trajectories of non-buoyant particles within the model eddy field demonstrated that the fall velocity of a non-buoyant particle may be modified by the action of vertical components of fluid velocity, even when the net vertical motion of the fluid is zero. It was demonstrated that a non-buoyant particle can, under appropriate conditions, be suspended indefinitely within an individual eddy. A particle thus suspended was found to effect a net transfer of energy between different zones of the eddy. When the conditions for suspension of the particle were not fulfilled, the particle fell through the eddy field with a velocity that generally exceeded the settling velocity of the particle in the quiescent fluid. The results are to some extent specific to the particular conditions applied in the computations performed. The results do, however, yield some insight into the mechanism of suspension of a non-buoyant particle within a turbulent flow, and demonstrate the potential usefulness of the eddy model in the examination of this phenomenon. (See also W75-05192) (Humphreys-ISWS)
W75-05228

CALCULATIONS OF SUSPENDED LOAD IN ALLUVIAL CHANNEL,
Public Works Research Inst., Tokyo (Japan). River Hydraulic Section.
A. Tsuchiya, and K. Hoshihata.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 443-454. 7 fig, 6 ref.

Descriptors: *Sediment discharge, *Suspended load, Alluvial channels, Bed load, Running waters, Tractive forces, Sediment distribution, Evaluation, Sediment transport, Laboratory tests, Equations.
Identifiers: *River mechanics.

Calculation methods proposed by Einstein, Lane-Kalinske, and Laursen for suspended sediment discharge were evaluated by comparing calculated values with experimental laboratory data measured by the U.S. Geological Survey. The results indicated closer agreement with the methods of Einstein and Laursen than calcualted values obtained by the Lane-Kalinske method. A derived equation for calculating total sediment discharge was proposed. An equation was given as (average sediment concentration) = (alpha)P(tau) (effective tractive force/critical tractive force - 1); where alpha is a constant, P is the same function used in the Lane-Kalinske method, and tau is a nondimensional expression of effective tractive force. (See also W75-05192) (Humphreys-ISWS)
W75-05229

EFFECT OF PHYSICO-CHEMICAL PROPERTIES OF FINE SUSPENDED SEDIMENT ON THE DEGREE OF DEPOSITION,
Florida Univ., Gainesville. Dept. of Coastal and Oceanographic Engineering.
A. J. Mehta, and E. Partheniades.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 465-476. 4 fig, 8 ref.

Descriptors: *Suspended load, *Sedimentation, *Deposition(Sediments), Settling velocity, Shear stress, Cation exchange, Cohesive soils, Turbulent flow, Hydraulic engineering, Clay minerals, Silts, Physicochemical properties, Hydrodynamics, Flocculation, Saline water.
Identifiers: Attractive forces, Repulsive forces, Brownian motion, Log-normal relationships.

Experimental measurements showed that a given flow can maintain in suspension a constant fraction of a suspended cohesive sediment. In a closed, self-contained flow system, this fraction is represented by the ratio C*sub eq - Csub eq/Csub o, where Csub o is the suspended sediment concentration at the beginning of deposition, and Csub eq is the final steady state concentration. It was found that the ratio 1-C* sub eq, referred to as the degree of deposition, is uniquely related to the bed shear stress, tau sub b, by a logarithmic-normal relaionship. For the different sediment suspensions tested, while the standard deviation, sigma sub y, of the logarithmic-normal relationship remains constant, the geometric mean, (tau*sub b - 1)sub 50, which is the value of (tau*sub b - 1) corresponding to C*sub eq = 0.50, and where tau*sub b = tau sub b/tau sub bmin, is strongly related to the minimum bed shear stress, tau sub bmin, below which all the sediment eventually deposits. Moreover, both (tau*sub b - 1) sub 50 and tau sub bmin appear to be correlated to the Cation Exchange Capacities of the sediments used. (See also W75-05192) (Visocky-ISWS)
W75-05230

SEDIMENT TRANSPORT THROUGH A POROUS COLUMN,
Madras Univ., Guindy (India). Coll. of Engineering.
R. Sakthivadivel.
In: Sediment Transportation, Volume 1; Porceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 477-488. 3 fig, 2 ref.

Descriptors: *Sediment transport, *Porous media, *Particle size, *Groundwater movement, *Interstices, Clogging, Equations, Physical properties, Steady flow, Filters, Confined water, Seepage, Deposition, Flow, Hydraulics, Model studies, Laminar flow.
Identifiers: *Inclined flow, *Equilibrium transport rate.

An experimental investigation of the sediment behaviour when it was transported by a laminar liquid current of constant discharge through a porous column packed regularly with uniform spheres and kept in horizontal or inclined directions was reported. The interactions of the pore size and sediment size in clogging a porous medium and the feasibility of transporting sediment through a porous column were studied. With the concept of a critical tractive stress, an equation for the equilibrium transport rate was derived and verified experimentally. The transport equation is applicable to horizontal flows as well as to those with about 60 degree inclinations. (See also W75-05192) (Prickett-ISWS)
W75-05231

SEDIMENT TRANSPORT RELATIONS USING CONCEPT OF EFFECTIVE SHEAR STRESS,
Regional Engineering Coll., Rourkela (India). Dept. of Applied Mechanics and Hydraulics.
N. Vittal, K. G. Ranga Raju. , and R. J. Garde.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 489-499, 4 fig, 4 ref.

Descriptors: *Sediment transport, *Sediment load, Analytical techniques, Bed load, Tractive forces, Rivers, Canals, Laboratory tests, Sediment discharge, Alluvial channels, Movement, Particle size, Beds, Ripple marks, Dunes, Flow, Running waters, Analysis, Equations.
Identifiers: River mechanics, Manning-Strickler equation, Movable beds, Plane bed.

Relationships for rates of total load and bed load transport in alluvial streams were developed by using the concept of effective shear stress. For a plane bed unique relationships were shown to exist between the dimensionless shear stress and a dimensionless transport parameter. These relationships, which are different for bed and total loads, were used to define effective shear stresses for ripple and dune beds. It was shown that the effective shear stress for bed load transport is approximately equal to the grain shear stress computed from the Manning-Strickler equation. The effective shear stress for total load transport was found to be greater than the grain shear stress, but related to it. This relationship along with that for total load transport for a plane bed enables computation of total load transport on undulated beds to be made with reasonable accuracy. Published data of measured sediment transport rates in laboratory studies, rivers, and canals were used in the analysis. (See also W75-05192) (Humphreys-ISWS)
W75-05232

BED MATERIAL TRANSPORT IN SAND BED CHANNELS,
Colorado State Univ., Fort Collins. Coll. of Engineering.
K. Mahmood, and D. B. Simons.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 513-524, 5 fig, 8 ref.

Descriptors: *Sediment transport, *Alluvial channels, *Sediment discharge, *Bed load, Suspended load, Bottom sediments, Sands, Streambeds, Theoretical analysis, Laboratory tests, On-site data collections, Equations, Velocity, Profiles, Sediments, Gradation, Particle size, Distribution, Running waters.

A bed material load function was developed for equilibrium flows in sand bed channels. This function was based on an average velocity profile. For graded sand bed materials, the function can be used by dividing the cumulative size distribution curve into fractions of equal probability. The size gradation of the bed material load is, therefore, also obtained. The cumulative gradation curves of total load predicted by the function were very close to those observed in the laboratory. (See also W75-05192) (Humphreys-ISWS)
W75-05233

INVESTIGATION AND COMPUTATION OF SEDIMENT TRANSPORT WITH REGARD TO THEIR DENSITY,
Moskovskii Institut Inzhenerov Zheleznodorozhnogo Transporta (USSR).
For primary bibliographic entry see Field 8B.
W75-05234

SEDIMENT TRANSPORT CHARACTERISTICS OF THE TEESTA RIVER,
Bangladesh Univ. of Engineering and Technology, Dacca. Dept. of Civil Engineering.
M. S. Hossain.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 537-546, 8 fig, 5 ref.

Descriptors: *Sediment transport, *Sediment discharge, *On-site data collections, Evaluation, Graphical analysis, Investigations, Bed load, Suspended load, Discharge(Water), Rivers, Analytical techniques, Foreign countries.
Identifiers: River mechanics, *Bangladesh(Teesta River).

The sediment transport characteristics of the Teesta River, a major tributary of the Brahmaputra, were analyzed by using available data from the Bangladesh Water and Power Development Authority. Rating curves in the form of simple power functions for the approximate prediction of total sediment discharge from water discharge were obtained. The simple relations given by Colby for estimating unmeasured sediment discharge and total sediment discharge per unit width of stream from mean velocity of the stream were found in good agreement with the Teesta River data. Results were presented in graphical form. (See also W75-05192) (Humphreys-ISWS)
W75-05235

SEDIMENT DISCHARGE FORMULAE - A COMPARATIVE ANALYSIS,
Central Water and Power Research Station, Poona (India).
C. V. Cole, Z. S. Tarapore, V. N. Kanhere, and J. G. Dixit.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 547-560, 6 fig, 11 ref.

Descriptors: *Sediment discharge, *Equations, *On-site data collections, Estimating, Discharge(Water), Rivers, Analysis, Evaluation, Sediment transport.
Identifiers: *River mechanics, DuBoys-Straub equation, Shields equation, Einstein-Brown equation, Coby equation, Engelund-Hansen equation.

A comparative analysis of the validity of five different sediment discharge formulas was undertaken with respect to prototype data obtained from four streams. The purpose was to determine which of these formulas could be utilized with confidence when an estimate of sediment transport was required for a field study. The analysis was made by determining the goodness of fit for each of the formulas with the Chi-Square test, as well as by examining the standard deviations. The study revealed that the Engelund-Hansen formula gives the least deviation within the range of observed data. As such when a prediction of sediment discharge is required where the flow variables are within the range of data reported, this formula may be used. However, the scatter about this formula does not follow a normal distribution indicating that there might be systematic errors. For extrapolating sediment discharge values beyond the range of observation reported in would be desirable to use the DuBoys-Straub formula which shows a significant goodness of fit with respect to the normal error distribution and at the same time has a reasonably low standard deviation. (See also W75-05192) (Humphreys-ISWS)
W75-05236

SEDIMENT DIFFUSION OVER A WAVY, MOBILE BED,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05237

ON THE CONCEPT OF THE WASH LOAD,
Florida Univ., Gainesville. Dept. of Civil and Coastal Engineering.
E. Partheniades.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 573-584. 3 fig, 8 ref. NSF Grant GK-31259.

Descriptors: *Sediment transport, *Suspended load, *Mathematical models, Sediment load, Sediment yield, Particle size, Movement, Channels, Hydrodynamics, Bed load, Stream erosion, Equations, Alluvium, Erosion rates, Cohesionless soils, Cohesive soils, Flow, Entrainment, Statistical methods, Probability.
Identifiers: *River mechanics, Sediment transport capacity, Bed load function.

Existing theories on the erosion and deposition process were critically reviewed and a new model describing the hydrodynamic interaction between a turbulent flow and sediment particles, cohesionless and cohesive, was formulated, which links the behavior of both the wash load and the suspended bed material load. The model explains some important depositional characteristics of fine cohesive sediments revealed by recent research. It was concluded that the wash load consists of three distinct sediment types. The first has a bed load function but its supply rate is less than the sediment transport capacity of the flow. This sediment is expected to be found in the composition of the bed and its supply rates may have an effect on the channel characteristics and the configuration of the bed. The second may have a bed load function for only a limited discharge range, whereas the third type cannot have a bed load function at any flow rate and cannot be found in the composition of an alluvial bed. For this type no sediment transport capacity can exist for any flow. Although the first type agrees most closely with the traditional definition of the wash load, field observations and laboratory experiments suggested that the bulk of the wash load consists of the third type. (See also W75-05192) (Humphreys-ISWS)
W75-05238

STATISTICAL REGULARITIES IN THE MOVEMENT OF BED LOAD,
Research Inst. for Water Resources Development, Budapest (Hungary).
K. Stelczer.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 585-601. 3 fig, 5 tab, 11 ref.

Descriptors: *Sediment transport, *Bed load, *Saltation, *Model studies, Statistical models, Laboratory tests, Cohesionless soils, Gravels, Bed material, Sediments, Statistical methods, Stochastic processes, Probability, Movement, Particle size, Flumes, Evaluation, Distance.
Identifiers: Gamma distribution, Poisson-type distribution.

The parameters describing the movement of bed load are influenced by a number of factors and display a random fluctuation. A particle at any point in the bed remains stationary for a while, then is set into motion, after which it becomes stationary again. Its travel is thus intermittent and the path traveled in a single step may differ from step to step and behave as a random variable. In the laboratory glass flume, the distances traveled by bed load particles from 16 to 40 mm in dimeter and the time spent at rest between successive steps were observed for different bottom slopes. The number of steps during time T was thus also available. Each run was repeated at least 30 times for statistical analysis. The samples were examined for independence and uniformity and the distribution function of distances traveled in individual steps was established to be an exponential one. The probability of the distance traveled in steps was demonstrated to follow a gamma distribution computed from the sum of exponential distributions. The number of steps during time T was approximated by a Poisson-type distribution. (See also W75-05192) (Humphreys-ISWS)
W75-05239

A PROBABILISTIC METHOD FOR DETERMINING THE DISTRIBUTION OF SUSPENDED SOLIDS IN OPEN CHANNELS,
Queens Univ., Kingston (Ontario).
For primary bibliographic entry see Field 8B.
W75-05240

STOCHASTIC MODELS OF SEDIMENT TRANSPORT,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
R. G. Quimpo.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 615-626. 26 ref.

Descriptors: *Statistical models, *Sediment transport, *Reviews, Stochastic processes, Suspended load, Bed load, Sediment discharge, Alluvial channels, Movement, Saltation, Mathematical studies, Equations, Markov processes, Flow characteristics, Boundaries(Surfaces).

To provide a perspective on where modeling might be headed, current stochastic models of sediment transport were reviewed. With a few exceptions, most models incorporate some element of randomness in a basically deterministic analysis to allow for the statistical variability of determinants in the formulation. Two broad classes of models were identified--models of suspended load and models of bed load transport. The genesis of probabilistic models of suspended load was traced to Reynolds' decomposition of the turbulent motion of a fluid and Taylor's statistical theory of diffusion. From these, emanate random walk, Markov, and other stochastic models of sediment particle motion. Current models pave the way for parameters that took the form of empirical constants in earlier models to be broken down into more basic components allowing detailed characterization. Some areas of research need which stand out include the integration of suspended load and bed load models. Traditionally, the tie-up has been effected through the common properties at the interphase defining the bed layer and the shear at the bed. The relation between stochastic measures of boundary and flow properties (e.g., models and statistics of bed form) and the mechanics of flow is another promising field of activity. Prospects in this area are especially encouraging as the linkage which would result points to the eventual unification of deterministic and stochastic models. (See also W75-05192) (Humphreys-ISWS)
W75-05241

SPECTRAL PROPERTIES OF ALLUVIAL BED FORMS IN RIVERS AND FLUMES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05242

EFFECT OF CHARACTERISTICS OF BED MATERIAL AND FLUID ON RIPPLE FORMATION,
Roorkee Univ. (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05243

ON THE CAUSE OF MEANDERING OF RIVERS,
Chuo Univ., Tokyo (Japan). Hydraulic Lab.
T. Hayashi.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 667-678, 7 fig, 6 ref.

Descriptors: *Meanders, *Mathematical studies, *Dunes, Rivers, Alluvial channels, Length, Analytical techniques, Laplaces equation, Flow, Sand waves, Streams, Profiles, River beds, Sediment transport, Scour, Deposition(Sediments), Movement, Erosion, Potential flow.
Identifiers: *River mechanics, Antidunes.

The cause of the initiation of meandering of rivers was analyzed as a problem of three-dimensional stability of the erodible bed. Potential flow was assumed. When the flow was subcritical, the 'unsymmetry' of sediment-transport rate existing with respect to the axes of symmetry of the double-periodic disturbance imposed on the bed plays an essential role in the amplification of the disturbance. When the flow was near-critical or supercritical, the standing alternating seiche waves play an important part in the formation of the alternating antidunes. The regions of occurrence of alternating dunes, flat beds, and alternating antidunes were examined in detail. From this analysis the relationship between the dimensionless meander length and the Froude number was obtained. The predicted meander lengths were compared with published experimental results, the comparison showing a good agreement. Conclusions were: (1) meandering of streams can occur in straight channels even when the side-walls are non-erodible, the meandering in such a case is caused by the development of alternating erosion parts in the river bed; (2) when the flow is subcritical, occurrence of sand waves is caused first by the 'unsymmetry' of sediment-transport rate; and (3) when the flow is supercritical, standing alternating seiche waves play an essential role in the formation of sand waves. The dominant length of alternating antidunes is approximately such that the speed of propagation of the short-crested waves formed by the alternating antidunes equals the undisturbed velocity of flow. (See also W75-05192) (Humphreys-ISWS)
W75-05244

CONDITION FOR THE FORMATION OF ALTERNATE BARS IN STRAIGHT ALLUVIAL CHANNELS,
Waseda Univ., Tokyo (Japan). Dept. of Science and Engineering.
For primary bibliographic entry see Field 8B.
W75-05245

GRAVEL BAR MIGRATION IN STREAMS OF MIDDLE-REACH CHARACTER,
Research Inst. for Water Resources Development, Budapest (Hungary).
O. Gyorke.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 691-702, 3 fig, 4 ref.

Descriptors: *River beds, *Bed load, *Sediment transport, *On-site investigations, Gravels, Sediments, Movement, Cohesionless soils, Aggradation, Degradation(Stream), Beds, Stream erosion, Coarse sediments.
Identifiers: *Hungary(Hernad River), Gravel bars.

The mechanics of bed load transport was reviewed as a background against which gravel bar migration observed and traced over the Hungarian reach of the Hernad River was described. Ideas were presented concerning the principles and methods of regulation on streams with rather flashy regimes, with special regard to the elimination of channel deterioration and inconveniences due to gravel bar migration. (See also W75-05192) (Humphreys- ISWS)
W75-05246

COMPREHENSIVE GRAPHS OF REGIME DATA,
Alberta Univ., Edmonton.
T. Blench, A. W. Peterson, and R. H. Cooper.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 703-714, 3 fig, 19 ref.

Descriptors: *Geomorphology, *Running waters, *Gradients(Streams), *Degradation(Stream), Sedimentation, Sedimentology, Erosion, Streams, Sediment transport, Rivers, Reach(Streams), Regimen.
Identifiers: *Fluvial morphology.

A discussion was given describing a graphical presentation of stream regime data in which average-steady depth and slope have been achieved by the sediment moved by a flow. (See also W75-05192) (Jess-ISWS)
W75-05247

STABLE CHANNELS IN ALLUVIUM,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05248

CHANNEL STABILITY IN RELATION TO BURIED UNCONSOLIDATED SEDIMENTS,
Dundee Univ., Newport-on-Tay (Scotland). Tay Estuary Research Center.
For primary bibliographic entry see Field 8B.
W75-05249

STABLE CHANNELS IN ALLUVIAL MATERIAL,
Regional Inst. of Tech., Jamshedpur (India). Dept. of Applied Mechanics.
For primary bibliographic entry see Field 8B.
W75-05250

DESIGN OF SCOUR-FREE CHANNELS ON MILD SLOPES,
Florida Univ., Gainesville. Dept. of Civil and Coastal Engineering.
For primary bibliographic entry see Field 8B.
W75-05251

SEDIMENT EQUILIBRIUM CONSIDERATIONS IN THE DESIGN OF IRRIGATION CANAL NETWORKS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05252

RIVER-BED VARIATIONS AT CONFLUENCES,
Gifu Univ. (Japan). Dept. of Civil Engineering.
S. Komura.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangko, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 773-784. 7 fig, 1 tab, 8 ref.

Descriptors: *River beds, *Junctions, *Mathematical studies, *Sediment transport, Sediment discharge, Discharge(Water), Equilibrium, Depth, Running waters, Channels, Rivers, Scour, Flow, Subcritical flow, Equations, Continuity equation, Analytical techniques.
Identifiers: *River mechanics, Equation of motion, Movable beds.

An analysis was made of the equilibrium depth of flow at confluences. A general fundamental equation of the equilibrium depth of flow at confluences was obtained by using the equations of motion and continuity for sediment transport, and the equations of continuity and friction velocity

for flowing water, under the assumption that riverbeds above and below the confluence have achieved a dynamic equilibrium state for given water discharges in adjoining channels. By using the fundamental equation for the equilibrium depth of flow, methods of predicting the equilibrium depth of flow at confluences were developed. Regions of occurrence of the equilibrium depth of flow at confluences were described. Field data were used to verify the analytical results. An approximate expression on the relative scour depth was presented. (See also W75-05192) (Humphreys-ISWS)
W75-05253

BED SLOPES OF AGGRADED CHANNELS WITH TWO DEGREES OF FREEDOM,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05254

CONTRIBUTION TO THE STUDY OF GENERAL SCOUR,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
J. A. Maza Alvarez, and F. J. E. Alfaro.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 795-803. 3 fig, 8 ref.

Descriptors: *Scour, *River beds, *On-site investigations, Streambeds, Stream erosion, Evaluation, Rivers, Alluvial channels, Running waters, Degradation(Stream), Discharge(Water), Mexico.
Identifiers: River mechanics.

The general scour, which is the lowering that the river bottom undergoes when a flood occurs, is the primary cause of failure of numerous structures constructed in the river beds. The lowering of the river bottom by general scour is more important than the local erosion that endangers the existence of works such as piers, abutments, pipelines, etc. A method to evaluate general scour in river beds formed of sand or gravel was presented. The method was developed from observations on eight bridges, sections in six rivers, and from observations by others. To evaluate the maximum depth to which the river bottom can descend in a section, a recommended formula was given. The maximum scour depth was related to the maximum and average water depths for the dry season, water discharge, river surface width, and grain size distribution of bed materials. (See also W75-05192) (Humphreys-ISWS)
W75-05255

SEDIMENTATION PHENOMENON OF THE FRASER RIVER,
Environmental Protection Service, Ottawa (Ontario). Ecological Protection Branch.
N. Tywoniuk, and W. Stichling.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 805-817. 7 fig, 1 tab.

Descriptors: *Rivers, *Sedimentation, *Deposition(Sediments), *Sediment transport, *Tidal streams, *Tidal effects, River basins, Erosion, Scour, Stream erosion, Channel erosion, *Canada, Bed load, River beds, Dredging, River training.
Identifiers: *Lower Fraser River(Canada).

A comprehensive hydrometric and sediment survey was started on the Lower Fraser River in 1965. Daily tidal fluctuations up to 10 feet, variations and reversals in river flows, and the relatively large river depths, widths (2000 feet to 3 miles), and velocities resulted in deviation from standard survey techniques. In the analysis of data, consideration was given to the time and space variations of flow and sediment discharge. In the unsteady flow or tidal regions, the flow and sediment transport phenomenon were investigated on an hourly basis; in the upper reaches, the mean daily data could be reliably interpreted. The longitudinal space variations were determined by means of a sediment balance. The seasonal variations in particle size distributions for both the suspended sediment and the bed load were found to be quite significant. Results of dredged and measured quantities indicated that more coarse material was dredged than was transported by the river to the dredging region. (See also W75-05192) (Sanderson-ISWS)
W75-05256

THE HISTORY OF SEDIMENT YIELD AND DEPOSITION OF THE JUBONES RIVER, ECUADOR, AND ITS RELATION TO ENGINEERING PROJECTS,
R. J. Maddrell.
In: Sediment Transportation, Volume I; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 819-829. 5 fig, 6 ref.

Descriptors: Rivers, *Sedimentation, *Stream stabilization, *Sediment transport, *River training, *Deposition(Sediments), *River basins, Erosion, Scour, Stream erosion, Channel erosion, Flood control, River beds, River regulation, Coastal plains, Embankments, Irrigation, History.
Identifiers: *Ecuador(Jubones River).

An engineering study of the Jubones River, undertaken in order to formulate recommendations for the development of a province, involved the investigation of flood protection, irrigation, and hydro-electric development. Generally, the river carries heavy sediment loads and the combination of heavy seasonal rainfall, flood flows, and sediment caused flooding in large areas of the coastal plain damaging or destroying bananas and other crops. In the past, numerous major changes in the course of the river nullified large stretches of the surface irrigation system. The course of the river was most recently changed in May 1970. These changes in the river's course do not appear to be haphazard, but are brought about by the accretion of the river bed and the building of a delta. The instability of the path of the river across the coastal plain shows that the control of the river cannot be achieved by attempting to confine the river to its present course, as this would be an attempt to hold back evolution. Such an attempt would involve continual vigilance and increasing maintenance costs, and the chances of a serious mishap occuring would increase with time, threatening not only the industry of the coastal plain, but the very existence of a major port. In the future, with regular surveys, a greater knowledge of the river, and bold planning, it should be possible to assist the river to evolve in its own way. The establishment of trials to examine the best method of assisting the river to establish a more stable regime was a key part of the engineering proposals. (See also W75-05192) (Sanderson-ISWS)
W75-05257

SCOURING CAPACITY OF FLOW IN NARROW OPEN CHANNELS,
Osmania Univ., Warangal (India). Regional Engineering Coll.
For primary bibliographic entry see Field 8B.
W75-05258

BED-CHANGE PROCESSES IN A SAND-BEARING RIVER,
Research Inst. for Water Resources Development, Budapest (Hungary).
I. Laczay.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 841-849. 5 fig, 1 tab.

Descriptors: *Surveys, *River beds, *On-site investigations, *Channel morphology, Regime, Sediment transport, Bed load, Profiles, Suspended solids, Sampling, Evaluation, River flow, Streambeds, Discharge(Water), Alluvial channels, Aggradation, Degradation(Stream), Stream erosion, Data collections.
Identifiers: *Hungary(Drava River).

A 6-km long reach of the Drava River was studied for 4 years by repeated surveys of selected bed-profiles, sediment sampling of bed-load, bed-material, and suspended sediment, and measurements of discharge and water surface slope. The objective of the investigations was to collect data and information necessary for a river training project. During this period an oscillation of bed-level of several meters was observed. The net bed-material balance of the river reach was surpassed several times by the amount of bed-material which was only rearranged within the reach. The amount rearranged within the reach did not show significant decrease even during low-flow periods. Thus, a certain amount of the total energy of the flow might be continuously consumed by the process of the bed-rearrangement and assumed to be almost independent of the variations in sediment transporting capacity, i.e., of the net bed-material balance. It was concluded that the sediment regime of the study reach is in a state of the long-term equilibrium. Channel bed volume changes determined from four surveys made during the period 1968-1971 were tabulated. (See also W75-05192) (Humphreys-ISWS)
W75-05259

PREDICTION OF SUBSOIL ERODIBILITY USING CHEMICAL, MINERALOGICAL AND PHYSICAL PARAMETERS,
Purdue Research Foundation, Lafayette, Ind.
C. B. Roth, D. W. Nelson, and J. M. Romkens.
For sale by the Superintendent of Printing , Office, Washington, D.C. 20402. $1.90. Environmental Protection Agency, Technology Series, Report EPA-660/2-74-043, June 1974. 111p, 55 fig, 17 tab, 17 ref, 3 append. 1BB042 EPA Project.

Descriptors: Agronomy, Agricultural engineering, Aluminum, Inorganic compounds, Clay minerals, Erosion control, Iron compounds, Regression analysis, Silicates, Soil erosion, Soil aggregates, Soil analysis, Soil structure.

Evidence is presented that the surface soil erodibility prediction nomography which uses terms involving soil particle size, organic matter, structure and permeability, could not be improved upon by consideration of other mineralogical and chemical parameters. However, the surface soil erodibility nomograph did not adequately preict the soil erodibility factor, K, of high clay subsoils studied in the field under simulated rainfall conditions. A multiple linear regression equation and nomograph were developed which can be used to estimate the erodibility factor, K, of many hihg clay subsoils. The subsoil erodibility factor, K, of many high clay subsoils. The subsoil erodibility nomograph uses terms involving soil particle size distribution and the amount of amorphous hydrous oxides or iron, aluminum, and silicon in the soil. Multiple regression analysis revealed that amorphous iron, aluminum and silicon hydrous oxides serve as soil stabilizers in subsoils, whereas, organic matter is the major stabilizer in surface soils. Soil erodibility from seim-compacted fill and scalped subsoil surface surface conditions were essentially identical. The scalped condition is best standard soil surface to base the caluclation of the erodibility factor for subsoils. A soil-management factor should replace

the cropping-management factor in the Universal-Soil-Loss Equation when the Equation is used to predict subsoil erosion. (EPA) (See W71-13910)
W75-05308

AN EXECUTIVE SUMMARY OF THREE EPA DEMONSTRATION PROGRAMS IN EROSION AND SEDIMENT CONTROL,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 5G.
W75-05310

PROGRAMMED DEMONSTRATION FOR EROSION AND SEDIMENT CONTROL SPECIALISTS,
Hittman Associates, Inc., Columbia, Md. Environmental and Geosciences Dept.
For primary bibliographic entry see Field 5G.
W75-05311

DEMONSTRATION OF THE SEPARATION AND DISPOSAL OF CONCENTRATED SEDIMENTS,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 5G.
W75-05312

BENTHIC ANIMAL-SEDIMENT,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5A.
W75-05343

2K. Chemical Processes

INTERLABORATORY QUALITY CONTROL STUDY NO 6: SPECIFIC CONDUCTANCE, PH, COLOUR AND RESIDUE,
Canada Centre for Inland Waters, Burlington (Ontario).
D. J. McGirr.
Canada Centre for Inland Waters, Report No 28, 1974, 6 p, 4 ref, 5 tab, append.

Descriptors: *Water analysis, *Laboratory tests, Water chemistry, Testing procedures, Analytical techniques, Sampling, Hydrogen ion concentration, Color, Evaluation, Measurement, *Pollutant identification.
Identifiers: *Accuracy, Conductance, Residue, Residue determination.

Three synthetic samples and two filtered natural samples were sent to eighteen participating laboratories for the determination of specific conductance, pH, color and filterable residue. The pH of the natural samples was determined with a standard deviation of 0.3-0.5 pH units, which is distinctly higher than the value of about 0.1 pH units which is found for buffered synthetic samples. The precision of the color measurements was fair, as would be expected for the visual method used. Generally good precision was obtained for specific conductance using the conductivity meter. Results for residue were surprisingly poor on the synthetic samples but satisfactory on the natural samples. It appeared that weighing difficulties were an important problem in residue determination. (Environment Canada)
W75-04887

FURTHER STUDIES ON THE HEAVY METAL LEVELS IN OTTAWA AND RIDEAU RIVER SEDIMENTS,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 5A.
W75-04890

THE GEOCHEMISTRY OF CERTAIN MINE AND SPRING WATERS, WESTERN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 5B.
W75-04938

WATER AND AQUEOUS SOLUTIONS: INTRODUCTION TO A MOLECULAR THEORY,
Hebrew Univ., Jerusalem (Israel). Inst. of Chemistry.
For primary bibliographic entry see Field 1B.
W75-04970

WEATHERING OF OIL AT SEA,
Esso Research and Engineering Co., Linden, N.J. Government Research Div.
For primary bibliographic entry see Field 5B.
W75-05106

GROUNDWATER IN PERMAFROST REGIONS OF CANADA,
Department of the Environment, Calgary (Alberta). Water Resources Branch.
For primary bibliographic entry see Field 2C.
W75-05150

HYDROGEOLOGY OF THE LETHBRIDGE-FERNIE AREA, ALBERTA,
Alberta Research, Edmonton.
For primary bibliographic entry see Field 2F.
W75-05151

REGIONAL CHEMISTRY AND WATER LEVEL DISTRIBUTION OF THE NEAR-SURFACE GROUNDWATERS OF THE EDMONTON AREA (NORTHWEST SEGMENT), ALBERTA,
Alberta Research, Edmonton.
For primary bibliographic entry see Field 2F.
W75-05152

HYDROGEOCHEMISTRY OF CARBONATE GROUNDWATERS OF AN URBAN AREA,
Illinois Univ., Chicago. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W75-05163

AMORPHOUS SOLID WATER: A NEUTRON DIFFRACTION STUDY,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 1B.
W75-05169

ACTIVATION ANALYSIS OF HEAVY METALS IN SURFACE WATERS USING ION EXCHANGE FILTER PAPERS AND CYANIDE COMPLEXING,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5A.
W75-05274

ACTIVATION ANALYSIS OF HEAVY METALS IN SURFACE WATERS USING ION EXCHANGE FILTER PAPERS AND CYANIDE COMPLEXING,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5A.
W75-05275

2L. Estuaries

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT: INTERIM REPORT ON RESOURCE CAPABILITY,
Texas Univ. at Austin.
E. G. Fruh, W. L. Fisher, K. Haynes, J. E. Hazleton, and J. F. Malina.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 975, $8.50 paper copy, $2.25 microfiche. Prepared for: National Science Foundation, Washington, D.C. Interim report. May, 1973. 249 p, 37 tab, 39 fig, 46 ref. GI-34870X.

Descriptors: *Coastal engineering, *Gulf Coastal Plain, *Areal hydrogeology, Geology, *Geologic investigations, *Coasts, *Natural resources, *Coastal structures, *Soils, Soil analysis, Groundwater, Flood plains, Regional planning, Barrier islands, Land use, Zoning, Aquifers, Management, *Texas, Engineering, Soil classification, Physical properties.
Identifiers: Nueces County(Tex), San Patricio County(Tex), Aransas County(Tex), Refugio County(Tex), Corpus Christi area(Tex).

For effective coastal zone management in Nueces, San Patricio, Refugio, and Aransas Counties of south Texas a comprehensive catalogue of environmental data has been compiled. The environmental effects of man's current activities, future activities, and potential management policies in the area can all be understood better with these guidelines. To examine the geology, soils, biology, hydrology, physical and chemical properties, and natural processes involved, forty categories of capability units are analyzed, mapped, and catalogued. Capability units are environmental entities -- land, water, or biota -- defined in terms of the kind and degree of activity or use they can withstand without degrading the environment beyond acceptable levels. Physical, process, man-made, and water units in the following categories are described: Coastal Plain; Flood Plain; Barrier Islands; Wetlands; Man-made Features; Bays, Lagoons, Estuaries, and Open Gulf; Active and Potentially Active Faults. The land capability units are subjected to standard engineering studies, including foundation strength and shrink-swell analysis. The potentiometric surface (ground water surface) is mapped from well data and dynamics of ground water movement are explored. Finally, each capability unit is described. Limiting factors, beneficial uses, and detrimental uses are outlined. A taxonomy showing the relationship of capability units to human activities (construction, waste disposal, and agriculture) is presented to aid in future coastal zone management. (Herr-North Carolina)
W75-04851

DIGITAL SIMULATION OF HORIZONTAL SALT-WATER ENCROACHMENT INDUCED BY FRESH-WATER PUMPING,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Vanden Berg.
Scientific Series, No 41, Ottawa, Ontario, 1974. 2[illegible] p, 17 ref, 23 fig, 6 tables.

Descriptors: *Saline water intrusion, *Saline water-freshwater interfaces, *Encroachment, Groundwater, Model studies, Analytical techniques, Pumping, Seepage, Hydrology, Aquifer characteristics, Wells, Mathematical models.
Identifiers: *Coastal aquifers, Hydraulic conductivity.

The horizontal movement of salt water into a coastal aquifer can be determined if the piezometric-head distribution and the hydrologic characteristics of the aquifer are known and if the density difference between fresh and salt water is ignored

The calculation of the time-variant head distribution in a nonhomogeneous horizontal aquifer of irregular shape by the alternating direction implicit procedure (ADIP) is reviewed, and modifications to the basic procedure are introduced. The procedure is tested against analytical solutions for aquifers of various shapes, and for continuous as well as discontinuous variations of the transmissivity. In all the tests the numerical and analytical solutions agreed to within 2% and more commonly to within 1%. When a pumping well, however, was involved the error at the nodes adjacent to the well could be as large as 6%, depending on the mesh size of the finite-difference grid. (Environment Canada)
W75-04875

DELINEATION OF GREAT LAKES ESTUARIES,
Ohio River Valley Sanitation Commission, Cincinnati.
For primary bibliographic entry see Field 2H.
W75-04912

ROOKERY BAY LAND USE STUDIES, THE RESOURCE BUFFER PLAN: A CONCEPTUAL LAND USE STUDY,
Miami Univ., Fla. Center for Urban Studies.
For primary bibliographic entry see Field 4A.
W75-04929

ESTIMATION OF HEAVY METAL POLLUTION IN TWO NORWEGIAN FJORD AREAS BY ANALYSIS OF THE BROWN ALGA ASCOPHYLLUM NODOSUM,
Trondheim Univ. (Norway). Inst. of Marine Biochemistry.
For primary bibliographic entry see Field 5A.
W75-05002

IMPACT OF PESTICIDES ON PHYTOPLANKTON IN EVERGLADES ESTUARIES,
Florida State Univ., Tallahassee.
For primary bibliographic entry see Field 5C.
W75-05005

HARMONIC FUNCTIONS FOR SEA-SURFACE TEMPERATURES AND SALINITIES, KOKO HEAD, OAHU, 1956-69, AND SEA-SURFACE TEMPERATURES, CHRISTMAS ISLAND, 1954-69,
National Marine Fisheries Service, Monterey, Calif. Environmental and Fishery Forecasting Center.
G. R. Seckel, and M. Y. Y. Young.
Fishery Bulletin, Vol 69, No 1, p 181-214, 1971. 7 fig, 8 tab, 10 ref.

Descriptors: *Mathematical studies, *Temperature, *Sea water, *Salinity, *Hawaii, Surface waters, Fourier analysis, Pacific Ocean.
Identifiers: *Harmonic function, *Koko Head(Oahu), *Christmas Island.

Harmonic functions are presented of sea-surface temperatures and salinities regularly measured near Koko Head, Oahu during 1956-1969 and at Christmas Island during 1954-1969. Sea-surface temperatures and salinities change in response to, and therefore reflect, sea-air interaction processes (heat exchange, evaporation minus precipitation) and oceanographic processes (advection, diffusion). The manner in which Fourier analysis has been adapted to this application is described. The standard errors of estimate for Koko Head temperatures and salinities are less than .26C and less than 0.05 salinity, respectively. The standard errors of estimate for Christmas Island temperatures are approximately 60% above those for the Koko Head temperature. The expected values of Koko Head temperature and salinity functions have an uncertainty of plus or minus 0.1C and plus or minus 0.015 salinity, respectively, when samples were obtained semiweekly. Error terms of the Christmas Island temperatures, with daily sampling, are on average 0.07C. Harmonic analysis spanning the entire sampling duration shows that long-term variations in the Christmas Island temperature and Koko Head salinity are larger than the seasonal variations. Seasonal variations in the Koko Head temperatures are dominant and longer term variations small. Results of the harmonic analyses are presented. (See also W75-05016) (Jones-Wisconsin)
W75-05026

PRIMARY, PHYSICAL IMPACTS OF OFFSHORE PETROLEUM DEVELOPMENTS.
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5C.
W75-05032

A GUIDE TO THE MEASUREMENT OF MARINE PRIMARY PRODUCTION UNDER SOME SPECIAL CONDITIONS,
United Nations Educational, Scientific and Cultural Organization, Paris(France).
For primary bibliographic entry see Field 5A.
W75-05047

REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT - LAFOURCHE PARISH, LOUISIANA,
Louisiana State Univ., Baton Rouge. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 4A.
W75-05095

OIL CONTAMINATED BEACH CLEANUP,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 5G.
W75-05100

WATERBORNE DEBRIS IN MARINE POLLUTION INCIDENTS,
Battelle Columbus Labs., Long Beach, Calif. Long Beach Research Facility.
For primary bibliographic entry see Field 5B.
W75-05114

THE USE OF COLOR INFRARED AERIAL PHOTOGRAPHY IN DETERMINING SALT MARSH VEGETATION AND DELIMITING MAN-MADE STRUCTURES OF LYNNHAVEN BAY, VIRGINIA,
Old Dominion Univ., Norfolk, Va. Dept. of Biology.
R. E. Holman, III.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-31855, $4.25 in paper copy, $2.25 in microfiche. Report No. NASA CR-62099, June 1974. 47 p, 15 fig, 9 tab, 38 ref. NASA Grant No. NGL-47-003-067.

Descriptors: *Remote sensing, *Virginia, *Salt marshes, *Aerial photography, Coastal marshes, Ecology, On-site investigations, Wetlands, *Vegetation, Infrared radiation, Analytical techniques, *Estuarine environment.
Identifiers: *Lynnhaven Bay(Va).

Color infrared aerial photography was found to be superior to color aerial photography in an ecological study of Lynnhaven Bay, Virginia. The research was divided into three phases: (1) determination of the feasibility of correlating color infrared aerial photography with saline wetland species composition and zonation patterns, (2) determination of the accuracy of the aerial interpretation and problems related to the aerial method used, and (3) comparison of developed with undeveloped areas along Lynnhaven Bay's shoreline. Wetland species composition and plant community zonation bands were compared with aerial infrared photography and resulted in a high degree of correlation. Problems existed with changing physical conditions, such as time of day, aircraft angle, and sun angle, making it necessary to use several different characteristics in wetland species identification. The main characteristics used were known zonation patterns, textural signatures, and color tones. Lynnhaven Bay's shoreline was 61.5% developed. (Sims-ISWS)
W75-05126

SOFAR CHANNEL AXIAL SOUND SPEED AND DEPTH IN THE ATLANTIC OCEAN,
Naval Undersea Center, San Diego, Calif.
For primary bibliographic entry see Field 8B.
W75-05156

MEAN LENGTH OF RUNS OF OCEAN WAVES,
Chicago Bridge and Iron Co., Planfield, Ill. Marine Research and Development.
For primary bibliographic entry see Field 8B.
W75-05160

SOURCES AND TRENDS IN WASTE WATER LOADINGS TO THE SAN FRANCISCO BAY REGION,
Sir George Williams Univ., Montreal (Quebec). Dept. of Economics.
For primary bibliographic entry see Field 5B.
W75-05186

CHANNEL STABILITY IN RELATION TO BURIED UNCONSOLIDATED SEDIMENTS,
Dundee Univ., Newport-on-Tay (Scotland). Tay Estuary Research Center.
For primary bibliographic entry see Field 8B.
W75-05249

ARSENIC DISTRIBUTION IN WATERS AND SEDIMENTS OF THE PUGET SOUND REGION,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-05294

LATERALLY INTEGRATED NUMERICAL WATER QUALITY MODEL FOR AN ESTUARY,
Rhode Island Univ., Kingston. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-05323

MINIMUM INTERFERENCE BETWEEN PLANKTON SPECIES AND ITS BENEFICIAL EFFECT,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W75-05338

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS, VOL. 2.
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05342

BENTHIC ANIMAL-SEDIMENT,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5A.
W75-05343

BLUE CRAB SURVEY IN THE WATERS ADJACENT TO THE CALVERT CLIFFS

NUCLEAR STEAM ELECTRIC STATION AND THE CHESAPEAKE BAY REGION,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05344

FISH SURVEY: OTHER TRAWL COLLECTIONS OFFSHORE OF THE CALVERT CLIFFS NUCLEAR POWERPLANT SITE,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05345

ECOSYSTEM MODELING: EFFECTS OF TEMPERATURE ON ESTUARINE MICROCOSMS,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05346

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

FRACTIONATION OF SPENT SULFITE LIQUORS USING ULTRAFILTRATION CELLULOSE ACETATE MEMBRANES,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W75-04975

EVALUATION OF NEW REVERSE OSMOSIS MEMBRANES FOR THE SEPARATION OF TOXIC COMPOUNDS FROM WASTEWATER,
Illinois Univ., Urbana. Environmental Engineering Program.
For primary bibliographic entry see Field 5D.
W75-04988

MECHANISMS OF BRINE-SIDE MASS TRANSFER IN A HORIZONTAL REVERSE OSMOSIS TUBULAR MEMBRANE,
Clarkson Coll. of Technology, Potsdam, N.Y.
L. J. Derzansky, and W. N. Gill.
American Institute of Chemical Engineers Journal, Vol 20, No 4, p 751-761, July 1974. 8 fig, 3 tab, 37 ref.

Descriptors: *Reverse osmosis, *Convection, *Laminar flow, Reynolds number, *Desalination, Buoyancy, Membranes, Mass transfer.
Identifiers: Concentration polarization, Rayleigh number, Deissler analogy, Leveque model, Peclet number, Sherwood number, Schmidt number.

The desalination performance of a tubular reverse osmosis membrane was studied. Measurements of local mass transfer rates were made at sixteen locations along the tube length for laminar and turbulent flows. The dominant transport mechanisms in laminar flow are forced convection upstream and combined free and forced convection downstream. After a distance of about 16 diameters, system behavior controlled by combined free and forced convection proved insensitive to Reynolds number and axial distance. Correlations in terms of the Rayleigh number Ra agreed better with the data of other tests--this suggests that previous design methods may give conservative predictions of performance, as they neglect mass transfer enhancement due to ubiquitous buoyancy effects. (Carpenter-FIRL)
W75-04989

NEW MEMBRANES FOR REVERSE OSMOSIS TREATMENT OF METAL FINISHING EFFLUENTS,
Minnesota Pollution Control Agency, Minneapolis.
For primary bibliographic entry see Field 5D.
W75-05089

3B. Water Yield Improvement

A REVIEW OF FISHERIES MINIMUM FLOW METHODOLOGIES FROM THE VIEWPOINT OF WATER AVAILABILITY,
Washington State Dept. of Ecology, Olympia.
R. T. Milhous.
Presented at the 1973 National Conference of the American Water Resources Association, Seattle, Washington, October 22-24, 1973. 13 p, 7 fig, 3 tab, 6 ref.

Descriptors: *Fisheries, *Flow rates, *Water allocation(Policy), *Washington, *Low flow, Fish conservation, Fish management, Water utilization.
Identifiers: *Water availability.

One of the requirements in the development of a water resources program for the State of Washington is that flows in perennial rivers and streams shall be adequate to preserve environmental values with the remaining water allocation on the basis of maximum net benefits. In order to establish minimum flows for fish, methodologies have been developed in Oregon, Montana, and Washington which estimate the minimum flows required to (1) preserve, and (2) maintain at an optimum level, the fisheries habitat of streams. These methods have been reviewed from the viewpoint of the water available, naturally, to satisfy the calculated minimum flows. It was found that the various methods tend to result in rearing flows considerably in excess of the water naturally available. In general, the methods developed to estimate the flows required to maintain a fishery in the streams result in flow requirements in excess of the water naturally available. These methods need to be improved before they can be used in a management program which requires that preservation flows be known. (Poertner)
W75-04861

PRECIPITATION MECHANISMS IN SUMMERTIME CONVECTIVE CLOUDS,
Meteorology Research, Inc., Altadena, Calif.
T. B. Smith, D. M. Takeuchi, and C. W. Chien.
Available fromthe National Technical Information Service, Springfield, Va 22161 as PB-235 326, $5.25 in paper copy, $2.25 in microfiche. Arizona Weather Modification Research Program Report No. REC 14-06-D-6581, February 28, 1974. 144 p, 1 tab, 23 ref, 4 append. Contract No. 14-06-D-6581.

Descriptors: *Weather modification, *Cloud seeding, *Cloud physics, *Computer models, Atmospheric physics, Precipitation(Atmospheric), Meteorology, Optimization, Decision making, *Arizona, Clouds, Model studies.
Identifiers: Project skywater, Flagstaff(Ariz), Mesoscale convective systems.

Optimization procedures were developed and techniques for promoting mesoscale organization of convective systems. Optimization procedures required a more detailed physical understanding of the microphysical processes occurring in natural and seeded clouds. Several microphysics models were developed to permit computer simulation of these processes. Much time and effort was devoted to acquisition and analysis of observational data for comparison with model calculations. Development of techniques for the rapid assimilation of synoptic weather data for the purposes of treatment decision-making was considered to be a part of the problem of developing optimization procedures. An attempt was made to bring order into the field of steady-state cumulus models by summarizing and comparing key aspects of the models currently in use. The climatological seedability study, based on a relatively crude model of convective clouds, needs to be used with caution, particularly in regard to quantitative results. These results probably depict most accurately the conditions at Flagstaff where the model was originally developed. The results suggest that the potential for dynamic seeding tends to be greater within the southern tier of states (Arizona to Texas). This is likely to be the result of more frequent stable layers aloft than usually occur in the northern areas. Heat released by the seeding then has a more frequent opportunity for stimulating further growth. Aside from this generality, the study is valuable for suggesting the potential use of cloud models and for indicating that important areal variations in seedability may exist. (Jones-ISWS)
W75-05111

WEATHER MODIFICATION-RELATE UNCERTAINTIES IN ECOLOGICAL AND AGRICULTURAL SYSTEMS IN THE HIGH PLAINS: SCIENTIFIC APPRAISAL AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
F. M. Smith, F. F. Calhoun, B. D. Church, J. E. Fletcher, and J. E. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 033, $6.25 in paper copy, $2.25 in microfiche. Bureau of Reclamation, Denver, Colorado, Report No. 14-06-D-7519, July 31, 1974. 153 p, 6 fig, 1 tab, 70 ref, 9 append. 14-06-D-7519.

Descriptors: *Weather modification, *Cloud seeding, *Ecology, *Agriculture, Hydrology, Forages, Cost-benefit ratio, Livestock, Temperature, Precipitation(Atmospheric), Evaporation, Crops, Insects, Phenology, Population, Economics, Social aspects, Model studies, Cultures, Plant populations, Land use, Pathology, Natural resources.
Identifiers: *High plains, Game species, Endangered species.

A multidisciplinary appraisal was performed of weather modification-related uncertainties in ecological and agricultural systems in the High Plains with respect to a 5 to 7 year weather modification experiment. The ecological and agricultural systems were regarded as being causally coupled with the hydrologic and seeding agent systems and directly coupled with economic and social systems. The recommendations for conducting a 5 to 7 year program included: an overall scientific plan; awarding the prime contract to a central coordinating group of scientists; selecting a soil water balance model, a simulation model of land use, a livestock production model, and a comprehensive cost-benefit analysis model; studying the response of major plant pathogens to weather modification; surveying public attitudes; coordinating public information from the precipitation enhancement and hail suppression programs; and inventorying existing background agents, the convening of a national workshop on the impacts of seeding agents, study of the progress of seeding agents through physical and ecological systems and endangered species. (Jones-ISWS)
W75-05118

JEMEZ ATMOSPHERIC WATER RESOURCE RESEARCH PROJECT, VOLUME I: SUMMARY AND ACCOMPLISHMENTS,
New Mexico State Univ., University Park. Engineering Experiment Station.
C. G. Keyes, Jr., F. D. Stover, J. V. Lunsford, and M. Lentner.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 00 $4.25 in paper copy, $2.25 in microfiche. Bureau Reclamation, Denver, Colorado, Report No. RE 14-06-D-6803, January 1974. 53 p, 4 fig, 3 tab, ref, 1 append. Contract No. 14-06-D-6803.

Descriptors: *Cloud seeding, *Weather modification, *Meteorology, *Precipitation(Atmospheric), Data processing, Statistical methods, Snowfall, Winds, Storms, *New Mexico, Data collections, Precipitation gages, Weather forecasting, Summer, Winter, Orography.
Identifiers: *Jemez Mountains(N Mex).

The different schemes used for the evaluation of the randomized winter cloud seeding in the Jemez Mountain immediate target area were given. The relative crude methods of evaluation that indicated beneficial results were: preliminary nonstatistical evaluation scheme, refined preliminary nonstatistical evaluation scheme, isohyeti examination of seeding effect, double ratio scheme, and the diurnal precipitation patterns versus seeding scheme. The 'meteorological partitioning technique' used in conjunction with the nonparametric statistical analysis indicated specific meteorological conditions associated with probable increases and decreases in precipitation while seeding the wintertime storms that crossed the research area during 1968 through 1972. Recommendations for additional evaluation of the Jemez data set were included that could benefit any future winter cloud seeding program, whether experimental, pilot, or operational. (See also W75-05122) (Jones-ISWS)
W75-05121

JEMEZ ATMOSPHERIC WATER RESOURCES RESEARCH PROJECT, VOLUME II: SPECIAL ASPECTS OF THE PROGRAM,
New Mexico State Univ., University Park. Engineering Experiment Station.
A. G. Keyes, Jr., F. D. Stover, J. V. Lunsford, and A. Lentner.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 006, $3.75 in paper copy, $2.25 in microfiche. Bureau of Reclamation, Denver, Colorado, Report No. REC ERC-06-D-6803-2, December 1973. 130 p, 19 fig, 14 tab, 59 ref, 5 append. Contract No. 14-06-D-6803.

Descriptors: *Cloud seeding, *Weather modification, *Meteorology, *Precipitation(Atmospheric), Data processing, Statistical methods, Snowfall, Winds, Storms, *New Mexico, Data collections, Precipitation gages, Weather forecasting, Summer, Winter, Orography.
Identifiers: *Jemez Mountains(N Mex).

Scientific studies on precipitation augmentation in the Jemez Mountains of northern New Mexico were conducted during the period 1 July 1969 to 31 September 1973. The studies included the operation of a mesoscale observation network, evaluation of randomized seeding, and physical interpretation of the results of the 6-hour analysis unit. Preliminary studies were made of downwind effects. The conclusions of the study were presented in Volume 1. (See also W75-05121) (Jones-ISWS)
W75-05122

PILOT PROJECT OF WEATHER MODIFICATION FOR THE SAN JUAN MOUNTAINS OF THE COLORADO RIVER BASIN,
Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
O. O. Grant, C. F. Chappel, L. W. Crow, J. M. Rosch, and P. W. Mielke, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-237 085, $3.75 in paper copy, $2.25 in microfiche. Final Report, February 1974. 64 p, 11 fig, 5 tab, 59 ref, 9 append. BuRec Contract 14-06-D-6467.

Descriptors: *Artificial precipitation, *Orography, Cloud seeding, Snowpacks, Weather modification, Design, *Colorado River Basin, Data collections, Evaluation.
Identifiers: Precipitation augmentation.

A design program was prepared to apply results from experimental programs for augmenting orographic precipitation to a pilot project that would have the goal of providing sound scientific and engineering evaluation of precipitation increases over a large area by operational-type application of cloud seeding techniques. Described were: (1) the purpose of the project, (2) the scientific and technological basis, (3) the design constraints, and (4) the details of the design. The design itself includes descriptions of: (1) experimental hypothesis; (2) site selection; (3) experimental procedures (randomization, etc.); (4) data collection requirements; (5) operations procedures; and (6) evaluation techniques to be employed. (Jones-ISWS)
W75-05127

AIR PRESSURES OVER SURFACES EXPOSED TO WIND - I. WATER HARVESTING CATCHMENTS,
Agricultural Research Service, Water Conservation Lab. Phoenix, Ariz.
A. R. Dedrick.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 5, p 917-921, September-October 1974. 6 fig, 13 ref.

Descriptors: *Water harvesting, *Watersheds(Basins), *Wind pressure, Water conservation, Winds, Turbulence, Air, Air circulation, Model studies.
Identifiers: Air pressure.

The magnitude and location of wind forces over unprotected water harvesting catchment aprons constructed of exposed flexible membrane liners were determined by the use of models in a wind tunnel. Geometric factors studied included two berm configurations and four breadth to berm-height ratios. Pressure distributions over water-catchment aprons were independent of breadth to berm-height ratios of 50 or more. Negative pressures were three times lower over gradually sloped catchment berms than over sine-shaped berms. Each berm shape, on the leeward side of the upwind berm, had an associated pressure distribution that was independent of shape but varied in magnitude depending on the shape of the windward side of the berm. Pressures were not as extremely negative on the leeward side of the berm when the windward side was gradually sloped rather than sine-shaped. Pressures were near zero to slightly positive over a large part of the water-catchment apron between the berm toes. (Jess-ISWS)
W75-05179

WAMIS--A BIBLIOGRAPHIC INFORMATION SYSTEM FOR WATER YIELD IMPROVEMENT,
Arizona Unov., Tuscon. Dept. of Watershed Management.
For primary bibliographic entry see Field 10A.
W75-05302

A BIBLIOGRAPHIC INFORMATION SYSTEM FOR WATER YIELD IMPROVEMENT PRACTICES,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 10A.
W75-05303

3C. Use Of Water Of Impaired Quality

WATER QUALITY OF THREE SMALL WATERSHEDS IN NORTHERN UTAH,
Forest Service (USDA), Logan, Utah. Forest Sciences Lab.
For primary bibliographic entry see Field 5B.
W75-04943

CALCULATION OF CONCENTRATION OF IMPURITIES IN THE RECYCLING SYSTEM OF PROCESS WATER IN KRAFT PULP MANUFACTURE (BERECHNUNG DER VERUNREINIGUNGSKONZENTRATION IM REZIRKULATIONS SYSTEM DER BETRIEBSWAESSER BEI DER SULFATZELLSTOFFHERSTELLUNG),
IRAPA, Prague (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W75-04959

WATER RECYCLING IN THE MANUFACTURE OF SIZED PAPERS (ISPOL'ZOVANIE OBOROTNYKH VOD V PROIZVODSTVE KLEENYKH VIDOV BUMAGI),
Belorusskii Tekhologicheskii Institut, Minsk (USSR).
For primary bibliographic entry see Field 5D.
W75-04960

NITRATE AND CHLORIDE MOVEMENT IN THE PLAINFIELD LOAMY SAND UNDER INTENSIVE IRRIGATION,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-04997

EVALUATION OF DRAINAGE FOR SALINITY CONTROL IN GRAND VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-05090

3D. Conservation In Domestic and Municipal Use

FLOOD ESTIMATION FOR URBAN AND RURAL CATCHMENTS,
Snowy Mountains Engineering Corp., Cooma (Australia). Hydrology Branch.
For primary bibliographic entry see Field 4A.
W75-04856

AGRICULTURAL LAND USE IN THE POUDRE VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-05260

3E. Conservation In Industry

TRAINING MANUAL ON THE BASIC TECHNOLOGY OF THE PULP AND PAPER INDUSTRY AND ITS WASTE REDUCTION PRACTICES,
Lakehead Univ., Thunder Bay (Ontario).
For primary bibliographic entry see Field 5D.
W75-04871

CHELANT TREATMENTS PROVIDE MAXIMUM RETURN TO THE PULP AND PAPER INDUSTRY,
Betz Lab., Inc., Trevose, Pa.
For primary bibliographic entry see Field 5F.
W75-04940

EFFLUENT TOXICITY REMOVAL ON THE WEST COAST,
B.C. Research Ltd., Vancouver.
For primary bibliographic entry see Field 5D.
W75-04942

EXPECTATIONS FOR THE CLOSED WATER SYSTEM AND COST COMPARISON WITH EF-

FLUENT PURIFICATION (DIE ERWARTUNGEN AND DEN GESCHLOSSENEN WASSERKREISLAUF IM KOSTENVERGLEICH ZUR ABWASSERREINIGUNG),
Krofta Apparatebau (Gesellschaft) (West Germany).
For primary bibliographic entry see Field 5D.
W75-04944

SYSTEM CLOSURE IN RHEMSPRINGE (KREISLAUFSCHLIESSUNG IN RHUMSPRINGE),
Harzer Papierfabrik Sievers G.m.b.H. and Co. KG, Rhumspringe (West Germany).
For primary bibliographic entry see Field 5D.
W75-04947

ENVIRONMENTAL PROTECTION IN THE FINNISH PULP AND PAPER INDUSTRY (UMWELTSCHUTZ IN DER FINNISCHEN ZELLSTOFF- UND PAPIERINDUSTRIE),
Finnish Pulp and Paper Research Inst., Helsinki.
For primary bibliographic entry see Field 5G.
W75-04949

INTRODUCTION OF THE ATTISHOLZ PROCESS INTO PAPER MILLS AND SOME RESULTING EXPERIENCES (EINSATZ DES VERFAHRENS ATTISHOLZ IN PAPIEROFABRIKEN UND DARAUS RESULTIERENDE ERFAHRUNGEN),
Cellulose Attisholz A.G., Luterbach (Switzerland).
For primary bibliographic entry see Field 5D.
W75-04951

'FLOAT WASH' -- A CLOSING-UP SYSTEM FOR THE PULP AND PAPER INDUSTRY,
Fractionator, Stockholm (Sweden). Aktiebolaget.
For primary bibliographic entry see Field 5D.
W75-04955

WATER CONSERVATION AND FIBER ECONOMY,
Thames Board Mills Ltd., Purfleet (England).
T. Frette.
Paper Technology, Vol 15, No 5, p 271-278 (T161-168), Oct, 1974. 14 fig, 12 ref.

Descriptors: *Water conservation, *Pulp and paper industry, *Water utilization, *Recirculated water, *Industrial water, *Water pollution control, Water circulation, Flow system, Legislation, Discharge(Water), Water consumption(Except consumptive use), Fibers(Plant).
Identifiers: *Fiber recovery.

Problems accompanying water utilization in the basic (primary, secondary, and tertiary) paper mill circulation systems are considered. Of great importance in the primary circulation system is the concentration difference between the diluting water and the desired breast box suspension, which ultimately determines the load on the secondary circulation, and hence on the final effluent. Diagrams illustrate the interplay between flows and concentrations at the wet end of the paper machine and the effect on the water economy. The design and control of the fiber recovery unit are particularly significant in the secondary circulation. Ideally, the secondary circulation system should be able to produce an acceptable substitute for white water, and thus be coordinated in the total mill water utilization scheme. Legislation governing discharges from the tertiary (outer) circulation system is also discussed. Methods of saving water are suggested, and an example is provided to illustrate fiber recovery in a fine paper mill. (Sykes-IPC)
W75-04956

THE FEDERAL WATER POLLUTION CONTROL ACT AND FORESTRY,
National Forest Products Association, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04957

CALCULATION OF CONCENTRATION OF IMPURITIES IN THE RECYCLING SYSTEM OF PROCESS WATER IN KRAFT PULP MANUFACTURE (BERECHNUNG DER VERUNREINIGUNGSKONZENTRATION IM REZIRKULATIONS SYSTEM DER BETRIEBSWAESSER BEI DER SULFATZELLSTOFFHERSTELLUNG),
IRAPA, Prague (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W75-04959

REDUCTION OF FRESHWATER CONSUMPTION AT A BOARD MILL (OPYT L'VOVSKOI KARTONNOI FABRIKI PO SNIZHENNYU RASKHODA SVEZHEI VODY),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev (USSR).
For primary bibliographic entry see Field 5D.
W75-04961

INDUSTRIAL WATER PURIFICATION,
For primary bibliographic entry see Field 5D.
W75-04968

AT ABITIBI, IROQUOIS FALLS, $2.5-MILLION PRIMARY TREATMENT SYSTEM NEARS COMPLETION.
For primary bibliographic entry see Field 5D.
W75-04976

CHEMICAL AND NUTRITIONAL CHARACTERISTICS OF FISH PROTEIN CONCENTRATE PROCESSED FROM HEATED WHOLE RED HAKE, UROPHYCIS CHUSS,
National Marine Fisheries Service, College Park, Md. National Center for Fish Protein Concentrate.
D. J. Dubrow, and B. R. Stillings.
Fishery Bulletin, Vol 69, No 1, p 141-144, 1971. 3 tab, 10 ref.

Descriptors: *Food processing industry, *Fish, *Proteins, *Heat treatment, Effects, Amino acids, Nutrients, Chemical properties.
Identifiers: *Fish protein concentrate, *Red hake.

This investigation was designed to determine whether fish protein concentrate is affected by heating prior to its extraction by solvent. The lean fish, red hake, was heated at 100C, 109C and 121C for 10, 20, 40 and 80 min, the samples exstracted with isopropyl alcohol. Fish protein concentrate produced from the heated hake samples contained slightly less crude protein and more ash than did the fish protein concentrate produced from samples that were not heated. The amino acid composition of samples that had been heated did not differ markedly from those that were not heated. The nutritive quality of the samples that were heated at 100C and 109C was not significantly affected. Samples heated at 121C, however, were lower in nutritive quality than the controls. Conclusions are that red hake can be heated at 100C and 109C for as long as 80 min before being extracted by solvent without the protein quality being significantly affected. (See also W75-05016) (Jones-Wisconsin)
W75-05022

EFFECT OF ICE STORAGE ON THE CHEMICAL AND NUTRITIVE PROPERTIES OF SOLVENT-EXTRACTED WHOLE FISH--RED HAKE, UROPHYCIS CHUSS,
National Marine Fisheries Service, College Park, Md. National Center for Fish Protein Concentrate.
D. L. Dubrow.
Fishery Bulletin, Vol 69, No 1, p 145-150, 1971. 7 tab, 7 ref.

Descriptors: *Ice, *Storage, *Effects, *Fish, Amino acids, Proteins, Nutrients, Food processing industry, Chemical properties, Preservation.
Identifiers: *Fish protein concentrate, *Red hake.

The effect of ice storage of food-grade fish has on the chemical composition of the tissue components and on the nutritive quality of the protein was determined. Whole red hake were stored in ice for 2, 6, 8, and 11 days. The fish were organ-oleptically evaluated for freshness at each storage period and then processed by freeze-drying to form a reference sample or by solvent extraction with isopropyl alcohol to form a fish protein concentrate. These products were then analyzed for proximate composition and amino acid concentration and for protein quality. The results of the subjective evaluation for freshness indicated that the fish stored up to 8 days were still acceptable for food by that those stored for 11 days were not acceptable. The approximate composition of fish protein concentrates produced from fish stored up to 8 days in ice remained relatively constant. The crude protein in the concentrate produced from fish stored for 11 days decreased about 2.5%. It is concluded that storage of whole hake in ice up to 8 days is a satisfactory means of preservation prior to extracting the ground hake with isopropyl alcohol to produce fish protein concentrate. (See also W75-05016) (Jones-Wisconsin)
W75-05023

PRIMARY, PHYSICAL IMPACTS OF OFFSHORE PETROLEUM DEVELOPMENTS.
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5C.
W75-05032

SIMULATION OF HYPOTHETICAL OFFSHORE PETROLEUM DEVELOPMENTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
H. S. Lahman, J. B. Lassiter, and J. W. Devanney
In: Primary, Physical Impacts of Offshore Petroleum Developments, MITSG 74-20, p 7-83, Apr 1974. 16 fig, 12 tab, 11 ref.

Descriptors: *Computer models, *Oil fields, *Exploration, Oil wells, Investment, Royalties, Continental shelf, Economies of scale, Decision making.

An offshore development model considers a series of hypothetical oil finds on the outer continental shelf and plots investors' development strategy, the resulting oil and gas production, the number of platforms, amount of drilling activity, and the mode and amount of transport activity. The model can be used for: Pre-decisions to lease by government bodies involving economic and environmental impact, and to determine the effects of changes in lease bidding, royalty, and regulatory policies. Post-decisions to lease by industry and government can be plotted to estimate the profits. Post-exploratory drilling by industry to determine maximum profit development strategy and post-exploratory drilling by government to monitor the development to ensure that production maximizes national income, and for regulating oil and gas prices. Minor modifications allow this program to be used to simulate onshore developments which employ directional drilling from central pads. For at least the internal gas drive fields, offshore production is characterized by very sharp economies of scale up to a break point field size and very gentle economies of scale thereafter. Above these break points, the model claims that offshore petroleum can be very cheap compared to the likely landed cost of imported oil and gas. (See also W75-05032) (Auen-Wisconsin)
W75-05033

SHRIMP CANNING WASTE TREATMENT STUDY,
Domingue, Szabo and Associates, Inc., Lafayette, La.
For primary bibliographic entry see Field 5A.
W75-05087

EFFECTS OF ECONOMIC DEVELOPMENT UPON WATER RESOURCES (AN INTERINDUSTRY APPROACH TO MODELING ECONOMIC-ENVIRONMENTAL SYSTEMS),
Maryland Univ., College Park. Bureau of Business and Economic Research.
For primary bibliographic entry see Field 6G.
W75-05174

AQUATHERMAL FLUID MIGRATION,
Imperial Oil Ltd., Calgary (Alberta).
For primary bibliographic entry see Field 4B.
W75-05182

POSSIBILITIES OF CONVERTING PART OF THE PIRITU LAGOON (STATE OF ANZOATEGUI) INTO AN ARTIFICIAL SALT PIT, (IN SPANISH),
Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
J. Carvajal Rojas.
Lagena. 29. 7-11. Illus. 1972.
Identifiers: Anzoategui, Elops-saurus, Eucinostomus-argenteus, Eugerres-plumieri, Fish, *Lagoons, Lakes, Moharra-rhombea, Mugil-curema, Mugil-liza, Penaeus-schmitti, Production, Rainy, *Salt pits(Artificial), Season, Strongylura-marina, *Venezuela(Piritu Lagoon).

The lagoon is in eastern Venezuela, between 10 degrees 2 minutes-10 degrees 5 minutes N latitude and 65 degrees 2 minutes-65 degrees 11 minutes W longitude and is 37 k sq m in area. It communicates with the sea by an outlet 200 m wide. The water has a salinity of 37%; a July temperature of 29C on the surface. This reaches 40C in the dry season when the salinity is 92% with a consequent destruction of fish. In March 1971, the margins of the lagoon were covered with dead fish: Elops saurus, Eugerres plumieri, Moharra rhombea, Eucinostomus argenteus, Mugil curema and Strongylura marina. At this time, 7 km sq of water is left. The remaining lake is necessary for the life cycle of M. liza, M. curema and Pennaeus schmitti. The total fish production of the lagoon of Piritu between 1967-1970 had an annual yield of 107,000 kg and was distributed by 100 fisherman. The artificial salt lake at Araya (State of Sucre, Venezuela) produces 60,000 tons of NaCl yearly. A similar artificial salt bed at Piritu could produce 660,000 tons (metric) of salt yearly. This requires engineering work to prevent inundation in the rainy season. The rain does not exceed 300 mm yearly.--Copyright 1974, Biological Abstracts, Inc.
W75-05276

NATIONAL NEED - AN INDUSTRY VIEW OF RESEARCH,
AMAX Lead and Zinc, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 5G.
W75-05299

3F. Conservation In Agriculture

CRESTED WHEATGRASS YIELDS AS INFLUENCED BY WATER CONSERVATION PRACTICES,
Agricultural Research Service, Logan, Utah.
A. T. Bleak, and W. Keller.
Agron J. Vol 66 No 2, 3 p 326-328. 1974.
Identifiers: Agropyron-Desertorum, *Evaporation, Fertilization, Mulch, Transpiration, *Water conservation, *Wheatgrass, *Crops production.

Evaporation of water from the soil surface is a major economic loss to the western USA, because water is the primary limiting factor in plant growth on arid and semiarid rangelands. 'Nordan' crested wheatgrass (Agropyron desertorum (Fisch. ex Link) Schult.) was planted in rows 1.1 m apart; the effect on total herbage yield of a gravel mulch, a sheet metal 'mulch', close rows of grass, and cereal grain seeded between the grass rows was determined for a 2-yr period. Some treatments received different rates of N fertilizer. Sheet metal between the rows, covering 86% of the land surface, increased mean 2-yr yield about 112% over clean cultivation (check). A gravel mulch 1.5 cm deep increased mean yield about 16%. Close rows of grass and cereal grain between the grass rows also increased total yield . Benefit from N at 22, 44, or 66 kg/ha/yr was minor. Benefit from the mulches was greater the 2nd yr than the 1st.--Copyright 1974, Biological Abstracts, Inc.
W75-04873

EFFECT OF SOIL WATER AT VARIOUS GROWTH STAGES ON SOYBEAN YIELD,
Agricultural Research Service, Auburn, Ala.
B. D. Doss, R. W. Pearson, and H. T. Rogers.
Agron J. Vol 66 No 2 p 297-299. 1974. Illus.
Identifiers: Glycine-Max, *Growth rates, Irrigation, *Soil water, *Soybeans, *Crop production, *Alabama.

Insufficient water during flowering and pod-fill stages frequently limits yields of soybeans (Glycine max (L.) Merr.). In a 3-yr experiment, field plot covers were used to control rainfall and water stress was imposed on plants at various stages of growth to determine more specifically the critical periods for irrigating soybeans for maximum yields. Soil water regimes ranged from a limited supply (10% available soil water) to adequate water (50% available) during the entire growing season. More bean production was obtained from water applied after full bloom than earlier. The pod-fill stage, Aug. 15-Sept. 20 for 'Bragg' soybeans at Thorsby, Alabama, was the critical time for adequate water for maximum yields. Yields from adequately watered soybeans were 540-1040 kg/ha, or 24-55% greater than where water was limited throughout the growing season. Highest yield obtained under the best water regime was 3320 kg/ha. Conditions limiting yields were not obvious.--Copyright 1974, Biological Abstracts, Inc.
W75-04877

DIURNAL CYCLING IN ROOT RESISTANCE TO WATER MOVEMENT,
Duke Univ., Durham, N.C. Dept. of Botany.
L. R. Parsons, and P. J. Kramer.
Physiol Plant. Vol 30, No 1, p 19-23. 1974 Illus.
Identifiers: *Cotton, *Cycling(Diurnal), Gossypium-Hirsutum, Growth rates, Light, Nitrogen, Pressure, Regulator, Resistance, *Root systems, Salt concentration.

The occurrence of diurnal changes in root resistance of cotton (Gossypium hirsutum) was studied by measuring the flow of water through 35-70-day old root systems under a pressure of 3.10 bars or a vacuum of 0.88 bar. The volume of exudate obtained under constant pressure or constant vacuum was 2-3 times greater near midday than near midnight indicating that the root resistance apparently was 2-3 times greater at night than during the day. The salt concentration of the exudate also cycled; the concentration was lowest at midday and highest at night, hence there was little diurnal variation in the total amount of salt moved/h. The cycle for volume of exudate, salt concentration, and apparent root resistance had a period of 22-26 h at 24 degrees C. The cycle gradually died away 2-3 days after removal of the shoots. The diurnal variations appeared to be controlled by signals from the shoots because the phase of the cycles could be reset by changing the light-dark cycle under which the plants were grown. Cycling was eliminated by exposure to 8 or more days of continuous light before removing the shoots, and cycling could not be entrained by a 6 h light-6 h dark cycle. Bubbling N2 gas through the nutrient medium stopped cycling. A possible role of ion or growth regulator action is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04885

MULTIPLE USES OF UTAH IRRIGATION CANALS: CACHE COUNTRY AS A CASE STUDY,
Utah Cooperative Forest Recreation Research Unit, Logan.
For primary bibliographic entry see Field 4A.
W75-04939

PHOSPHOROUS ASSOCIATED WITH SEDIMENTS IN IRRIGATION AND DRAINAGE WATERS FOR TWO LARGE TRACTS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 5B.
W75-04999

THE EFFECT OF PLANT SPACING, NITROGEN FERTILIZER AND IRRIGATION ON THE APPEARANCE OF SYMPTOMS AND SPREAD OF VIRUS YELLOWS IN SUGAR BEET CROPS,
For primary bibliographic entry see Field 5C.
W75-05020

THE COURSE AND MAGNITUDE OF WATER STRESS IN LOLIUM PERENNE AND DACTYLIS GLOMERATA,
Imperial Coll. of Science and Technology, London (England). Dept. of Botany.
D. K. Jackson.
J Agric Sci. Vol 82, No 1, p 19-27, 1974, Illus.
Identifiers: *Dactylis-glomerata, Diffusion, Drought, Evaporation, Irrigation, Leaf, *Lolium-perenne, Roots, Stomatal, *Water stress, Wilting.

Simulated swards of Dactylis glomerata (var. S.37) and Lolium perenne (var. S.23) were grown in large lysimeters or vertical pipes of 15 cm diameter, both sufficiently deep to allow largely unrestricted root development. Rainfall was excluded, and the effect of a drying cycle on the plant water balance was compared with irrigated controls in a sequence of sampling harvests at increasing soil water deficits. Leaf water potential fell during the day, both in treatments and controls, to levels which might be expected to reduce extension growth and, frequently, stomatal diffusion. Rapid recovery occurred in the evening to levels which might allow normal functioning of growth processes not dependent on sunlight. Defoliation reduced plant stress and stomatal restriction. The amelioration of plant water stress appeared to require a reduction in atmospheric evaporative demand, and irrigation had relatively little effect. The leaf water status was more sensitive to drought, transpiration was reduced more, and the root system extended more slowly in Dactylis than in Lolium. Consequently, the onset of permanent wilting due to exhaustion of water from the profile was delayed compared with Lolium. The characteristic might enhance the survival of Dactylis in prolonged drought, but prove disadvantageous in terms of growth during short droughts, when reduced stomatal opening might limit CO2 uptake. This would not be an impediment, however, if investigations suggesting that partial closure has a minor effect on CO2 uptake compared with that on transpiration were to be confirmed.--Copyright 1974, Biological Abstracts, Inc.
W75-05056

CROP INSURANCE AND INFORMATION SERVICES TO CONTROL USE OF PESTICIDES,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-05070

EFFECT OF FERTILIZER RATES AND IRRIGATION ON FUSARIUM INFECTION OF WINTER WHEAT,
University of Agriculture, Debrecen (Hungary). Dept. of Agronomy.
E. Bocz, E. Hefni, and O. Toth.
Acta Agron Acad Sci Hung 23(1/2): 87-91 1974.
Identifiers: *Fertilizers, *Fusarium infection, Germination, *Nitrogen fertilizer, *Irrigation, *Wheat(Winter), Fertilizer rates.

In Fusarium-infected wheat the kernels shrivelled, the 1000-kernel weight and germination % decreased when the doses of N fertilizer were high. The highest mean % of germination in unirrigated subplots was 88% while the lowest mean was 82.5% obtained at the highest rates of fertilizer. In the irrigated subplot, the highest mean of germination was 90% obtained from the control while the lowest mean was 81% obtained from the highest rates of fertilizer. The baking quality gradually improved by increasing the doses of N fertilizer up to 300 N kg/ha, without irrigation, while it reached its peak at 200 N + 100 P2O5 + 100 K2O kg/ha of fertilizer rates with irrigation.--
Copyright 1974, Biological Abstracts, Inc.
W75-05073

LOSSES OF FERTILIZERS AND PESTICIDES FROM CLAYPAN SOIL,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-05081

LIVESTOCK AND THE ENVIRONMENT, A BIBLIOGRAPHY WITH ABSTRACTS,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 10B.
W75-05084

USE OF REMOTE SENSING IN AGRICULTURE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 7B.
W75-05107

WEATHER MODIFICATION-RELATE UNCERTAINTIES IN ECOLOGICAL AND AGRICULTURAL SYSTEMS IN THE HIGH PLAINS: SCIENTIFIC APPRAISAL AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 3B.
W75-05118

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME I,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 7B.
W75-05123

RESEARCH IN REMOTE SENSING OF AGRICULTURE, EARTH RESOURCES, AND MAN'S ENVIRONMENT,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 7B.
W75-05132

UTILIZING ERTS IMAGERY TO DETECT PLANT DISEASES AND NUTRIENT DEFICIENCIES, SOIL TYPES AND SOIL MOISTURE LEVELS,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
W. L. Parks, J. I. Sewell, J. W. Hilty, and J. C. Rennie.
Available from the National Technical Information Service, Springfield, Va. 22161, as N74-28828, $4.25 in paper copy, $2.25 in microfiche. Final Report, March 1, 1974. 44 p, 15 fig, 9 tab, 16 ref. NAS5-21873.

Descriptors: *Remote sensing, *Satellites(Artificial), *Agriculture, *Forests, Wetlands, Land use, Soil moisture, Land management, Soil classification, Soil surveys, Sedimentation, Erosion, Flood plains, Tennessee.

Imagery from the ERTS-1 satellite was useful in delineating soil associations and dividing soils into groups with similar land use management. ERTS imagery offers definite potential for making gross flood-plain, wetland, river shoreline, and land use change surveys. Determinations of volume strata and forest type from the two usable bands of ERTS imagery were of questionable value. Because no imagery was received covering the target area during the time of the year when studies on maize dwarf mosaic virus and southern corn leaf blight are active, no report of the plant disease phase of the investigation was possible. (Sims-ISWS)
W75-05133

AGRICULTURAL LAND USE IN THE POUDRE VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
R. G. Evans, W. R. Walker, and G. V. Skogerboe.
Report AER 73-74 RGE - WRW - GVS1, October 1973. 213 p, 89 fig, 240 tab. OWRR B-083-COLO(8).

Descriptors: Agriculture, *Land use, *Consumptive use, Industrial water, Irrigated crops, Municipal water, Surfaces, Phreatophytes, Mapping, Maps, Data collections, *Colorado.
Identifiers: *Poudre Valley(Colo).

Agricultural land use was mapped in each township of the Poudre Valley along with other important land uses such as urban, phreatophyte, and water surface acreages. Data were collected using aerial photographs. The land use data were transferred to computer storage and to overlay maps. The results of this land classification are presented in a township by township and canal by canal manner. (Skogerboe-Colorado State)
W75-05260

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: I. YIELDS AND NUTRIENT COMPOSITION,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
For primary bibliographic entry see Field 2I.
W75-05265

ACCUMULATION OF AVAILABLE MOLYBDENUM IN AGRICULTURAL SOILS IRRIGATED WITH HIGH-MOLYBDENUM WATERS,
Colorado State Univ., Fort Collins. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-05297

ROOT DEVELOPMENT AND NUTRIENT UPTAKE BY CORN GROWN IN SOLUTION CULTURE,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
D. D. Warneke, and S. A. Barber.
Agronomy Journal, Vol 66, p 514-516, July-August 1974. 6 tab, 6 ref. OWRT B-026-IND (5).

Descriptors: *Nitrogen, *Root Development, Phosphorus, Potassium, Calcium, Magnesium, Root distribution, Nitrates, *Corn(Field), *Nutrients, *Absorption.
Identifiers: Root-Shoot Ratio.

Although nutrient uptake by young corn (Zea mays L.) roots from solution culture has been extensively studied, little information is available on the rate of root development and nutrient uptake during the entire development of the corn plant. Corn root growth rate, the nutrient content of the root and shoot, and the nutrient uptake rate were studied for five stages of development of corn plants growing in solution culture in the greenhouse. The data were compared with similar observations in the field. Corn root length increased exponentially with time until the tasseling stage, as also occurred in the field. Beyond this stage root length in solution cluture increased slowly. The proportion of N, P, K, Ca, and Mg present in the roots ranged from 0.11 to 0.22 and averages 0.15 of the total. Nutrient uptake rate per meter of root was greatest for the first growth stage and decreased with plant age. Rates of uptake per meter or root were similar to those obtained in the field except that the rates for the youngest plants in solution culture were slower than for similar plants grown in the field.
W75-05305

AN AGRICULTURAL IRRIGATION MODEL FOR A WATERSHED,
Washington State Univ., Pullman. Dept. of Agricultural Engineering.
G. T. Thompson.
Report PNW 74-47, (1974). 51 p, 4 fig, 1 tab, 14 ref, append. For presentation at the 1974 Annual Meeting of the Pacific Northwest Region of the American Society of Agricultural Engineers. Twin Falls, Idaho. B-036-WASH, B-043-WASH (2), and B-050-WASH (2).

Descriptors: Model studies, Computer models, *Washington, Watershed management, Irrigation, Agriculture, Irrigation efficiency, Water requirement, Water demand, Crop production, Farm management.
Identifiers: *Yakima River(Wash).

An irrigation model was tested by application to the Yakima River watershed in the state of Washington. The tests were conducted using recent cropping histories and other data. Comparisons were made between the predicted flow and measured river flows on the Yakima River. Essentially, it was found that if recent cropping patterns and efficiencies of irrigation occurred the water demands could not be met. Water requirements could be met, however , by increasing the overall irrigation efficiency by 15%. The irrigation model presented provides a basis for planners to analyze the effects of existing and proposed irrigation activities on watersheds including those that are large and complex. Preparatory to using the model, basic data concerning irrigation areas to be serviced, cropping pattern and planned water use, return flow parameters and economic data covering costs of facilities, and management must first be developed.
W75-05307

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

FLOOD PLAIN INFORMATION: KANSAS AND WAKARUSA RIVERS, LAWRENCE, KANSAS,
Army Engineer District, Kansas City, Mo.
Prepared for the City of Lawrence, Douglas County and the Kansas Water Resources Board, April 1969. 46 p, 16 fig, 10 tab, 21 plates.

Descriptors: Floods, *Flooding, *Flood control, *Flood protection, *Levees, Flood plain, Flood plain zoning, *Kansas, Historic floods.
Identifiers: Kansas River(Kan), Wakarusa River(Kan), Lawrence(Kan), Douglas County(Kan), Intermediate Regional Flood, Standard Project Flood, Rock jetty, Rock blanket.

Lawrence and its southern suburban areas are subject to flooding from the Kansas River with a drainage area of 58,504 square miles, and Wakarusa River which drains an area of 516 square miles. Kansas River flood plain, 2 to 3 miles wide, is primarily agricultural but changing in land use with the increased development of Lawrence. Obstructions to flood flow include 3 bridges and a weir type dam. Existing flood protection consists of drainage levees, private agricultural levees, rock jetties, rock blankets, and channel improvements as well as several upstream projects. The Wakarusa River, joining the Kansas River south of Lawrence, slopes at 2 feet per mile in the study area which is devoted to agriculture with industrial encroachment occurring on the flood plain. The city and county plan to zone flood plain uses consistent with the flood hazard. Corps of Engineers has begun construction of a system of levees and channel improvements scheduled for completion in 1971. The greatest flood occurred in July 1951 when the Kansas River remained above flood stage for approximately 10 days with a peak discharge of 483,000 cfs with damage estimated at $3,121,000 and the Wakarusa had a peak discharge of 40,600 cfs with $2,500,000 damage estimated for the Wakarusa basin. Floods are mostly of relatively slow rise and long duration. Peak discharges for Intermediate Regional Flood on the Kansas and Wakarusa Rivers would be 190,000 cfs and 54,000 cfs respectively. A Standard Project Flood peak discharge on the Wakarusa River would be 92,000 cfs. A Standard Project Flood on both rivers would inundate approximately the same area as the July 1951 flood with water overtopping the levee system on the Kansas. (Salzman-North Carolina)
W75-04852

FLOOD PLAIN INFORMATION -- GREENS AND HALLS BAYOUS, HARRIS COUNTY, TEXAS,
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, and the Texas Water Development Board, Austin, Texas, June, 1972. 41 p, 6 tab, 12 fig, 44 plates, glossary.

Descriptors: *Flood control, *Flood protection, *Non-structural alternatives, Regional flood, Peak discharge, Historic floods, River basin development, Floods, Floodways, Floodwaters, Flood peak, Flood data, Flood damage, Flood plain zoning, *Texas.
Identifiers: *Greens Bayou(Tex), *Halls Bayou(Tex), Hurricane surge, Tidal flooding, Standard Project Flood, Intermediate Regional Flood.

To the north and east metropolitan Houston, Texas, is bounded by and partially includes the 454 square miles of the combined watersheds of Greens Bayou and its principal tributary, Halls Bayou. Greens Bayou flows into the Houston Ship Channel (Buffalo Bayou) in the city. Heavy industrial development is on its flood plain in the river's first four miles. The flood plains of the middle reaches of both rivers are rapidly becoming urbanized with residential and commercial development, and the rapid growth of Harris County is encroaching on the upper reaches. Ten railroad and 48 vehicular bridges cross the Bayous, adding to the obstruction of their relatively flat channels during the frequent floods. Thunderstorms and occasional hurricanes cause flooding on both Bayous. Hurricane surges also cause tidal flooding on the lower 12 miles of Greens Bayou. The worst flood (July, 1954) in the 20 years of available gage records showed peak discharge of 7000 cfs which caused severe industrial, residential, and commercial damages. An Intermediate Regional Flood, recommended as the minimum design flood level, would have peak discharge of 25,400 cfs and a hazardous, eroding, main-channel velocity of 6.3 feet per second. A Standard Project Flood would be even more severe: 46,600 cfs, 7.7 feet per second, respectively. Structural control measures can be located with the aid of the report's maps and cross sections. Guidelines for flood plain management including non-structural measures such as zoning, subdivision regulations and building codes, are described and urged to minimize damages on the flood plain. (Herr-North Carolina)
W75-04853

FLOOD PLAIN INFORMATION: CHOCOLATE BAYOU, BRAZORIA COUNTY, TEXAS,
Army Engineer District, Galveston, Tex.
Prepared for Brazoria County Conservation and Reclamation District Number Three. June, 1971. 35 p, 9 tab, 6 fig, 18 plates, glossary.

Descriptors: *Flood control, *Flood protection, *Non-structural alternatives, *Floods, Flood data, Flood plains, Flood profiles, Floodways, Floodproofing, Historic floods, Maximum Probable Flood, Peak discharge, *Texas.
Identifiers: *Chocolate Bayou(Tex), Comprehensive Flood Damage Prevention Planning, Intermediate Regional Flood, Standard Project Flood, Brazoria County(Tex).

Chocolate Bayou flows through the town of Liverpool, Texas and into Galveston Bay to the southeast. In the upper reaches of its 159-square mile watershed it is a few miles south of Houston. This has been an agricultural area, but with recent development of a petrochemical industrial site along the Bayou plus expansion pressures from Houston, three residential developments have been built and more are anticipated along the flood plain. Stream gaging records and newspaper reports, as well as interviews, establish the flood pattern. Severe spring and summer thundershowers and occasional winter storms have flooded the Bayou on an average of more than once each year for the last 20 years. Generally the flood plain remains flooded for several days. In July, 1939, the Bayou's largest recorded flood measured 22.90 feet at the gage on State Road 1462, with a peak discharge of 15,600 cfs. This crest is two feet lower than the computer Standard Project Flood, with a peak discharge of 29,500 cfs. Future floods will be more extensive, deeper, swifter and more hazardous due to indiscriminate filling and construction along the channel, and the typically greater runoff from developed areas. Several non-structural alternatives for flood plain management include comprehensive development plan, preservation of open space, and the limitation of public utility extensions for the flood plain. (Herr-North Carolina)
W75-04854

FLOOD PLAIN INFORMATION: BRANDYWINE CREEK, NEW CASTLE COUNTY, DELAWARE,
Army Engineer District, Philadelphia, Pa.
Prepared for New Castle County Department of Planning, July, 1973. 26 p, 8 tab, 8 fig, 12 plates, glossary.

Descriptors: Floods, *Flood control, *Flood protection, *Delaware, *Flood profiles, River basin development, Flood damage, River forecasting, Flood data, Flood frequency, Flood plain zoning, Historic floods, Peak discharge.
Identifiers: *Brandywine Creek(Del), Wilmington(Del), Intermediate Regional Flood, Standard Project Flood, Flood plain management.

Early industrial development along Brandywine Creek above its mouth at Wilmington, Delaware, was encouraged by its steep gradient (25 feet per mile) and swift current. Today there are 9 small dams across the Brandywine which, along with 19 bridges in the 10-mile reach under study, offer considerable obstruction to flood flow. There has been recent industrial development on the flood plain and pressure for residential development. In Wilmington much of the flood plain above Market Street is incorporated in Brandywine Park. The city's filtration plant is located near the river, and has experienced interruption of service during floods. Further development on the flood plain is now prohibited by a New Castle County Ordinance which will limit further damage, but not protect the considerable development already there. In the maximum flood of record, June 23, 1972, Hurricane Agnes caused severe flooding. Brandywine Creek crested at 15.5 feet in Wilmington with a peak discharge of 29,000 cfs. The area flooded by a Standard Project Flood would be more extensive, including industrial, commercial, and residential property, with a peak flow of 73,100 cfs. Ten dams on the East and West Branches are proposed, with two already built, which will reduce flooding on the main stem. (Herr-North Carolina)
W75-04855

FLOOD ESTIMATION FOR URBAN AND RURAL CATCHMENTS,
Snowy Mountains Engineering Corp., Cooma (Australia). Hydrology Branch.
A. P. Aitken.
Australian Road Research, Vol 5, No 3, p 50-71, October, 1973. 5 fig, 38 ref.

Descriptors: *Flood forecasting, *Mathematical models, *Hydrographs, *Rational formula, *Australia, Computer models, Engineering, Rural areas, Urban areas.
Identifiers: Storm water management models.

Procedures for flood estimation of urban and rural catchments in Australia are examined. A 1958 publication entitled Australian Rainfall and Runoff, a guide to practicing engineers, is being revised. Criticisms of the publication follow new developments in hydrology, particularly those of mathematical and computer models. Methods for studying urban catchments include the Transport and Road Research Laboratory Hydrograph Model (TRRL), a British computer model; the Rational Formula, a statistical model; and mathematical models such as the complex Storm Water Management Model. Mathematical models may have indirect or direct applications. For urban catchments, despite its limitations, the Rational Formula is most widely used in Australia; however, additional research is needed, including collection of more urban rainfall-runoff data. Methods for investigating flood estimation for rural catchments include the Rational Formula, the soil conservation method, the Bureau of Public Roads method, and the tacitly maximised peak method. Hydrograph techniques and mathematical models are still in developmental stages for rural areas. A frequency analysis of stream flow records is the most used method for Australian rural flood estimation. (Prague-FIRL)
W75-04856

SOUTHERN TIER EAST REGION, BROOME-TIOGA COUNTIES, NEW YORK COMPREHENSIVE DRAINAGE STUDY, REPORT SUMMARY,
V. O. Shumaker, and K. C. Hawk.
Southern Tier East Regional Planning Board, Binghamton, New York, March 1974. 24 p, 3 fig.

Descriptors: *Surface drainage, *Storm runoff, *Flood control, *Erosion control, *Watershed management, Storage, Detention reservoirs, Land use, Water conservation, Soil conservation, Soil erosion, Retention, Regional analysis, Design criteria, Water policy, New York, Local governments, Planning, Water resources planning.
Identifiers: *Tioga County(New York), Broome County(New York), *Susquehanna River.

The data and findings are summarized contained in the Southern-Tier East Region, Broom-Tioga Counties, New York Comprehensive Drainage Study. The region is in the south-central part of New York, adjacent to Pennsylvania. The study area is in the glaciated Allegheny Plateau between the Allegheny Mountains and the lower slopes of the Catskill Mountains. The 1236 square miles of rough topography receives 36 inches annual precipitation and is drained primarily by the Susquehanna River. Two-thirds of the 1970 population of 268,328 persons live along both sides of the Susquehanna. To facilitate the study of storm drainage, the region has been subdivided into forty-four different planning basins containing one or more major watersheds as shown on the included map. The existing drainage problems are related to erosion and flooding in urban areas along tributaries of the Susquehanna. Anticipated future major drainage problems are associated closely with new development or changing land uses. Upstream control measures that should be undertaken include the following: land use control and water conservation on agricultural lands; use of flood control and debris collection reservoirs; and on-site detention storage of runoff. Downstream protection measures for storm drainage problems include storage, channel stabilization, flood control structures, enlargement of existing facilities, and land use control. These measures, except land use controls, should be considered supplemental to upland control. They may become necessary for economical reasons or because existing upland development or other topographical considerations preclude the use of upstream control measures. (Poertner)
W75-04858

INTERIOR DRAINAGE STUDY, PUMPING PLANT B AREA, DALLAS FLOODWAY PROJECT,
URS Forrest and Cotton, Inc., Dallas, Tex.
For primary bibliographic entry see Field 8B.
W75-04859

INTERIOR DRAINAGE STUDY, WEST LEVEE, DALLAS FLOODWAY PROJECT,
URS Forrest and Cotton, Inc., Dallas, Tex.
For primary bibliographic entry see Field 8B.
W75-04860

HYDROLOGIC ASPECTS OF A LOW FLOW WATER MANAGEMENT PROGRAM,
Washington State Dept. of Ecology, Olympia.
R. T. Milhous.
Paper presented at the 1973 Pacific Northwest Regional American Geophysical Union Meeting, Missoula, Montana, October 18-19, 1972. 11 p, 3 fig, 8 ref.

Descriptors: *Low flow, *Streamflow, *Administration, *Water policy, *Water utilization, *Water allocation(Policy), Washington, Legislation, Water conservation, Regulated flow, River flow, Perennial streams, Water users, Water demand, Streamflow forecasting, Planning.
Identifiers: *In-stream water uses, *Out-of-stream water uses, Preservation flows, Riggs flow forecasting procedures.

The 'Water Resources Act of 1971', passed by the Washington State Legislature, required that the utilization and management of the waters of the State shall be guided by a number of fundamentals. Included are declarations that both instream and out-of-stream uses of water are beneficial; the allocation of waters among potential uses and users shall be based (generally) on securing the maximum net benefits for the people of the State; and perennial rivers and streams shall be retained with base flows necessary to provide for preservation of wildlife, fish, scenic, aesthetic, and other environmental values. In a water management program allocating the waters between competing uses, it is important to know the water required for various uses (especially instream uses), to know the water available for allocation, and to be able to manage (regulate) the use of the water. The various methodologies of estimating flow requirements for fisheries have been reviewed and the calculated flow requirements have been found to be above the availability in many cases. The methodologies for estimating the availability of water have also been reviewed and the best method found to be one based on miscellaneous measurement. Methods of regulating flows have also been reviewed and the method using 'control' points was found to be the best procedure. The management of the water must be based on sound hydrologic principles. (Poertner)
W75-04862

STREAM PROGRAMMER'S MANUAL.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W75-04874

FLOOD FREQUENCY AND RISK,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
G. W. Kite.
(1974), 263 p, 13 fig, 40 tab, 30 ref.

Descriptors: *Floods, *Flood control, *Frequency, *Forecasting, *Probability, Mathematical models, Equations, Methodology, Analytical techniques, Distribution, Hydrologic properties, Regional analysis, Protection, *Risks.
Identifiers: *Risk analysis.

The background and justification for probability and risk analysis in the forecasting of floods are discussed. The use of specific procedures to determine plotting positions, choose a probability distribution and compute design event magnitudes and their confidence limits is recommended. Other topics discussed include the advantages of regional analysis and design procedures based on a specified project risk or hydrologic risk. It is concluded that the mean frequency should be used as a plotting position, that the lognormal distribution is of more practical use than many other distributions and that some form of risk analysis should be used for all hydrologic designs. (Environment Canada)
W75-04876

HYDROLOGIC FORECASTING IN THE WATER RESOURCES BRANCH,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
G. W. Kite.
1974, 24 p, 6 tab, append.

Descriptors: *Forecasting, *Runoff forecasting, *Hydrology, Warning systems, Methodology, Research, Surveys, River forecasting, Drainage, Snowmelt, Snow cover, Water temperature, *Canada, Snow surveys.
Identifiers: River depth, Ice thickness.

Forecasting of river flows and other hydrologic parameters usually only attracts public attention during floods and droughts. Throughout the year, however, hydrologic forecasting is of equal importance for planning basin use, power development, navigation, pollution disposal, recreation opportunity, water supply and many other uses. The Water Resources Branch is involved in the provision of data to forecasting agencies, the provision of forecasts, and the provision of forecasting knowledge in a consultative role to other agencies. Some of these forecasts have been provided over a considerable period; up to 30 years or more in some instances. The current hydrologic forecasting activities of the Branch are described. (Environment Canada)
W75-04881

INFILTRATION ROLE OF LARGE SOIL PORES: A CHANNEL SYSTEM CONCEPT,
Nevada Agricultural Experiment Station, Reno.
For primary bibliographic entry see Field 2G.
W75-04919

THE OVERLAND FLOW PROCESS UNDER NATURAL CONDITIONS,
Purdue Univ., Lafayette, Ind., Agricultural Experiment Station.
G. R. Foster.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 173-185. 7 fig, 17 ref.

Descriptors: *Overland flow, *Flow resistance, *Obstruction to flow, *Erosion, Flow, Design flow, Flow friction, Friction, Runoff, Natural flow, Soil, Sediments, Suspended solids, Infiltration, Hydrographs, Hydrology.
Identifiers: Natural conditions, Parameters, Fluid flow, Water drag.

Sediment yield as well as runoff from small watersheds was found to be closely related to overland flow which generally concentrated quickly over bare eroding soil. A runoff hydrograph was simulated with a kinematic model that included retention storage, infiltration, and hydraulic roughness parameters. The choice of infiltration parameters for freshly tilled dry soils was found to be most critical. Next was retention storage. For surfaces where the flow concentration pattern had developed, a constant friction factor was satisfactory for hydrograph simulation for slope lengths as long as 35 feet. The friction factor was found to depend on soil erodibility and runoff rate, but not on slope steepness. Also, limited data indicated that it was a function of slope length as well. The friction factor was found to vary with soil erodibility to the negative 2.8 power and with runoff rate to the negative 0.8 power. The more erodable soils eroded into more efficient rill systems, which lowered the friction factor. Also, the increased erosion due to increased runoff apparently contributed to smaller friction factor values. (See also W75-03023) (Roberts-ISWS)
W75-04920

MECHANICS OF SURFACE RUNOFF ON HILLSLOPES,
Agricultural Research Service, Athens, Ga. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2E.
W75-04921

STORMFLOW PRODUCTION FROM PERMEABLE UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 2A.
W75-04925

ROOKERY BAY LAND USE STUDIES, THE RESOURCE BUFFER PLAN: A CONCEPTUAL LAND USE STUDY,
Miami Univ., Fla. Center for Urban Studies.
A. R. Veri, A. R. Marshall, S. Y. Wilson, J. H. Hartwell, and P. Rosendahl.
Available from National Technical Information Service Springfield, Va. 22161, as PB-239 862, PC$3.75,MF$2.25. The Conservation Foundation, Washington, D.C. Study Rept. No. 2, Oct 73. 41 p, 10 fig, 2 tab, 24 ref. OWRT C1817(No. 3170)(6).

Descriptors: *Florida, *Water Management(Applied), *Land use, Human population, Comprehensive planning, Water pollution, *Mangrove swamps, *Land management, Bays, *Ecosystems, Water districts, Ecology, Land resources, Resources, Alternative planning.
Identifiers: *Rookery Bay Sanctuary(Fla), Resource buffer plan.

This study provides an alternative conceptual land use plan, development guide lines and implementation policies for Water Management District No. 6 in Collier County, Florida. This District encompasses most of the uplands and waterways which drain into the Rookery Bay Sanctuary, a 5,000-acre preserve owned by the National Audobon Society. Several plans were proposed: The Perimeter Canal Concept (1968); The Interceptor Canal Concept (1972); and The Resource Buffer Concept (1973). The latter is proposed by this study. The Resource Buffer Plan proposes to use naturally functioning ecological systems (water, vegetation, and distance) as the 'buffer'. The two previously proposed plans would advocate extensive filling of wetlands and rely upon untested technology and the judgement of supervising personnel to operate a canal-like 'buffer' around the landward perimeter of the mangrove to intercept, assimilate, and distribute contaminants to tide. This study evaluates the affect of holding land from development upon the ultimate populations and densities within the study area. Various possibilities for land preservation are discussed including transfer development rights. A descriptive list of flora and fauna, geology, water resources and soils is provided.
W75-04929

MULTIPLE USES OF UTAH IRRIGATION CANALS: CACHE COUNTRY AS A CASE STUDY,
Utah Cooperative Forest Recreation Research Unit, Logan.
J. J. Kennedy, and K. Unhanand.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 830, $5.25 in paper copy, $2.25 in microfiche. Utah Water Research Laboratory, Logan, Report No PRJERO24-1, 99 p, 3 fig, 6 tab, 5 append. 1974. OWRT A-017-UTAH(1), 14-31-0001-3845.

Descriptors: *Canals, *Multiple purpose, *Recreation, Wildlife, Flood control, Trout, Management, Legal aspects, *Utah, *Irrigation canals.
Identifiers: Cache County(Utah).

Irrigation use is an obvious benefit of Utah canals that has been recognized for over 100 years. This study attempts to illustrate other, less obvious, uses. The major use examined was recreational, but canals are presently functioning as storm drainage systems and have potential for diverting flood crests in many river systems. Recreational use of canals, falls into two categories. There is passive use such as its landscape values, affects on creating shade and bird-wildlife habitat, etc., that is difficult to quantify but no less important than active canal use such as tubing, hiking, bankplay, bicycling, etc. Several canals were selected in and about Logan, Utah, and considerable active use; this will probably increase with suburban expansion. A Logan City canal that flowed year-round was also electro-shocked and found to have a resident brown trout population as great as many exceptional trout streams in the west. The multiple uses of this case study can best by summarized as a contrast between community benefits and conflict. In return for the thousands of hours of public enjoyment that irrigation companies now provide, they get nothing but problems. IF communities don't begin to recognize the value of their canals and cooperate with canal companies to equitably share in the cost of public use, then canals of Utah will continue to be withdrawn from public use and become another amenity that is sacrificed to urbanization.
W75-04939

CONTROL OF AQUATIC WEEDS FROM WATER BODIES USING GRASS CARP,
Central Public Health Engineering Research Inst., Madras (India). Zonal Centre.
H. L. Bhatia, C. A. Sastry, and R. K. Nigam.
Indian Journal Environmental Health, Vol 15, No 2, p 92-99, 1973. 2 fig, 2 tab, 14 ref.

Descriptors: *Biocontrol, *Carp, *Aquatic weed control, Fish, Submerged plants.
Identifiers: *Grass carp, Ctenopharyngodon idella, Bhopal(India), *India.

A series of feeding experiments were carried out in three nursery ponds at Bhopal, India during October 1968 to March 1969 in order to assess the quantities of submerged aquatic weeds that can be consumed by grass carp (Ctenopharyngodon idella) and the preference of the fish for a particular weed. During the course of experiments the water in the experimental nursery ponds was regularly analyzed for pH, temperature, dissolved oxygen and plankters. The fish were found to consume almost all types of noxious aquatic weeds to varying extents. Submerged weeds like Hydrilla, Najas, Ceratophyllum, Pososteman, Potamogeton, and Vallisneria were readily consumed by the fish. Lemna and Myriophyllum were consumed to a lesser extent. Ipomoea and Eichhornia were the least preferred. For clearing 44.82 kg of a mixture of seven different weeds, five grass carp totalling in weight about 6.5 kgs were found to take about 144 hrs. For effective biocontrol of various weeds, the weed density and their growth rate should be determined; also to grass carp should be sufficiently large to escape predation in order to maintain an adequate number of fish. (Jones-Wisconsin)
W75-05058

REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT - LAFOURCHE PARISH, LOUISIANA,
Louisiana State Univ., Baton Rouge. Dept. of Environmental Engineering.
J. G. Ragan, J. H. Green, and C. A. Whitehurst.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-26912, $3.75 in paper copy, $2.25 in microfiche. March 1974. 28 p, 12 fig, 4 tab, 7 ref. NASA Grant No. 19-001-097 and 19-001-024.

Descriptors: *Marshes, *Marsh management, *Coastal marshes, *Remote sensing, Tidal marshes, Marsh plants, On-site investigations, Aquatic habitats, Weirs, Aerial photography.

NASA aerial photography, primarily color infrared and color positive transparencies, was used in a study of marsh management practices and in comparing managed and unmanaged marsh areas. Interpretations of the aerial photography were compared with ground observations. It was determined that with proper management techniques Louisiana's marshes can be improved by providing stable habitats for desirable vegetative associations and their associated fauna. Weir locations for tidal control were recommended. Aerial photography was found to be an aid in the study of marshes. (Sims-ISWS)
W75-05095

A PROCEDURE FOR AUTOMATED LAND USE MAPPING USING REMOTELY SENSED MULTISPECTRAL SCANNER DATA,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05096

KANSAS ENVIRONMENTAL AND RESOURCE STUDY: A GREAT PLAINS MODEL,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W75-05110

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME I,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 7B.
W75-05123

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME II,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 7B.
W75-05124

GEOECOLOGY INFORMATION SYSTEM, PART I. BIOGEOGRAPHIC MAPPING OF SPECIES RANGES: DOCUMENTATION OF INPUT AND DATA CHECKING PROCEDURE FOR COMPUTER STORAGE AND RETRIEVAL OF INFORMATION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7C.
W75-05129

TO DEVELOP A LAND USE-PEAK RUNOFF CLASSIFICATION SYSTEM FOR HIGHWAY ENGINEERING PURPOSES,
Maine Dept. of Transportation, Augusta. Bureau of Highways.
E. G. Stoeckeler, R. S. Farrell, and R. G. Woodman.
Available from the National Technical Information Service, Springfield, Va 22161 as NASACR 139037, $4.75 in paper copy, $2.25 in microfiche. Report No. 8, March 15, 1974. 55 p, 17 fig, 11 tab, 7 ref. NAS 5-21772,MMC 203.

Descriptors: *Remote sensing, *Land use, *Floods, *Hydrology, *Aerial photography, Highways, Drainage, Watersheds(Basins), Flood plains, Forests watersheds, Precipitation(Atmospheric), Wetlands, Swamps, Runoff, *Maine.
Identifiers: *ERTS-1, *Sunkhaze Stream(Maine).

The 101 square mile watershed of Sunkhaze Stream was studied in detail by using standard airphoto interpretation techniques with ERTS imagery, U-2 RC 10 photography, and Maine Department of Transportation airphotos. Stereo viewing of ERTS imagery was preferred throughout the study for gaining detail. The sidelap area of adjacent orbits was studied stereoscopically as were various band and season combinations. Tracings of ERTS features were made from 1:125,000 scale projections for direct overlay on RC-10 transparencies. A variance of about six percent was computed for hydrologic studies prepared from standard USGS 15 minute quadrangle maps, U-2 9 inch photography and ERTS imagery. Comparable results were obtained from color infrared RC 10 transparencies and simulated ERTS color infrared products in preparing land use maps. Thirty-eight square miles of spring flooding in the Penobscot River valley were detected and measured on 23 April 1973 imagery, which is being utilized to study flooding problems in the town of Bradley. Repetitive ERTS coverage

during all seasons is a necessity for obtaining accurate hydrologic and land use data. Color infrared ERTS imagery added significantly to the resolution of detail for hydrologic studies and land use mapping. (Sims-ISWS)
W75-05130

RESEARCH IN REMOTE SENSING OF AGRICULTURE, EARTH RESOURCES, AND MAN'S ENVIRONMENT,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 7B.
W75-05132

HYDROLOGICAL BASIS FOR FORECASTING AND CALCULATING RUNOFF BY SPACE IMAGES OF THE EARTH'S SURFACE,
Kanner (Leo), Associates, Redwood City, Calif.
G. P. Kalinin.
Available from the National Technical Information Service, Springfield, Va. 22161, as N74-25889, $3.75 in paper copy, $2.25 in microfiche. NASA TT-F 15665, May 1974, 41 p, 2 tab, 42 ref. Translated from Gidrologicheskiye Osnovy Prognoza i Rascheta Stoka po Aerokosmicheskim Snimkam Zemnoy Poverkhnosti, Unpublished Manuscript, Academy of Sciences, Moscow (USSR), 53 p, 1974. NASW-2481.

Descriptors: *Remote sensing, *Hydrology, *Runoff forecasting, *Runoff, Surface waters, Groundwater, Satellites(Artificial), Aerial photography, Floods, Snow cover, Mathematical models.

Procedures were outlined for applying generally accepted hydrological equations to determine runoff from parameters that can be derived from satellite or aerial photography. Some of these parameters are the area of coverage of the surface with water, the surface area of the river network, and the soil moisture content. Some American studies of the use of remote sensing for runoff prediction were described. Further problems in the investigation of processes of formation of runoff by use of aerial and space photographs were listed. (Sims-ISWS)
W75-05135

DISCHARGE OF SELECTED RIVERS OF CANADA.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
For primary bibliographic entry see Field 2E.
W75-05136

DISCHARGE OF SELECTED RIVERS OF CANADA, SUPPLEMENT 1.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
For primary bibliographic entry see Field 2E.
W75-05137

WATER RESOURCES DEVELOPMENT, 1950-1965, AN INTERNATIONAL BIBLIOGRAPHY,
Center of Scientific and Technological Information, Tel Aviv (Israel). Library Services.
For primary bibliographic entry see Field 10B.
W75-05154

MODELING THE HYDROLOGIC EFFECTS RESULTING FROM LAND MODIFICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2A.
W75-05189

BHUMIBOL RESERVOIR-SEDIMENT STATUS AFTER EIGHT YEARS OF OPERATION,
Electricity Generating Authority of Thailand, Nonthaburi.
For primary bibliographic entry see Field 2J.
W75-05195

AN APPROACH TO THE SEDIMENT YIELD ESTIMATION BY SPECTRAL ANALYSIS OF MOUNTAIN RELIEF,
Gifu Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W75-05197

TECHNIQUES OF MEASUREMENT OF SILT DEPOSITION IN VICTORIAN RESERVOIRS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
For primary bibliographic entry see Field 2J.
W75-05198

ESTIMATING AVERAGE SEDIMENT YIELDS FROM ANNUAL STREAMFLOW AND SEDIMENT RECORDS,
Geological Survey, Fort Collins, Colo.
C. F. Nordin, and G. V. Sabol.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 93-104, 5 fig, 2 tab, 4 ref.

Descriptors: *Sediment yield, *Streamflow, *Correlation analysis, *Estimating equations, *Streamflow forecasting, Sedimentation rates, Sediment discharge, Equations, Statistical methods, Variability, Sedimentology, Frequency analysis, Synthetic hydrology, Sediment load, Markov process.
Identifiers: Extending records, Double mass curves.

Generally, streamflow records extend longer in time than sediment records. Where simultaneous streamflow and sediment discharge records are available, mathematical relations between annual streamflow and annual sediment loads can be developed. These relations can be used to estimate annual sediment yield and long-term average sediment yield for periods when only streamflow records are available. The relative information content of the mean, defined as the rati of variance of the mean for a random series of annual sediment loads to variance of the mean for non-random, or autocorrelated, series of annual sediment loads, served as a criterion to determine whether or not estimates of long-term average sediment yields could be improved by estimating sediment loads from the linear relation. Twenty-four simultaneous records of annual water and sediment discharges were examined to determine if estimates of long-term average sediment discharges could be improved by extending the sediment records, based on a linear relation between sediment discharge and water discharge, to periods during which only water discharges were available. It was concluded that a linear relation between the logarithms of the values should be used to extend the sediment records, and the estimates of the long-term mean sediment discharges would be improved for all cases considered when consistent relations exist between sediment and water discharge. (See also W75-05192) (Prickett-ISWS)
W75-05200

SEDIMENT EQUILIBRIUM CONSIDERATIONS IN THE DESIGN OF IRRIGATION CANAL NETWORKS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05252

THE HISTORY OF SEDIMENT YIELD AND DEPOSITION OF THE JUBONES RIVER, ECUADOR, AND ITS RELATION TO ENGINEERING PROJECTS,
For primary bibliographic entry see Field 2J.
W75-05257

FLOOD FLOW FREQUENCY TECHNIQUES,
Texas Univ. at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 2E.
W75-05262

DEMONSTRATION OF THE SEPARATION AND DISPOSAL OF CONCENTRATED SEDIMENTS,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 5G.
W75-05312

OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05315

FORMULATING THE PROBLEM OF THE OPTIMAL EXPANSION OF AN EXISTING WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05317

A PROCEDURE FOR SOLVING THE OPTIMAL EXPANSION PROBLEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05318

APPLICATION OF THE OPTIMIZATION ALGORITHM TO A WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05319

THE SENSITIVITY OF PLANNING DECISIONS IN RIVER BASIN MANAGEMENT,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05320

4B. Groundwater Management

DIGITAL SIMULATION OF HORIZONTAL SALT-WATER ENCROACHMENT INDUCED BY FRESH-WATER PUMPING,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2L.
W75-04875

RECONNAISSANCE RESISTIVITY SURVEY AROUND A BRINE POND, ESTERHAZY, SASKATCHEWAN,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
H. Lazreg.
Water Resources Branch, Scientific Series, No 42, 1974, 8 p, 3 ref, 6 fig.

Descriptors: *Resistivity, *Surveys, Saline water, On-site investigations, Aquifers, Analytic

techniques, *Canada, Brines, Inflitration, *Saline water intrusion, Water pollution sources.
Identifiers: *Brine ponds, Waste disposal ponds, Esterhazy(Saskatchewan-Canada).

A surface resistivity profiling with current electrode spacings of 40m and 100m was conducted around a brine pond generated by waste disposal of salt from a potash mine in Saskatchewan. The results of the survey indicate that salt water infiltration into the subsurface materials in the immediate vicinity of the northeastern edge of the brine pond is a possible explanation of at least one and possibly two observed conductive anomalies. (Economic Canada)
W75-04883

THE GEOCHEMISTRY OF CERTAIN MINE AND SPRING WATERS, WESTERN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 5B.
W75-04938

SEEPAGE-ENVIRONMENTAL ANALYSIS OF THE SLIME ZONE OF A TAILING POND,
Bureau of Mines, Spokane, Wash. Spokane Mining Research Center.
For primary bibliographic entry see Field 5B.
W75-05115

THREE-DIMENSIONAL SUBSURFACE DELINEATION VIA A NOVEL METHOD FOR DETERMINING THE SUBSURFACE ELECTRICAL PROFILE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2F.
W75-05116

GEOHYDROLOGIC RELATIONSHIPS IN WATER POLLUTION,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
For primary bibliographic entry see Field 5G.
W75-05128

GROUNDWATER IN PERMAFROST REGIONS OF CANADA,
Department of the Environment, Calgary (Alberta). Water Resources Branch.
For primary bibliographic entry see Field 2C.
W75-05150

HYDROGEOLOGY OF THE LETHBRIDGE-FERNIE AREA, ALBERTA,
Alberta Research, Edmonton.
For primary bibliographic entry see Field 2F.
W75-05151

REGIONAL CHEMISTRY AND WATER LEVEL DISTRIBUTION OF THE NEAR-SURFACE GROUNDWATERS OF THE EDMONTON AREA (NORTHWEST SEGMENT), ALBERTA,
Alberta Research, Edmonton.
For primary bibliographic entry see Field 2F.
W75-05152

HYDROGEOCHEMISTRY OF CARBONATE GROUNDWATERS OF AN URBAN AREA,
Illinois Univ., Chicago. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W75-05163

THE GEOLOGY AND HYDROGEOLOGY OF THE NEW LEAD BELG, MISSOURI,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 2F.
W75-05175

AQUATHERMAL FLUID MIGRATION,
Imperial Oil Ltd., Calgary (Alberta).
K. Magara.
The American Association of Petroleum Geologists Bulletin, Vol 58, No 12, p 2513-2516, December 1974. 2 fig, 7 ref.

Descriptors: *Sedimentary rocks, *Pore water, *Organic compounds, Pore pressure, Compaction, Pressure, Temperature, Porosity, Geology, Migration, Expansion.
Identifiers: Geothermal gradients.

A given weight of water expands in volume with increase of subsurface temperature during burial. The expansion may contribute to water movement from deep sections to shallow, or from the basin center to the margins, and thus could be a contributing factor in hydrocarbon migration. The higher the geothermal gradient, the more water expansion can be expected; a high geothermal gradient favors fluid migration and possible flushes more hydrocarbons. Where the geothermal gradient is constant, the rate of water expansion increases with depth of burial. Therefore, water expansion becomes increasingly important at depths necessary for the generation of hydrocarbons. In a geologic model of shale-sandstone interbeds, where the shales have the greater porosity and hence contain a greater volume of water, the expansion resulting from burial would cause water to move out of the shales and into the sandstones. This movement, therefore, could help the migration of hydrocarbons from shales to sandstones. (Schicht-ISWS)
W75-05182

MANAGEMENT OF WASTE FLUIDS IN SALAQUIFERS,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05191

INVESTIGATION OF ALTERNATIVE PROCEDURES FOR ESTIMATING GROUNDWATER PARAMETERS,
Water Resources Engineers, Inc., Walnut Creek, Calif.
D. McLaughlin.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 952, $7.00 in paper copy, $2.25 in microfiche. Completion Report, January 1975. 182 p, 19 fig, 10 tab, 25 ref, 8 append. OWRT C-4238(No. 9035)(1).

Descriptors: *Groundwater basins, *Optimization, Simulation analysis, Statistics, *Estimating, *Model studies, *California, Calibration, Forecasting, Reviews, Measurement.
Identifiers: Model calibration, Kalman filtering, Parameter estimation, *San Jacinto groundwater basin(Calif).

The objective was development of an improved technique for automatically calibrating groundwater basin simulation models. The research consisted of four major tasks: (1) A critical review of available literature identified three promising parameter estimation techniques which may be used to calibrate groundwater simulation models; (2) The capabilities of each of the three selected techniques were evaluated, both analytically and experimentally, and computational refinements were made where appropriate; (3) The best overall parameter estimation technique was tested on a 179 parameter model of the San Jacinto groundwater basin in Southern California; (4) An investigation was made of problems caused by uncertain calibration measurements. Results indicated that an iterative nonlinear programming algorithm (Gauss' algorithm) is the best available groundwater model calibration technique. A preliminary analysis suggests that the detrimental effects of uncertain calibration measurements can be reduced by the use of a statistical technique known as Kalman filtering.
W75-05263

SEEPAGE FLOWS - GROUNDWATER POLLUTION INVESTIGATIONS,
Rutgers - The State Univ., New Burnswick, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-05273

FLOW PATTERNS OF STEADY RAINFALL SEEPING THROUGH BEDDED LAND OR A HILLSIDE WITH A BARRIER AT GREAT DEPTH,
Virginia Polytechnic/Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 2F.
W75-05339

4C. Effects On Water Of Man's Non-Water Activities

HYDROLOGIC ASPECTS OF A LOW FLOW WATER MANAGEMENT PROGRAM,
Washington State Dept. of Ecology, Olympia.
For primary bibliographic entry see Field 4A.
W75-04862

FACTORS AFFECTING POTENTIAL EVAPOTRANSPIRATION,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2D.
W75-04916

EFFECT OF VEGETATION ON STORM HYDROGRAPHS,
Agricultural Research Service, Coshocton, Ohio. Soil and Water Conservation Research Div.
L. L. Harrold.
In: Biological Effects in the Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Inidana, p 332-346. 6 fig, 3 tab, 16 ref.

Descriptors: *Storm runoff, *Vegtation effects, *Hydrographs, Vegetation, Forests, Reforestation, Vegetation regrowth, Retardance, Runoff, Infiltration, Soil surfaces, Surface runoff, Water yield, Canopy, Watersheds(Basins), Rainfall-runoff relationships, Discharge(Water), Peak discharge.
Identifiers: *Storm Hydrograph, *Runoff peak rates, Woodland.

Ten years of research results at several research centers was evaluated, and selected results were used to evaluate analytical methods and show the influence of catchment characteristics. Complete vegetative cover tended to maintain high rates of infiltration, resulting in low rates of storm runoff, providing there was enough soil-water storage potential to absorb volumes of water during the storm period. Complete vegative cover, through evapotranspiration, extracted soil water and increased the potential volume of storm rainfall retention as compared with fallow. Twenty years after planting trees on a Tennessee catchment a flood peak of 0.02 cu m/sec would have been 3 cu m/sec without reforestation. Before reforestation, 94% of the total storm flow occurred within 1 hour

after flow started. Fifteen years later, the 94% value was reached after 20 hours of flow. The hydrographs flattened, peaks were less, and stormflow persisted longer: the effects of a drastic change in vegetation that increased storm rainfall infiltration potential. (See also W75-03023) (Roberts-ISWS)
W75-04926

THE INFLUENCE OF VEGETATION AND VEGETATIVE MULCHES ON SOIL EROSION,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
L. D. Meyer, and J. V. Mannering.
In: Biological Effects In The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 355-366. 4 tab, 33 ref.

Descriptors: *Soil erosion, *Vegation effects, *Erosion control, *Land management, Soil stabilization, Wind erosion, Cultivated lands, Retardance, Mulching, Erosion rates, Water control, Soil surfaces, Watershed management.

The vegetation characteristics of a watershed very strongly influence its runoff and erosion response. Dense and vigorous vegetation was one of the best practices for protecting land from excessive soil erosion. When land was not covered by growing plants, surface mulches of plant residues were very effective. Wise management of vegetation and vegetative residues can greatly reduce water and air pollution from one of our Nation's major contaminates, eroded soil. Tabulated data showed: (1) Influence of type, rate and management of crop residues on wind erosion; (2) Influence of mulch rate on erosion by water; (3) Relative erodibilities for several crop sequences; and (4) Relative erosion from slopes. (See also W75-03023) (Humphreys-ISWS)
W75-04928

WATER QUALITY AFTER CLEARCUTTING A SMALL WATERSHED IN WEST VIRGINIA,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
G. M. Auberton, and J. H. Patric.
Journal of Environmental Quality, Vol 3, No 3, p 243-249, July-September, 1974. 2 fig, 3 tab, 13 ref.

Descriptors: *Age, *Turbidity, *Forestry, *Streamflow, *Nutrients, *Clear-cutting, Temperature, Agriculture, Watersheds(Basins), Water management(Applied), Hydrogen ion concentration, *West Virginia, Water quality.
Identifiers: Fernow Experimental Forest(Parsons-West Virginia).

In 1969, an 85-acre watershed was clearcut on the Fernow Experimental Forest, Parsons, West Virginia. As a result of the clearcutting, streamflow increased; this increase was reduced during the second year by rapid revegetation. Clearcutting had a negligible effect on the temperature, pH, nonstorm turbidity, and concentrations of dissolved solids. Storm turbidity, nitrate-nitrogen and phosphate concentrations showed slight increases. Water quality remained high due to careful road management, retention of forest along the stream, and lush vegetation regrowth after cutting. (Carpenter-FIRL)
W75-04998

ANALYSES OF THE EFFECT OF URBANIZATION ON RAINFALL CHARACTERISTICS I,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
R. A. Rao, and R. G. Srinivasa Rao.
Available from the National Technical Information Service, Springfield Va. 22161, as PB-239 871, $7.25 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center; Technical Report No 50, 1974. 156 p, 21 fig, 42 tab, 43 ref, 3 append. OWRT B-025-IND (3).

Descriptors: *Urban sociology, *Rainfall, Statistical methods, Statistical Models, *Urbanization, Model studies, Cities.

The study deals with testing the significance of observed changes in precipitation in an around urban areas. The data from St. Louis, Missouri, LaPorte, Indiana, Tulsa, Oklahoma, and Kansas City, Missouri were analyzed. Several statistical tests were used in analyzing the data. The assumption was made that the annual data are independent and identically distributed random variables and analyzed by using the multivariate and univariate tests. As a by-product of this analysis, the minimum number of observations required to estimate a given change in the mean was estimated. The main conclusions are (1) the observed increases in the monthly and annual rainfall in and around urban areas are statistically significant in many instances. The observed increase in LaPorte rainfall is definitely significant. (2) These increases do not occur in only warm or in the cold seasons. (3) The tests based on time series models are better than multivariate and univariate tests based on the independent and identically distributed assumption. The available length of data from any station in the affected period is sufficient to carry out various statistical tests to obtain reliable results.
W75-05172

INVESTIGATION OF ENRICHMENT OF MOLYBDENUM IN THE ENVIRONMENT THROUGH COMPARATIVE STUDY OF STREAM DRAINAGES, CENTRAL COLORADO,
Colorado Univ., Boulder. Dept. of Geological Science.
For primary bibliographic entry see Field 5B.
W75-05293

THE EFFECT OF PARK USE ON SURFACE WATER QUALITY,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W75-05306

SECOND ANNUAL REPORT, DOT-CIAP PROGRAM,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2B.
W75-05349

4D. Watershed Protection

SOUTHERN TIER EAST REGION, BROOME-TIOGA COUNTIES, NEW YORK COMPREHENSIVE DRAINAGE STUDY, REPORT SUMMARY,
For primary bibliographic entry see Field 4A.
W75-04858

EXTENSION OF HYDROLOGIC PROCESS MODELING TO TOTAL WATERSHED MODELING,
Agricultural Research Services, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 2A.
W75-04924

THE INFLUENCE OF VEGETATION AND VEGETATIVE MULCHES ON SOIL EROSION,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04928

WATER QUALITY OF THREE SMALL WATERSHEDS IN NORTHERN UTAH,
Forest Service (USDA), Logan, Utah. Forest Sciences Lab.
For primary bibliographic entry see Field 5B.
W75-04943

A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME I: SUMMARY REPORT.
IBM Federal Systems Div., Huntsville, Ala.
For primary bibliographic entry see Field 2A.
W75-05108

A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME II: SUPPORTING TECHNICAL DETAILS.
IBM Federal Systems Div., Huntsville, Ala.
For primary bibliographic entry see Field 2A.
W75-05109

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEMS STUDIES, VOLUME III,
Tennessee Univ., Knoxville. Dept. of Geology.
For primary bibliographic entry see Field 7B.
W75-05125

BIBLIOGRAPHIES PERTINENT TO WILDLAND HYDROLOGY,
Utah State Univ., Logan. Dept. of Range Science.
For primary bibliographic entry see Field 10C.
W75-05153

EXPERIMENTAL STUDY OF RILL EROSION,
Colorado State Univ., Fort Collins. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W75-05178

AIR PRESSURES OVER SURFACES EXPOSED TO WIND - I. WATER HARVESTING CATCHMENTS,
Agricultural Research Service, Water Conservation Lab. Phoenix, Ariz.
For primary bibliographic entry see Field 3B.
W75-05179

MODELING THE HYDROLOGIC EFFECTS RESULTING FROM LAND MODIFICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2A.
W75-05189

SEDIMENT CONTROL AND REMEDIAL WORKS IN THE BRANTAS RIVER, JAVA, INDONESIA,
Ministry of Public Works, Djakarta (Indonesia). Directorate General of Water Resources.
S. Doelhomid.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 213-226. 5 fig, 1 tab.

Descriptors: *Volcanoes, *Flood control, *Sediment control, *Mudflows, Sediment transport, Embankments, River beds, Aggradation, Drainage, Gradients(Streams), Alluvial fans, Equilibrium, Silting, Tunnels, Rivers, Craters.
Identifiers: *Indonesia(Brantas River), Mt. Kelud(Java), Lahars, Volcanic debris, Pyroclastic materials.

The behavior of the 320 km long Brantas River in East Java is largely dominated by the inflow of

volcanic debris from Mt. Kelud which has an eruption cycle of about 15 years. This debris is not all transported to the sea and in consequence there has been a gradual overall rise in river bed levels, which in the past century have been accelerated by man who has confined the river between flood embankments. The continued formation of an alluvial plain through flood spill, particularly in the Middle Brantas, has thus been prevented and now there are some reaches where the bed level is meters above the adjacent plain. The basic problem is flood prevention, and the solution lies in sediment control. Three broad approaches were considered: (1) preventing or reducing sediment inflow, (2) diverting sediment from the river, and (3) increasing sediment transport to the sea. Within each approach there are various engineering alternatives, and the solution must be a combination of alternatives, implemented as a phased program. A thorough understanding of the basin hydrology and river hydraulics is essential before firm solutions can be established. The required data is sparse and a continued program of detailed observations is necessary. (See also W75-05192) (Visocky-ISWS)
W75-05211

LANG LANG RIVER, VICTORIA ATTEMPTS TO CONTROL SEDIMENT, EROSION AND FLOODS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
D. T. Currey.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 227-239. 10 fig, 2 ref.

Descriptors: *Stream erosion, *Flood damage, *Flood control, Erosion, Stream stabilization, Gradients(Streams), Embankments, Levees, Swamps, Drainage, Erosion control, Weirs, Drains, Bank erosion, Channels, Equilibrium, Sheet piling, Overfalls, Australia.
Identifiers: *Australia(Lang Lang River), Lang Lang River(Koo-wee-rup Swamp).

The Koo-wee-rup Swamp reclamation works constitute the most important swamp drainage scheme in Victoria. Drainage works were commenced in 1885, but it was not until 1917 that a comprehensive drainage scheme for a 23,500 hectare area was provided. A herringbone bone system of drains was effective in draining the area but was not able to cope with flood overflows from the Lang Lang River. Despite extensive river improvement works over the last 57 years, including an 18 km channel, rapid erosion is occurring, especially in the central portion of the river which is a sloping plain. An embankment and a levee constructed across the path of flood overflows were suggested as the prime structures leading to the bed and bank erosion. In 1964 two bridges were threatened by undermining from headward erosion. Two low overfall weirs were constructed as grade-reducing structures near the upper bridge and proved successful in preventing further erosion there. Similar structures near the lower bridge failed, however, and undermining made the bridge unserviceable by 1971. Costs of two alternative solutions are being considered: (1) allow erosion to continue until an equilibrium is reached, or (2) build structures that would drown the erosion heads. (See also W75-05192) (Visocky-ISWS)
W75-05212

GTWS: GEORGIA TECH WATERSHED SIMULATION MODEL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05271

PREDICTION OF SUBSOIL ERODIBILITY USING CHEMICAL, MINERALOGICAL AND PHYSICAL PARAMETERS,
Purdue Research Foundation, Lafayette, Ind.
For primary bibliographic entry see Field 2J.
W75-05308

AN EXECUTIVE SUMMARY OF THREE EPA DEMONSTRATION PROGRAMS IN EROSION AND SEDIMENT CONTROL,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 5G.
W75-05310

PROGRAMMED DEMONSTRATION FOR EROSION AND SEDIMENT CONTROL SPECIALISTS,
Hittman Associates, Inc., Columbia, Md. Environmental and Geosciences Dept.
For primary bibliographic entry see Field 5G.
W75-05311

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

ANALYTICAL METHODS MANUAL - MANUEL DES METHODES ANALYTIQUES,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
1974, (90 p).

Descriptors: *Analytical techniques, *Methodology, *Testing, *Water quality, *Sediments, Analysis, Properties, Evaluation, Organic compounds, Pesticides, Herbicides, Turbidity, Measurement, Inorganic compounds, Hydrogen ion concentration, *Pollutant identification.
Identifiers: Manuals, Minerals.

This manual describes and updates methods and procedures used in the Water Quality Branch analytical laboratories, for analysing waters and other media such as wastes and sediments associated with water systems. The manual is divided into two parts; (1) Inorganic Constituents, such as metals, minerals, chemicals, pH, and Turbidity; and (2) Organic consitituents such as pesticides, herbicides and pentachlorophenol. (Environment Canada)
W75-04870

INTERLABORATORY QUALITY CONTROL STUDY NO 6: SPECIFIC CONDUCTANCE, PH, COLOUR AND RESIDUE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2K.
W75-04887

MODIFIED PROCEDURE FOR THE DETERMINATION OF PHOSPHORUS IN DETERGENTS,
Environmental Protection Service, Ottawa. (Ontario). Water Pollution Control Directorate.
P. D. Goulden, and M. C. Holton.
Technology Development Report EPS4-WP-74-2, March 1974. 20 p, 9 fig, 1 tab.

Descriptors: Research and development, *Detergents, *Phosphorus, *Analytical techniques, Methodology, Testing procedures, Investigations, Chemistry, Analysis, Chemical analysis, *Pollutant identification.

The procedure described by the American Society for Testing and Materials for the determination of phosphorus in detergents has been studied. It is concluded that, at 5% phosphorus as P205, the method as written does not give a true measure of the phosphorus level. A modified titrimetric procedure has been developed which overcomes the difficulties experienced in the ASTM procedure at low phosphorus levels. (Environment Canada)
W75-04888

TECHNIQUES FOR TRACING SEDIMENT MOVEMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2J.
W75-04889

FURTHER STUDIES ON THE HEAVY METAL LEVELS IN OTTAWA AND RIDEAU RIVER SEDIMENTS,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
B. G. Oliver, and H. Agemian.
Environment Canada, Inland Waters, Directorate, Scientific Series No 37, Ottawa, Ontario, Canada, 10 p, 10 ref, 4 fig, 3 tables, 1974.

Descriptors: *Sediments, *Heavy metals, Sampling, *Chemical analysis, Mercury, Lead, Industrial wastes, Sewers, Data collections, Zinc, Copper, Nickel, *Canada, *Pollutant identification.
Identifiers: *Ottawa River(Canada), Ontario, *Rideau River(Canada), Atomic absorption, Snow disposal.

Sediment samples, collected at two-mile intervals on the Ottawa and Rideau Rivers in the summer of 1972, were analyzed for lead, mercury, zinc, copper, nickel, cobalt, iron, manganese, chromium, and cadmium by atomic absorption spectrophotometry. Unusually high levels of mercury were recorded near pulp and paper industrial discharges as a result of former use by the industry of mercurial slimicides. Elevated metal levels were found at sewage plant and storm sewer outfalls. This is to be expected as sewage contains a significant quantity of metals, especially in the particulate form. The removal of snow disposal sites away from the Rideau River lowered the lead sediment levels in this river in the city of Ottawa. (See also W73-07588) (Environment Canada)
W75-04890

TRACE ELEMENT DETERMINATIONS ON LAKE MICHIGAN TRIBUTARY WATER SAMPLES USING SPARK SOURCE MASS SPECTROMETRY.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5C.
W75-04910

REMOTE SENSING POTENTIALS FOR RESOURCE MANAGEMENT,
Purdue Univ., Lafayette, Ind. Dept. of Forestry and Conservation.
R. M. Hoffer.
In: Biological Effects in The Hydrological Cycle, Proceedings of The Third International Seminar for Hydrology Professors, July 18-30, 1971, Purdue University, West Lafayette, Indiana, p 211-227. 9 fig, 1 tab, 18 ref. NASA Grant NGL 15-005-112.

Descriptors: *Remote sensing, *Analytical techniques, *Aerial photography, *Electromagnetic waves, *Reflectance, *Water quality control, Vegetation effects, Heated water, Land resources, Data processing.
Identifiers: *Optical-mechanical scanner, Spectral variations.

The manner in which we will be utilizing our resources during the next few decades and beyond depends largely on the decisions on use of these

resources. These decisions will be influenced by the amount and detail of information available about the various land and water areas. Remote sensing increases our ability to collect data at frequent intervals over vast geographic areas. It is a developing technology involving the acquisition of data about a portion of the earth's surface by using sensing devices operated from a remote location, usually from an aircraft or a spacecraft. Remote sensing has already proved to be a very useful tool in several areas of application in the management of out natural resources, and the potential applications seem almost unlimited. Further developments in the handling of spatial and temporal data, in addition to spectral data, will bring significant improvements in automatic data analysis. Even though major improvements in automatic data analysis techniques will be achieved, man's contributions will always be required in the analysis of remote sensor data. The need for accurate and detailed manual photo interpretation in many application areas will continue to be a major requirement. (See also W75-03023) (Singh-ISWS)
W75-04922

HANDBOOK OF ENVIRONMENTAL CONTROL. (1) AIR POLLUTION. (2) SOLID WASTE. (3) WATER SUPPLY AND TREATMENT. (4) WASTEWATER: TREATMENT AND DISPOSAL,
Minnesota Univ., Minne. Div. of Environmental Health.
For primary bibliographic entry see Field 5D.
W75-04945

INDIGESTER BLACK LIQUOR OXIDATION FOR ODOR CONTROL IN KRAFT PULPING,
North Carolina State Univ., Raleigh. Dept. of Wood and Paper Science.
For primary bibliographic entry see Field 5G.
W75-04952

IDENTIFICATION OF PETROLEUM PRODUCTS IN NATURAL WATER BY GAS CHROMATOGRAPHY,
New York State Dept. of Health, Albany.
R. Dell'Acqua, J. A. Egan, and B. Bush.
Environmental Science and Technology, Vol 9, No 1, p 38-41, Jan 1975. 6 fig, 10 ref.

Descriptors: *Oil wastes, Natural streams, *Pollutant identification, *Gas chromatography, *Water analysis, Water properties, Trace elements, Bodies of water, Springs, Chromatography, Analytical techniques, Oil, Oily water, Water pollution sources, Water pollution.
Identifiers: Kerosine, Diesel fuel, Fuel oil, Transmission fluid, Lubricating oil, Port of Albany(NY).

Gas chromatography on high-efficiency packed columns is suitable for the rapid identification of trace quantities of common petroleum products. Concentrations as low as 0.25 microliter/liter of the contaminants may be extracted and identified. Chromatograms of kerosine, diesel fuel, common fuel oils, transmission fluid, and lubricating oils are given. Three examples of the use of the method in differentiating fuel oils from different manufacturers, and in determining petroleum residues in water from the Port of Albany and in springwater from Albany County, New York, are described. (Witt-IPC)
W75-04967

A MODIFIED FLUOROMETRIC METHOD FOR MEASUREMENT OF LIGNIN SULFONATES AND ITS IN SITU APPLICATION IN NATURAL WATERS,
National Swedish Environment Protection Board, Uppsala.
A. Wilander, H. Kvarnas, and T. Lindell.
Water Research, Vol 8, No 12, p 1037-1045, Dec 1974. 10 fig, 3 tab, 15 ref.

Descriptors: Natural streams, *Fluorometry, *Lignins, *Pollutant identification, *Water analysis, Analytical techniques, Chemical analysis, Water properties, Water pollution sources, Pollutants, Pulp wastes, Optical properties, Water quality, Humus.
Identifiers: *Lignosulfonates, Lake Vanern(Sweden).

A modified fluorometric method is described for the determination of lignosulfonates in natural waters. The optimum wavelengths for excitation and emission are 285 and 405 nm, respectively. There is little interference from natural compounds, especially humic substances. The application of the method to a filter fluorometer for in situ measurements in Lake Vanern (Sweden) is described, together with some test results. (Witt-IPC)
W75-04972

EFFECT OF CARBON TO NITROGEN RATIO ON ACTIVATED SLUDGE SUBSIDENCE AND DEWATERING CHARACTERISTICS,
Envirex, Inc., Milwaukee, Wis. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W75-04987

AN IMPROVED CHEMICAL DELIVERY APPARATUS FOR USE IN INTERMITTENT-FLOW BIOASSAYS,
Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.
J. H. Chandler, Jr., H. O. Sanders, and D. F. Walsh.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 123-128, July 1974. 1 fig, 4 ref.

Descriptors: *Bioassay, *Laboratory equipment, *Pesticide toxicity, Pesticides, Equipment, *Toxicity, Aquatic life, Analytical techniques, Water pollution sources, *Pollutant identification, Monitoring, Measurement.
Identifiers: *Intermittent-flow bioassays, New equipment.

Flow-through systems for measuring toxicological and physiological effects of pesticides in aquatic organisms are an improvement over the static systems. A chemical delivery apparatus is described that is an improvement over many of the intermittent-flow toxicant systems previously devised. The apparatus does not require the use of a Mariotte bottle and is designed to replace the metering devices on existing intermittent flow systems without altering their basic function. It has no moving parts, consists of materials commonly found in well-equipped laboratories, and delivery of different volumes of toxicant is easily produced by changing the volume of the apparatus. (Orr-FIRL)
W75-04994

BIOLOGICAL ASSESSMENT OF DIESEL SPILL IN THE VICINITY OF ANACORTES, WASHINGTON, MAY 1971,
Texas Instruments, Inc., Dallas.
For primary bibliographic entry see Field 5C.
W75-05001

ESTIMATION OF HEAVY METAL POLLUTION IN TWO NORWEGIAN FJORD AREAS BY ANALYSIS OF THE BROWN ALGA ASCOPHYLLUM NODOSUM,
Trondheim Univ. (Norway). Inst. of Marine Biochemistry.
A. Haug, S. Melsom, and S. Omany.
Environmental Pollution, Vol 7, No 3, p 179-192, November 1974. 3 fig, 11 tab, 17 ref.

Descriptors: *Trace elements, *Heavy metals, *Phaeophyta, *Algae, *Fjords, Zinc, Copper, Lead, Cadmium, Mercury, Water quality control, Monitoring, Bioindicators, Estuaries, Methodology, Spectrophotometry, Analytical techniques, *Pollutant identification.
Identifiers: Ascophyllum nodosum, *Norway.

The usefulness of trace element analysis of seaweeds for determining the distribution of heavy metals in fjord areas was investigated. Concentrations of zinc, copper, lead, cadmium and mercury were determined in the brown alga Ascophyllum nodosum from two Norwegian fjords. In both areas marked local variations in heavy metal concentrations in the seaweeds were observed, and in one, maximum concentrations as high as 20-50 times normal levels were found for Zn, Cu, Pb, and Cd. The highest value observed for mercury was 20 ppm of dry matter, while the normal level was below 0.1 ppm. Levels of zinc, cadmium and mercury higher than normal were observed 90 km from the main source, while copper and lead reached normal levels 35 km from the source. The results indicate that trace element analysis of seaweeds is a useful and inexpensive method for evaluating the state of a marine recipient with regard to heavy metal contamination. (Katz)
W75-05002

ORGANOCHLORINE RESIDUES IN BROWN PELICAN EGGS: RELATION TO REPRODUCTIVE SUCCESS,
Bureau of Sport Fisheries and Wildlife, Laurel, Md. Patuxent Wildlife Research Center.
For primary bibliographic entry see Field 5C.
W75-05006

OCCURRENCE OF DDT AND PCB COMPOUNDS IN BALTIC HERRING AND PIKE FROM THE TURKU ARCHIPELAGO,
Turku Univ. (Finland). Inst. of Biochemistry.
For primary bibliographic entry see Field 5C.
W75-05008

INDICATORS OF EUTROPHICATION: VISUAL, CHEMICAL, PHYSICAL, BIOLOGICAL,
Limnology Information and Freshwater Ecology, Inc., Carmel, N.Y.
For primary bibliographic entry see Field 5C.
W75-05046

A GUIDE TO THE MEASUREMENT OF MARINE PRIMARY PRODUCTION UNDER SOME SPECIAL CONDITIONS,
United Nations Educational, Scientific and Cultural Organization, Paris(France).
UNESCO, 7 Place de Fontenoy, Paris, France 75700, (ISBN 92-3-101099-9), 1973. 73 p, 15 fig, 16 tab, 190 ref.

Descriptors: *Measurement, *Oceans, *Primary productivity, *Methodology, Biomass, Beaches, Benthic flora, Polar regions, Estuaries, Plankton, Ice cover, Tropical regions, Oligothrophy, Euthrophication, Marine plants, Marine algae, Laboratory tests, Shores, Pollutant identification.
Identifiers: Winkler method, Seaweeds.

Ways in which the original carbon-14 technique might be modified to determine primary productivity under special conditions found in some marine environments are described. The broad definition of primary production was adopted as being the formation of organic particulate material at the primary stages of the food chain. Section 2 reviews methods for measurement of primary production of plankton in near-shore communities including eutrophied and polluted waters. In Section 3 attention is drawn to references which pertain to some special difficulties encountered in specific environments. These include primary production of smaller seaweeds using carbon-14 technique; method determining growth production of Laminaria and Agarum; primary production of

large marine algae measured in situ using C-14 uptake; a method for determining seaweed production based on biomass estimate; primary production on a sandy beach; primary production of benthic microflora; measurement of primary production under polar ice; followed by the Winkler method and primary production studies under special conditions. Section 4 deals with a number of particular problems which may be encountered. (Jones-Wisconsin)
W75-05047

AN AUTOMATIC UNDERWATER CAMERA SYSTEM,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
R. J. Jirberg.
In: Project Hypo. An Intensive Study of the Lake Erie Central Basin Hypolimnion and Related Surface Water Phenomena. Environmental Protection Agency, Fairview Park, Ohio, Technical Report TS-05-71-208-24, February 1972, p 127-132, 3 fig.

Descriptors: *Remote sensing, *Cameras, Underwater, Bottom sediments, *Hypolimnion, Lakes, *Lake Erie, Pollutant identification.

To obtain nearly continuous photographic documentation of lake bottom conditions, an automatic underwater camera system was specially designed and built for a study of the Lake Erie Central Basin hypolimnion. The camera, together with an electronic flash unit as an illumination source, sat just off the bottom in mid-Lake Erie and automatically photographed the bottom at one hour intervals. Up to 10 days of unattended operation was possible while taking up to 250 color photographs, one per hour, before retrieval and reload was required. The camera consists basically of a two-part system: one water-tight housing contained a 35 mm motor-driven camera along with the timing and control circuitry, while the other contained the flash unit. It is commercially available as a 35 mm single lens reflex camera with motorized shutter release and film advance. The View field is more nearly that of a normal (50 mm) focal length lens. At a height of 1 meter off the bottom, the view field encompassed an approximate area of 0.6 x 0.9 m vertically below the camera. The actual area photographed could be viewed by a driver through the large pentaprism finder looking directly throught the rear housing panels. Design and operational details are presented. (See also W72-12990 thru W72-12997) (Auen-Wisconsin)
W75-05048

A SUBMERSIBLE AUTOMATIC DISSOLVED OXYGEN-TEMPERATURE MONITORING SYSTEM,
Environmental Protection Agency, Fairview Park, Ohio. Ohio District Basin Office.
C. J. Beier.
In: Project Hypo. An Intensive Study of the Lake Erie Central Basin Hypolmnion and Related Surface Water Phenomena. Environmental Protection Agency, Fairview Park, Ohio, Technical Report TS-05-71-208-24, February 1972, p 133-140, 5 fig.

Descriptors: *Monitoring, *Instrumentation, *Automation, Data collections, *Dissolved oxygen, Water temperature, Underwater, *Pollutant identification, *Lake Erie, Lakes.

In the summer of 1970, following modifications, five commercially available dissolved oxygen monitors designed to measure and record in situ dissolved oxygen and temperature simultaneously on a continuous basis, were installed in five locations in the Central Basin hypolimnion of Lake Erie. There they successfully documented, for the first time, on a continuous basis, the dissolved oxygen depletion rate over a period of fifty days. The monitor is a completely submersible system comprised of three major assemblies: the instrument module, a multi-conductor cable, and the sensor module. Complete records were obtained from four of the monitors while only a partial record was obtained from one monitor due to leakage of an electrical connector. Occasionally heavy seas precluded maintaining regular servicing schedules, but in no case did this result in a loss of data. Although the power supply was designed for a minimum of eight days continuous operation, uninterrupted operation up to eleven days was suggested modifications are detailed. The monitor is considered a prototype for future monitoring systems having greatly expanded capabilities. (See also W72-12990 thru W72-12997)
W75-05049

METHODS FOR STUDIES OF PLANKTON (IN SWEDISH),
For primary bibliographic entry see Field 7B.
W75-05061

STUDIES OF LOW MOLECULAR WEIGHT LIGNIN SULFONATES,
Washington Univ., Seattle.
B. F. Hrutfiord, L. N. Johanson, J. L. McCarthy, K. Forss, and W. Glasser.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Technology Series Report EPA-660/2-74-069, June 1974. 83 p, 23 fig, 4 tab, 39 ref. EPA Project 12040 DEH.

Descriptors: *Sulfonates, *Lignins, *Pulp wastes, Chemical analysis, By-products, Molecular structure, Organic wastes, *Separation techniques, Sulfite liquors, Waste identification, Pacific Northwest U.S., *Pollutant identification, Waste water treatment, Distillation.
Identifiers: Lignin sulfonate separation, Chemical composition, Spent sulfite liquor.

Low molecular weight lignin sulfonates have been separated in purified form and characterized by physiochemical and chemical methods. Their structure and reactions have been evaluated. Lignin sulfonates from the spent sulfite liquor of a mild acid bisulfite cook of Western Hemlock (Tsuga heterophylla) were purified and fractionated in Sephadex G-25 column chromatography. Samples were analyzed using acetylation of hydroxyl-groups and esterification of sulfonate-groups which aided the elimination of the polydisperse nature of the material under investigation. Complete elemental and functional group compositions were established for lignin sulfonates from a spent sulfite liquor and compared to those from milled wood lignin preparation. This allowed an estimate of the degree of sulfonation, condensation and demethylation as well. Extended separation studies indicated the low molecular weight lignin sulfonates to be the reaction product of a difunctional vinyl-type polymerization, thus accounting for the widely different properties as compared to their higher molecular weight counterparts. The feasibility of large scale separations was determined using (1) the extraction and precipitation of the dry matter in a spent sulfite liquor with alcohol, and (2) the fractionation of the material by ion exclusion in a column arrangement. (Willard-EPA)
W75-05072

AN INVESTIGATION OF ION REMOVAL FROM WATER AND WASTEWATER,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 5D.
W75-05080

PESTICIDES IN THE ILLINOIS WATERS OF LAKE MICHIGAN,
Environmental Protection Agency, Chicago, Ill.
For primary bibliographic entry see Field 5B.
W75-05083

IMPLEMENTATION OF A COMPUTER-BASED INFORMATION SYSTEM FOR MASS SPECTRAL IDENTIFICATION,
Battelle Columbus Labs., Ohio.
J. R. Hoyland, and M. B. Neher.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.10. Environmental Protection Agency Technology Series Report, EPA-660/2-74-048, June 1974. 43 p, 18 fig, 8 ref. EPA Project 16ADN 29, EPA R-800921.

Descriptors: *Mass spectrometry, *Pollutant identification, Organic compounds, *Computer programs, Data processing.
Identifiers: *Mass spectra, Computer identification(Pollutants).

A computer program has been developed for remote identification of mass spectra. Careful software design has led to a powerful and efficient system with minimum dialog and a highly flexible data input routine. Users may either access the main spectral library or create special libraries of their own. In addition, programs have been developed for the PDP-8/e or PDP-8/m computer of the System/150 to abbreviate spectra, punch spectra on tape, or to send spectra directly from the PDP-8 via a serial line interface. (EPA)
W75-05085

SHRIMP CANNING WASTE TREATMENT STUDY,
Domingue, Szabo and Associates, Inc., Lafayette, La.
A. F. Mauldin, and A. J. Szabo.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $2.05. Environmental Protection Agency, Technology Series Report, EPA-660/2-74-061, June 1974. 130 p, 31 fig, 38 tab, 18 ref, 4 append. S 800 904.

Descriptors: *Waste water treatment, *Monitoring, Screens, *Flotation, Sludge, Dewatering, Costs, Optimization, *Industrial wastes, Canneries, Treatment facilities, Surveys, Pilot plants.
Identifiers: *Shrimp processing wastewaters, *Dissolved air flotation.

Wastewater surveys were performed at several Gulf shrimp canneries over a period of three canning seasons. Water used for each process within the plant was metered and the wastewater was tested for biological, chemical and physical characteristics. Pilot screening tests were made over two canning seasons. Tangential, rotary and vibrating screens were evaluated. A 272 cu m/day (50 gpm) dissolved air flotation pilot plant with chemical addition and pH control was tested at the study plant over two canning seasons. A pilot basket centrifuge was evaluated for sludge dewatering. The study demonstrated that: (1) the waste poundage discharged per pound of raw shrimp processed is similar in most Gulf shrimp canning plants; (2) screening removal of heads and shells can be performed efficiently and with few operational problems; and (3) air flotation showed promise as a wastewater treatment method. When performing properly, treatment efficiencies were good, however, the operation was sensitive and treatment efficiencies that can be expected on a plant scale remain to be demonstrated. (EPA)
W75-05087

MEASUREMENT OF RESIDUAL CHLORINE LEVELS IN COOLING WATER--AMPEROMETRIC METHOD,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
R. M. Manabe.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.10. Environmental Protection Agency, Technology Series Report, EPA-660/2-

73-039, August 1974. 45 p, 6 fig, 14 tab, 14 ref, append. EPA Program Element 1BB392, ROAP 21AZU, Task 23.

Descriptors: *Chlorine, Chlorination, Chemical analysis, *Polarographic analysis, Water treatment, *Cooling towers, Pollutant identification, Measurement.
Identifiers: Cooling systems, *Amperometric method.

Modifications are described of the amperometric titration method for chlorine residuals in cooling tower blowdowns or other water systems with a high degree of metal ion content along with other dissolved and suspended solids. The addition of sodium pyrophosphate as a blanket complexing agent appears to remove successfully the heavy metals interferences contributed by Fe and Cu in the blowdown matrix. Recommendations are made to increase the efficiency of both sampling and the actual titration procedure in order to allow a residual determination in the minimum amount of time. Equipment recommendations along with a design of a biamperometric endpoint system which allows greater titration speed along with portability are described. (Nelson-EPA)
W75-05088

A METHOD FOR THE SEPARATION OF OIL FROM AN AQUEOUS OIL-DETERGENT SOLUTION PRIOR TO IR ANALYSIS,
Naval Ordnance Lab., White Oak, Md.
C. E. Adams.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 703, $3.25 in paper copy, and $2.25 in microfiche. Report No. NOLTR 74-102, July 19, 1974. 10 p, 1 tab.

Descriptors: *Separation techniques, *Oil, *Detergents, Oily water, Oil pollution, Chemical analysis, Chromatography, Aqueous solutions, Analytical techniques, *Pollutant identification.
Identifiers: *Infrared analysis.

A procedure was devised to permit the analysis of oil in water solutions in the presence of dissolved detergents by using the carbon tetrachloride extration-IR spectrophotometric method. After an initial extraction of the aqueous oil-detergent solution with carbon tetrachloride, the extract was evaporated on a silica gel column and eluted with carbon tetrachloride. This procedure effectively removed all the detergent and allowed an interference-free analysis of the carbon tetrachloride-oil solution with the IR spectrophotometer. About 10% of the initial oil was lost in the procedure. (Sims-ISWS)
W75-05098

DEVELOPMENT OF A FIXED SITE SURFACE FILM OIL SAMPLER,
Curtis-Le Vantine and Associates, Tarzana, Calif.
A. D. Le Vantine, and D. L. Curtis.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 106, $5.25 in paper copy, $2.25 in microfiche. Report No CG-D-102-74, April 1974. 100 p, 35 fig, 1 tab, 1 ref, 6 append. DOT-CG-31,971A.

Descriptors: *Sampling, *On-site data collections, *Oil pollution, *Oily water, Adsorption, Weirs, Equipment, Coasts, Estuaries, *Pollutant identification.
Identifiers: Polyurethane.

A development program was undertaken to construct and test a surface film oil sampler buoy capable of continuous in-situ sampling in coastal and estuarine waters. The purpose was to determine the feasibility of a particular sampler design for the collection of surface oil from a known surface area of water during a finite sampling interval. The determination of average surface oil per unit area was required as a means of establishing an ambient background level of oil pollution, monitoring changes in oil level with time, and relating these changes to pollution sources. The approach used a weir to provide a self-adjusting, wave-following means of skimming surface water at a fixed rate determined by a downstream, constant speed, battery driven screw pump. A sorbent material (polyurethane foam) collected the oil. At the completion of the collection time, the cartridge was analyzed for oil content. Collected surface area was determined separately by measurement of the average surface flow during the sampling interval. The results of tests with the buoy deployed in ocean conditions indicated a fundamental problem detrimental to its performance. The continuous bobbing of the buoy caused a pumping action around the buoy, counteracting the prevailing current flow and seriously reducing the amount of collected surface oil. (Sims-ISWS)
W75-05099

KANSAS ENVIRONMENTAL AND RESOURCE STUDY: A GREAT PLAINS MODEL,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W75-05110

SEEPAGE-ENVIRONMENTAL ANALYSIS OF THE SLIME ZONE OF A TAILING POND,
Bureau of Mines, Spokane, Wash. Spokane Mining Research Center.
For primary bibliographic entry see Field 5B.
W75-05115

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME II - DESIGN REPORT.
Aerojet Electrosystems Co., Azusa, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 483, $10.50 in paper copy, $2.25 in microfiche. Report No. CG-D-46-74, June 1973. 393 p, 101 fig, 21 tab, 2 append. DOT-CG-22,170-A.

Descriptors: *Remote sensing, Equipment, *Oil spills, Design, Radar, Infrared radiation, Water pollution, *Monitoring, *Pollutant identification.
Identifiers: Microwave radiometry, Low light level television.

Volume II contains details of the overall system design of the prototype Airborne Oil Surveillance System (AOSS). The AOSS is a multisensor airborne surveillance system configured to assist the Coast Guard in enforcement of antipollution legislation and assessment/clean-up of accidental spills. The surveillance system consists of (1) an X-band sidelooking radar system for long-range ship detection and adverse weather oil spill mapping; (2) a 37 GHz passive microwave imaging system for adverse weather spill mapping and spill thickness approximation; (3) a multispectral low light level TV system for spill identification, high resolution documentation, and violator identification; (4) a multichannel infrared line scanner for spill identification and discrimination; (5) a position reference system for legal and operational effectiveness; and (6) a real-time processor/display console for maximum operational effectiveness. (See also W75-05120) (Sims-ISWS)
W75-05119

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME III - SUBSYSTEM SPECIFICATIONS.
Aerojet Electrosystems Co., Azusa, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 484, $6.25 in paper copy, $2.25 in microfiche. Report No. CG-D-47-74, June 1973. 157 p, 7 fig, 9 tab. DOT-CG-22,170-A.

Descriptors: *Remote sensing, *Equipment, *Oil spills, Design, Specifications, Infrared radiation, Water pollution, *Monitoring, *Pollutant identification.
Identifiers: Low light level television.

Details of the prototype Airborne Oil Surveillance System (AOSS) design were provided. The AOSS is a multisensor airborne surveillance system configured to assist the Coast Guard in enforcement of antipollution legislation and assessment/clean-up of accidental spills. Volume III contains detailed subsystem specifications. These subsystems include the infrared scanner, the low light level TV, the airborne data annotation system, and the inertial navigation system. Specifications for the radar system were not included due to its security classification. (See also W75-05119) (Sims-ISWS)
W75-05120

HYDROGEOLOGY OF THE LETHBRIDGE-FERNIE AREA, ALBERTA,
Alberta Research, Edmonton.
For primary bibliographic entry see Field 2F.
W75-05151

WATER QUALITY MONITORING AND AQUATIC ORGANISMS: THE IMPORTANCE OF SPECIES INDENTIFICATION,
Ball State Univ., Muncie, Ind. Dept. of Biology.
V. H. Resh, and J. D. Unzicker.
Journal Water Pollution Control Federation, Vol 47, No 1, p 9-19, January 1975. 1 tab, 70 ref.

Descriptors: *Pollutant identification, Bioindicators, *Aquatic life, *Bioassay, *Hydrobiology, *Ecological distribution, *Systematics, Aquatic habitats, Caddis flies, Environmental effects, Monitoring, Water quality, North America, Lake Erie.
Identifiers: Athripsodes, St. Lawrence River, Niagara River, Rock River.

Difficulties have arisen in the use of saprobic or indicator organism systems in developing water quality criteria and in biological assessments of water quality when organisms are not known at the species level. Tolerance categories of benthic macro-invertebrate genera were used to emphasize the need for species-level identification and to demonstrate the questionable value of the generic-level taxonomic unit as a water quality indicator. An example was given to indicate how water quality tolerances may be developed for the caddis fly genus Athripsodes. A need was stated for investigations to associate immature and adult stages, develop species identification keys, and correlate species occurrence with chemical and physical parameters, particularly in conjunction with preparation of environmental impact statements. The advantages of depositing collections, made by consulting firms, at museums or major universities were deliniated. (Harmeson-ISWS)
W75-05157

MONITORING MARINE OUTFALLS BY USING ULTRAVIOLET ABSORBANCE,
Victoria Univ. (British Columbia). Dept. of Biology.
N. Balch, D. Brown, R. Pym, E. Maries, and D. Ellis.
Journal Water Pollution Control Federation, Vol 47, No 1, p 195-202, January 1975. 5 fig, 3 tab, 8 ref.

Descriptors: *Diffusion, *Effluents, *Monitoring, *Oceans, *Organic compounds, Waste water disposal, Water quality, Canada, Sea water, Spectophotometry, Measurement, Statistical analysis, Outlets, Sewer outfalls, Pollutant identification.
Identifiers: Ultraviolet absorbance.

Investigations were conducted on the suitability of performing ultraviolet absorbance measurements on the receiving waters of two types of marine wastewater outfalls in an attempt to assess the

concentration of dissolved organic matter in seawater. A scanning spectrophotometer was used to obtain spectra of seawater-effluent mixtures in the laboratory and a wave length of 250 nanometers was selected for routine measurements of field samples with a standard laboratory spectrophotometer. Comparison with other water quality data that were collected over an 8-month period indicated that ultraviolet absorbance measurements could indicate, in the receiving waters, the presence of effluent from those types of marine outfalls where well defined effluent fields are to be found. However, where the effluent fields were extremely dilute, none of the routinely sampled parameters, including ultraviolet absorbance, were able to detect the presence of effluent. (Harmeson-ISWS)
W75-05159

THREE-STEP MEASUREMENT BY THE SAPROMAT TO EVALUATE THE BOD5, THE MINERAL IMBALANCE AND THE TOXICITY OF WATER SAMPLES,
Ghent Rijksuniversiteit (Belgium). Dept. of General and Industrial Microbiology.
W. Verstraete, J. P. Voets, and R. Vanloocke.
Water Research, Vol 8, No 12, p 1077-1081, December 1974. 3 fig, 1 tab, 8 ref.

Descriptors: *Biochemical oxygen demand, *Waste water treatment, *Biological treatment, *Analytical techniques, *Organic matter, Water quality, Water properties, Eutrophication, Waste treatment, Wastes, Water chemistry, Estimating, Evaluation, Testing procedures, Organic compounds, Organic wastes, Biodegradation, Toxicity, *Pollutant identification.
Identifiers: *Sapromat technique, *Mineral imbalance, Microbial inoculum, Nutrient broth powder.

BOD sub 5 data obtained by analyzing wastewater samples, both by means of the dilution method and by means of the Sapromat technique, correlated satisfactorily (r = 0.98). However, the Sapromat technique turned out to be susceptible to certain distrubances such as variability of initial microbial inoculum, lack of essential mineral nutrients, and presence of toxic compounds. Therefore, a simple three-step Sapromat method was proposed. This method enables one to measure the BOD sub 5 and to calculate the biodegradation rate. In addition, it also allows one to evaluate the possible mineral imbalance, the toxicity, and/or the susceptibility to cooxidation of the wastewater sample. (Henley-ISWS)
W75-05162

GLC ANALYSIS OF 2,4-D CONCENTRATIONS IN AIR SAMPLES FROM CENTRAL SASKATCHEWAN IN 1972,
Saskatchewan Univ., Saskatoon. Dept. of Chemistry and Chemical Engineering.
S. S. Que Hee, R. G. Sutherland, and M. Vetter.
Environmental Science and Technology, Vol 9, No 1, p 62-66, January 1975. 4 fig, 3 tab, 7 ref.

Descriptors: *Pollutant identification, *Herbicides, *2,4-D, *Chromatography, *Air pollution, *Analytical techniques, Gas chromatography, Instrumentation, Air, Measurement, Chemical analysis, Evaluation, Chemistry, Testing procedures, Weed control, Mass spectrometry, *Canada, Solvents.
Identifiers: Saskatoon, Butyl ester, Octyl ester, Two-column technique, Boom spraying, Silica gel, Naicam, Rosetown.

Levels of 2,4-D (2,4-dichlorophenoxy, acetic acid) in the atmosphere of central Saskatchewan were estimated as butyl and octyl esters by using a two-column gas liquid chromatography technique, and then further characterized by chemical derivatization. Glc mass spectrometry confirmed the presence of 2,4-D. Mean total daily levels of 2,4-D (as n-butyl ester) found for Saskatoon for 33 days were 600 ng/cu m of air, and for Naicam for 47 days, 142 ng/cu m of air. Very little 2,4-D was detected at Rosetown. (Henley-ISWS)
W75-05176

COMPARISON OF INSTRUMENTAL METHODS TO MEASURE NITROGEN DIOXIDE,
Research Triangle Park, N.C. National Environmental Research Center, Chemistry and Physics Div.
R. E. Baumgardner, T. A. Clark, and R. K. Stevens.
Environmental Science and Technology, Vol 9, No 1, p 67-69, January 1975. 2 fig, 5 tab, 8 ref.

Descriptors: *Pollutant identification, *Measurement, *Nitrogen compounds, Evaluation, *Analytical techniques, *Instrumentation, Automation, Chemical analysis, Data collections, Monitoring, Gases, Nitrogen, Testing procedures, Laboratory tests, Chemistry, Colorimetry, Maintenance, Sampling.
Identifiers: Instrumental methods, *Coulometry analyzers, Chemiluminescent monitors, Calibration stability.

A comparison study was performed between the newly developed chemiluminescent NO-NO2 monitor and existing automated NO2 monitors based on coulometry and colorimetry and the 24-hr manual reference method for the measurement of NO2. Correlations were obtained among the various techniques by sampling ambient air in a nonurban atmosphere. In addition, a detailed study of maintenance requirements, calibration stability, and typical response patterns of the instrumental methods was obtained. The chemiluminescent monitors successfully measured ambient concentrations of NO2 under conditions of this study. The coulometric monitor gave lower mean values and the Federal Reference method gave higher mean values than the other measurement methods at this nonurban site. Performance tests showed that the chemiluminescent monitors have a faster response time than the coulometric or colorimetric methods and that each method has the sensitivity to measure NO2 concentrations of 0.01 ppm. Analysis of the calibration data for each instrumental method showed little variation. (Henley-ISWS)
W75-05184

MERCURY LEVELS IN LAKE POWELL: BIOAMPLIFICATION OF MERCURY IN MAN-MADE DESERT RESERVOIR,
New Mexico Univ., Albuquerque.
L. Potter, D. Kidd, and D. Standiford.
Environmental Science and Technology, Vol 9, No 1, p 41-46, January 1975. 3 fig, 1 tab, 28 ref.

Descriptors: *Pollutant identification, *Food chains, *Mercury, *Reservoirs, Algae, Bottom sediments, Fish, Invertebrates, Periphyton, Phytoplankton, Colorado River, Organic matter, *Arizona.
Identifiers: *Lake Powell(Ariz), Atomic absorption, Hydroelectric reservoir.

Flameless atomic absorption analyses of samples from Lake Powell, a new reservoir remote from major man-caused pollution sources, yielded mean mercury levels in parts per billion of 0.01 in water, 30 in bottom sediments, 10 in shoreline substrates, 34 in plant leaves, 145 in plant debris, 28 in algae, 10 in crayfish, and 232 in fish muscle. Trout were unique in having lower concentration in muscle than in highly vascularized blood tissues. Increased concentrations were found with increased body weight and higher levels on the food chain. Concentration in muscle of some large fish (largemouth bass and walleye pike) over 2 kilograms whole body weight exceeded 500 parts per billion. Results demonstrated bioamplification of mercury up the food chain and association of mercury with organic matter. (Harmeson-ISWS)
W75-05185

METHODS FOR MEASURING NO2 PHOTODISSOCIATION RATE, APPLICATION TO SMOG CHAMBER STUDIES,
Ford Motor Co., Dearborn, Mich. Scientific Research Staff.
C. H. Wu, and H. Niki.
Environmental Science and Technology, Vol 9, No 1, p 46-52, January 1975. 5 fig, 2 tab, 32 ref.

Descriptors: *Pollutant identification, *Smog, *Air pollution, *Nitrogen compounds, Air pollution effects, Evaluation, Measurement, Analytical techniques, Instrumentation, Gases, Chemistry, Testing procedures, Haze, Ozone, Radiation, Solar radiation, Atmosphere.
Identifiers: *Photodissociation rate, *Atmospheric chemistry, *Photolysis, Decay rate, Photochemical smog.

Methods for determination of the photodissociation rate of NO2 were evaluated critically for application in smog studies. The kinetics and mechanism of NO2 photolysis at ppm levels in 760 torr N2 or air were studied in detail by using a 45-liter bell jar reactor. Concentration-time profiles of the reactant NO2 and the products NO and 03 were monitored continuously by the NO-03 chemiluminescence method. The decay of NO2 in N2 deviated from first-order behavior, this being most noticeable in the early stages of photolysis when the yield of NO is less than a few percent. Thus, the commonly used k sub d method, based on the assumption of first-order decay, is not applicable. Alternative kinetic expressions were derived and validated, and values of the relevant rate constant ratios were obtained. In the photolysis of NO2 in air, the attainment of a photostationary state for NO2, NO, and O3 was observed, and the photodissociation rate can be determined from this relationship. Data obtained under various conditions were analyzed in terms of an 11-step mechanism by using numerical integration techniques. A set of rate constants was derived which can adequately describe the photolysis of NO2 at ppm level either in N2 or in the air. (Henley-ISWS)
W75-05190

ACTIVATION ANALYSIS OF HEAVY METALS IN SURFACE WATERS USING ION EXCHANGE FILTER PAPERS AND CYANIDE COMPLEXING,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
A. M. Kolaczkowski.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 930, $4.25 in paper copy, $2.25 in microfiche. Master of Science thesis, June 1972. 66 p, 7 tab, 8 fig, 43 ref, 5 append. OWRT A-026-PA(1). 14-31-0001-5038.

Descriptors: *Neutron activation analysis, *Analytical techniques, *Chemical analysis, *Acidic waters, *Heavy metals, Surface waters, *Ion exchange, *Pollutant identification.
Identifiers: Multielement analysis, *Cyanide complexing, Large water volume irradiation.

A technique is described for the multielement analysis of heavy metals in surface waters. It is capable of quantitative measurements of heavy metals down to trace amounts as shown by the 10 analyses performed. It is rapid enough to show great promise in future water monitoring programs. The technique has possibilities as a useful tool for heavy metal analysis of gasoline and other petroleum products, of blood, of human lung and other tissues, of foods, and other areas, provided the sample can be dissolved into an easily handled liquid form. The technique eliminates of sodium and bromine interference; sample preparation to the counting of the filter papers takes about 2-1/2 days (includes 2-day cooling period). The iodine-131 extraction step, the cyanide complexing step, and the filtering stage take only about 2-3 hours. The technique is very simple. (See also W75-05275) (Sink-Penn State)
W75-05274

ACTIVATION ANALYSIS OF HEAVY METALS IN SURFACE WATERS USING ION EXCHANGE FILTER PAPERS AND CYANIDE COMPLEXING,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
A. Kolaczkowski, and W. A. Jester.
Journal of Radioanalytical Chemistry, Vol 16, 1973. p 21-29, 2 tab, 4 fig, 7 ref. OWRT A-026-PA(2). 14-31-0001-5038.

Descriptors: *Neutron activation analysis, *Analytical techniques, *Chemical analysis, *Acidic waters, *Heavy metals, Surface waters, *Ion exchange, *Pollutant identification.
Identifiers: Multielement analysis, *Cyanide complexing, Large water volume irradiation.

A simple, reasonably rapid, and accurate technique is developed for the multielement analysis of heavy metals in surface waters using ion exchange filter papers and cyanide complexing in conjunction with neutron activation analysis. The method employs large water volume irradiation for improved sensitivity. Te was used as an internal flux monitor to correct for neutron flux variations in the samples. Proof of the value of this technique was obtained by the analysis of 10 surface water samples previously analyzed using conventional methods by the U.S. Geological Survey of the U.S. Department of Interior. Good agreement resulted from this comparison. (See also W75-05274) (Sink-Penn State)
W75-05275

PROCEEDINGS OF THE FIRST ANNUAL NSF TRACE CONTAMINANTS CONFERENCE.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-05277

ANALYTICAL STUDIES OF THE SPECIATION OF MERCURY, ARSENIC AND ANTIMONY,
University of South Florida, Tampa. Dept. of Chemistry.
R. S. Braman, D. L. Johnson, and C. C. Foreback.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, March, 1974. p 359-378, 5 fig, 4 tab, 7 ref.

Descriptors: *Analytical techniques, *Mercury, *Arsenic compounds, Testing procedures, Laboratory tests, Organic compounds, Inorganic compounds, Water, Pollution, Toxicity, Aqueous solutions, *Pollutant identification.
Identifiers: *Antimony.

A d.c. discharge detector system used with a He carrier gas had a limit of detection near 0.01 nanograms for mercury, thus permitting the analysis of 3 to 100 ng. Hg/cu M in 30 to 100 liter air samples. Selective determination and determination of metallic mercury, dimethyl mercury, methylmercury (II) compounds and less volatile mercury compounds such as HgC12 were achieved using a five-section sampling tube system. Water samples were analyzed for inorganic mercury ions and for methylmercury (II) compounds by selective reduction and detection in a d.c. discharge emission type system. Limits of detection were near 0.01 ppb. Methylmercury (II) compounds were found in a number of water samples. Analytical procedures were developed which permit the determination of arsenite ions, arsenate ions, dimethyl arsenic acid, methylarsonic acid, and, if present, phenylarsonic acid in aqueous solutions. Based upon reduction to arsine and detection in a direct current discharge emission detection system, the methods were capable of fractional nanogram limits of detection. Antimony analyses were done in a similar manner. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05278

GAS CHROMATOGRAPHY/MICROWAVE EMISSION SPECTROSCOPY FOR MEASURING VOLATILE ORGANOMETALLICS,
Oak Ridge National Lab., Tenn.
Y. Talmi, and R. E. Mesmer.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission Office of Information Services, Technical Information Center, Oak Ridge, Tenn, March, 1974. p 381-396, 6 tab, 4 fig, 18 ref.

Descriptors: *Analytical techniques, *Chromatography, *Mercury, Atmosphere, Natural streams, Organic compounds, Chemical reactions, Effluents, Industrial wastes, *Pollutant identification.
Identifiers: *Organometallics.

Gas chromatography with the very sensitive microwave emission spectrometric detector has been used to study the distribution of (CH3)2Hg between air and water and the vapor pressures above CH3HgX compounds and their solutions. The distribution coefficient for (CH3)2Hg is 0.31 at 25C and 0.15 at 0C which shows that this compound will be readily lost to the atmosphere above natural waters. The vapor pressures of CH3HgCl (s) and CH3HgOH(s) are 11 and 5.6 microns of Hg respectively at 22C. The volatility of monomethyl mercury above water solutions as a function of pH can be interpreted in terms of the known equilibria occurring in the water phase. Very rapid photochemically catalyzed reactions of CH3HgX with I2 or Br2 at very low concentrations were discovered in water at room temperature. Such reactions offer a potential means for the destruction of CH3HgX from laboratory or industrial discharges. In addition the reaction with I2 is an important potential source of error in analytical procedures utilizing the high extractability of the CH3HgI species. The reaction produces CH3I and HgI2(s) and is first-order in the concentrations of both the CH3HgCl and I2. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05279

DETERMINATION OF TRACE ORGANIC CONTAMINANTS IN NATURAL WATERS BY HIGH-RESOLUTION LIQUID CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
R. L. Jolley, C. D. Scott, W. W. Pitt, Jr., and M. D. McBride.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Ctr., Oak Ridge, Tenn, March, 1974. p 397-412, 4 fig, 6 tab, 16 ref.

Descriptors: *Trace elements, *Contaminants, *Organic compounds, *Natural streams, *Chromatography, Analytical techniques, Instrumentation, Pollutants, Anion exchange, Absorption, Tracers, Chlorination, *Pollutant identification.

High-resolution liquid chromatography is one instrumental technique which has been demonstrated to be capable of determining individual molecular contaminants. Samples of polluted natural waters have been collected at different sites, concentrated up to 10,000-fold, and chromatographed on a high-pressure anion-exchange column. By monitoring column eluate for ultraviolet absorbance and cerate oxidizability, the presence of numerous organic contaminants at concentrations less than 1 microgram/liter has been revealed. A multiple-analytical procedure for identification of constituents separated by high-resolution liquid chromatography has been effectively applied to the analysis of polluted waters, such as process effluents. Data obtained by the coupling of radioactive tracer techniques with high-resolution chromatography have shown that the chlorination of polluted water results in chlorinated organics. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05280

SPECIAL ANALYTICAL PROBLEMS IN THE ANALYSIS OF MOLYBDENUM BY ATOMIC ABSORPTION SPECTROPHOTOMETRY AND COLORIMETRIC METHODS,
Colorado Univ., Boulder. Molybdenum Project.
R. R. Meglen, and M. L. Glaze.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974. p 415-419, 2 fig.

Descriptors: *Analytical techniques, *Molybdenum, *Trace elements, *Spectroscopy, *Colorimetry, Testing procedure, Laboratory tests, Rocks, Soils, Sediments, Waters, Sewage, Aluminum, *Pollutant identification.

Rocks, soils, sediments, waters, sewage and biological samples were analyzed for molybdenum content. An interlaboratory exchange of some plant samples revealed matrix interference effects in the atomic absorption analysis for molybdenum. The interferences were removed by the addition of 1000 ppm of Al to the analyte. The importance of checking for matrix interference in atomic absorption analyses for molybdenum was emphasized. A.A. analyses were also performed on aliquots of the dilute 2% Mg(NO3)2 samples to which 1000 ppm ammonium ion was added. These analyses were accurate only at concentration below 30 ppm. The effect of background correction with a hydrogen continuum lamp was also examined. Background correction was not necessary for these samples. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05281

QUANTITATIVE TRACE ELEMENTS ANALYSIS WITH X-RAY FLUORESCENCE,
Oak Ridge National Lab., Tenn.
C. J. Sparks, Jr., and J. C. Ogle.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tennessee, Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974. p 421-439, 5 fig, 3 tab, 8 ref.

Descriptors: *Analytical techniques, *Trace elements, *X-ray fluorescence, X-rays, Spectroscopy, Radioisotopes, Heavy metals, *Pollutant identification.

Methods for using x-ray fluorescence for quantitative determination of trace elements in samples of environmental interest were given. Monoenergetic exciting x-rays obtained by using a doubly bent hot pressed pyrolytic graphite monochromator with a standard x-ray tube and solid state detector system allowed the determination of trace elements to levels of a few parts per million. Geometrical considerations in the design of the x-ray detection collimator system were discussed and the measurements of the necessary parameters for converting the observed fluorescent intensities into quantitative units were described. If a wide variety of samples of differing densities are to be analyzed, it is important that the sensitive area of the detector subtend the same solid angle for the fluorescent radiation from each part of the irradiated volume of the sample. The experimental intensity data along with published values of fluorescent yields, x-ray cross sections and scattering factors are all that are needed to do quantitative determination. No standard samples are needed. The measurement of the absorption coefficients for both the exciting and fluorescent x-rays in the sample and the background determination pose the major limitations to the accuracy of the analyses. Techniques were given to minimize the errors which could arise from these sources. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05282

HUMAN HAIR AS AN INDICATOR OF TRACE METAL ENVIRONMENTAL EXPOSURE,
Michigan Univ., Ann Arbor. Dept. of Chemistry.
A. A. Gordus, C. C. Maher, III, and G. C. Bird.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974. p 463-487, 15 fig, 4 tab, 15 ref. NSF(GI-31556).

Descriptors: *Trace elements, *Human physiology, *Analytical techniques, Spectroscopy, Pollutants, Testing procedures, Laboratory tests, Cadmium, Mercury, Lead, Zinc, Distribution, Statistical analysis, *Pollutant identification.

Both present-day and historical head-hair samples up to 200 years old were analysed for 38 trace elements using neutron activation and flameless atomic absorption spectrophotometry. This study was designed to permit evaluating the relationship between the trace-metal content of hair and (a) a wide variety of factors such as age, sex, diet, hair color, shampoos, extent of hair washing, etc., (b) the trace-metal content of blood and (c) the level of human intake of trace metals from pre-industrial periods to the present. Over 800 well-documented historical hair samples were obtained from museums and private owners and consisted primarily of hair encased in lockets or brooches as well as imitation-floral wreaths made of hair. The modern samples included hair obtained from Naval Academy midshipmen and Air Force Academy cadets both upon their arrival at the academies in mid-1971 and again six, eleven and 22 months later after equilibration to fixed diets and environments. Examples of some of the initial historical and modern hair analysis data were presented. In some cases it appears that human intake of certain trace metals has decreased in the last 100 years. Preliminary statistical correlations show a positive relationship between grades and Ti and Cu and a negative relationship between grade and I and Cd. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05283

UTILITY OF PLACENTAL TISSUE AS AN INDICATOR OF ENVIRONMENTAL EXPOSURE,
Vanderbilt Univ., Nashville, Tenn.
R. J. Baglan, A. B. Brill, D. Wilson, W. Schaffner, and A. Schulert.
In: Proceedings of the First Annual NSF Trace Contaminants, August 8-10, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974. p 504-509, 2 tab, 1 ref. NSF(GI-35348).

Descriptors: *Trace elements, *Human physiology, *Laboratory tests, Laboratory animals, Rodents, Toxicity, Testing procedures, Mercury, Lead, Cadmium, Zinc, Iron, Cobalt, Correlation analysis, Analytical techniques, Spectroscopy, Tracers, Organic compounds, Inorganic compounds, *Pollutant identification, *Bioindicators.

The placenta was investigated as a possible indicator of environmental exposure. Levels of eight trace elements (Hg, Pb, Cd, Se, Rb, Zn, Fe, Co) were measured in human placenta, maternal blood, and fetal blood. The trace element levels for the various tissues were correlated against one another. The elemental levels were also examined with respect to birth month, race, socio-economic status, gestational age at delivery, and infant status at birth. For several elements the levels in the placenta correlated against the levels in the maternal and fetal blood. In animal tracer studies - the mercury levels in placenta, infant hair, and total infant correlated among one another. The determination of the elemental levels in placenta reflected the elemental concentrations in the mother and infant. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05284

STABLE ISOTOPE STUDIES OF HUMAN LEAD METABOLISM,
California Univ., Los Angeles.
G. W. Wetherill, and J. D. Kopple.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974. p 510-518, 5 fig, 1 tab, 8 ref. NSF(GI-38339).

Descriptors: *Distribution, *Lead, *Human physiology, *Stable isotopes, *Diets, Isotope studies, Tracers, Radioisotopes, Absorption, Laboratory tests, Analytical techniques, Spectroscopy, Metabolism, *Pollutant identification, *Bioindicators.

A healthy man was fed a nutritious diet low in Pb content (156 micrograms (day) for 144 days in a metabolic unit. During the first 104 days, he also received 204 micrograms of Pb-204, a rare non-radioactive isotope, as Pb (NO3)2 to achieve a normal Pb intake. Concentration and isotopic composition of Pb was determined by mass spectrometry in all feces and urine and serially in diet, blood, and other body tissues and fluids. Results indicated that about 10% of dietary lead was absorbed and 8 micrograms/day was excreted endogenously into feces. Kinetic analyses identified 2Pb pools. Pool 1, distributed primarily in blood, contained about 1800 micrograms of Pb and had a half-life of 19 days. Pool 2 was as long lived and about half as large. Urine and blood were in isotopic equilibrium while the Pb in bile, gastric fluid and hair appeared to come from pool 2. When dietary Pb-204 was discontinued, blood, urine, and fecal Pb decreased, and the data suggested a close relation between blood, urine, and dietary Pb at this exposure range. No homeostatic mechanism for a preferred blood level was seen. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05285

A NETWORK TO DETERMINE CAUSALITY BETWEEN ABNORMAL TRACE ELEMENT LEVELS IN COGENITAL DEFECTS,
Vanderbilt Univ., Nashville, Tenn.
A. B. Brill, R. J. Baglan, W. Fleet, W. Schaffner, and A. Schulert.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 521-527, 4 tab. NSF (GI-35348).

Descriptors: *Trace elements, *Human pathology, *Laboratory tests, *Statistical analysis, Testing procedures, Sampling, Reproduction, Human physiology, Pollutant identification, *Bioindicators.

Placenta, blood and hair samples from a large number of births in Nashville were collected during 1971-73. These were analyzed for trace element content and findings were related to pregnancy outcome. Abnormalities such as numbers of abortuses, stillbirths, and neonatal deaths, and postnatal illnesses were studied. No unusual deviations from expectancy were noted. However, the study design should be useful if extended to communities with elevated elemental levels, and attention should be focused on a selected few types of malformations and matched normals. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05286

BIOLOGY OF MOLYBDENUM: PLATELET BIOCHEMISTRY AND FUNCTION - POSSIBLE USE IN EVALUATING TRACE METAL EFFECTS,
Colorado Univ., Denver. Dept. of Medicine and Pediatrics.
C. C. Solomons, and E. M. Handrich.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 528-533. 1 fig, 5 ref.

Descriptors: *Molybdenum, *Trace elements, *Human physiology, Biochemistry, Biology, Analytical techniques, Chromatography, Laboratory tests, *Pollutant identification, *Bioindicator.

A sensitive method was described in detail for obtaining nucleotide profiles in blood platelets using 1-2 ml of platelet-rich-plasma. The results provided information which can be used to study a wide variety of environmental stresses on human or animal cells. From the control studies it was seen that care must be exercised in handling the platelets especially with regard to washing with buffer and the temperature during storage of the charcoal pellets. The authors concluded that it should be possible to adapt the method to measure nucleotide changes affecting the survival of platelets exposed in vitro and in vivo to foreign internal surfaces such as prosthetic heart valves and other implantable devices. The effects of molybdenum salts on platelet metabolism was also evaluated. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05287

BEHAVIORAL EFFECTS OF METHYLMERCURY,
Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
H. L. Evans, V. G. Laties, and B. Weiss.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 534-540, 2 fig, 9 ref.

Descriptors: *Mercury, *Behavior, *Organic compounds, *Toxicity, Laboratory tests, Human physiology, Animal physiology, Laboratory animals, Birds, Mammals, *Pollutant identification, *Human pathology.
Identifiers: *Methylmercury.

Experiments were aimed at identifying behavioral tests capable of revealing methylmercury-induced damage. A further aim was to determine brain mercury concentrations that accompany behavioral symptoms and to clarify the contribution of exposure duration, an important parameter influencing the spectrum of observed symptoms. Visual impairment has provem to be a primary symptom in monkeys after sub-acute and chronic exposure to methylmercury. These monkeys had blood Hg concentrations of from 1.0 to 3.5 microgram/ml. The highest concentrations of Hg in brain were found in occipital cortex, which subserves visual function. Impairment of the stability to discriminate visual stimuli on the basis of form, and a reduction in ability to detect a dim light were the consequences observed. Motor incoordination was minimal and appeared much later than the emergence of the visual symptoms. In contrast to the monkey, a higher body burden of methylmercury was required to produce behavioral symptoms in the pigeon. Unlike the monkey, the pigeon displayed clear motor deficits, reflected by a disruption of orderly patterns of conditioned behavior and by a loss of the ability to fly. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05288

THE EFFECT OF MERCURIALS ON DNA-MEDIATED TRANSFORMATION IN BACILLUS SUBTILIS,
Rochester Univ., N.Y. Dept. of Microbiology.
D. J. Groves, and F. E. Young.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Com-

mission, Office of Information Service, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 543-553, 6 fig, 2 tab, 12 ref. NSF (GI-300978

Descriptors: *Mercury, *Bacteria, *Cytological studies, Ions, Laboratory tests, Biochemistry, *Pollutant identification, Human pathology, *Inhibition, Bioindicators.
Identifiers: *DNA.

Mercuriation of DNA inhibited transformation of Bacillus subtilis without decreasing the viability of the population. Pretreatment of the cells with Hg(++) also selectively blocked the transformation reaction. This inhibition of genetic transformation was accompanied by a decrease in the irreversible binding of DNA, suggesting that Hg(++) ions interfere with an early step in the transformation reaction by preventing the specific binding of DNA to the surface of the cell. The data indicated that Hg(++) may be used as a probe to dissect steps in the transformation reaction. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05289

THE UPTAKE AND SOME PHYSIOLOGICAL EFFECTS OF CADMIUM ON CORN,
Illinois Univ., Urbana. Dept. of Agromony.
For primary bibliographic entry see Field 5C.
W75-05290

PRELIMINARY DETERMINATIONS OF TRACE METALS IN HI-VOL PADS AND SOILS AROUND THE SOUTH END OF LAKE MICHIGAN,
Metropolitan Sanitary District of Greater Chicago, Ill. Research and Development Dept.
R. I. Peitz, J. E. Newman, and W. A. Bruns.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 573-588, 4 fig, 4 tab.

Descriptors: *Trace elements, Soils, Lakes, *Data collections, Cadmium, Lead, Copper, Zinc, On-site data collections, Sampling, Particle size, *Heavy metals, *Indiana, *Illinois, Filters, Analytical techniques, Correlation analysis, *Lake Michigan, *Pollutant identification, *Path of pollutants, *Soil analysis.

Cadmium, lead, copper and zinc were analyzed from total suspended particulate sample pads for 63 locations in NW Indiana and Cook County, Illinois. The study covered a three-month period for each regularly scheduled EPA sampling day from December,1972 through February, 1973. For each location, comparisons were made between mean daily total particulate and each of the four trace metals studied. Variability in sample pad loading was compared with the individual variability of the four trace metals. Soil sampling transects were initially established in northwest Indiana during 1972 to determine if airborne trace metal particulates from the Gary-East Chicago, Indiana area were contaminating the soils of the region. Sampling sites along the transects were selected using a constant geometric ratio. The soils collected at depths of 0-2.5 centimeters revealed higher levels than those taken at greater depths. Trace metal concentrations were highest in urban areas and generally decreased with distance from the urban sampling sites. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05291

DISTRUBUTION OF HEAVY METALS IN A BORROW PIT,
Purdue Univ., Lafayette, Ind. Dept. of Bionucleonics.
For primary bibliographic entry see Field 5B.
W75-05292

INVESTIGATION OF ENRICHMENT OF MOLYBDENUM IN THE ENVIRONMENT THROUGH COMPARATIVE STUDY OF STREAM DRAINAGES, CENTRAL COLORADO,
Colorado Univ., Boulder. Dept. of Geological Science.
For primary bibliographic entry see Field 5B.
W75-05293

ARSENIC DISTRIBUTION IN WATERS AND SEDIMENTS OF THE PUGET SOUND REGION,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-05294

DYNAMIC REDISTRIBUTION OF METHYLMERCURY IN A POND ECOSYSTEM,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-05295

PATTERNS OF TRACE-ELEMENT DISTRIBUTION IN A FORESTED WATERSHED,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-05296

ACCUMULATION OF AVAILABLE MOLYBDENUM IN AGRICULTURAL SOILS IRRIGATED WITH HIGH-MOLYBDENUM WATERS,
Colorado State Univ., Fort Collins. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-05297

PROBLEMS AND OPPORTUNITIES IN INTERDISCIPLINARY RESEARCH: THE MOLYBDENUM PROJECT,
Colorado Univ., Boulder. Dept. of Physics and Astrophysics.
For primary bibliographic entry see Field 5G.
W75-05298

NATIONAL NEED - AN INDUSTRY VIEW OF RESEARCH,
AMAX Lead and Zinc, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 5G.
W75-05299

AN APPROACH TO THE CONTROL OF TOXIC SUBSTANCES,
Environmental Protection Agency, Washington, D.C. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W75-05300

INFORMATION SYSTEMS IN ENVIRONMENTAL RESEARCH AND DECISION-MAKING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6B.
W75-05301

QUICK-TIME INSTRUMENTAL MEASUREMENTS OF WASTE-WATER ORGANIC CHARACTERISTICS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
T. Helfgott, and F. L. Hart.
In: Progress in Water Technology, Vol 6, p 159-168, 1974. 1 fig, 2 tab, 10 ref. (Edited by J. F. Andrews, and S. H. Jenkins, and R. Briggs). OWRT A-030-CONN (5) 14-01-0001-3007.

Descriptors: *Waste water treatment, *Organic wastes, *Automatic control, Sewage effluents, Sewage treatment, Ammonia, Nitrates, Nitrogen, Statistical models, *Pollutant identification, *Measurement, Instrumentation, *Biochemical oxygen demand.
Identifiers: *Quick-time instrumental measurements, Real time responses, Carbonaceous oxygen demand, Total oxygen demand, Total organic carbon, Total nitrogen, Statistical correlation analysis.

A rationale for replacing the biochemical oxygen demand either 5-day, ultimate or ultimate carbonaceous by quick-time (Real-time) measures of organic pollution is presented. Quick-time measures of organic pollution include total oxygen demand (TOD), total organic carbon (TOC), total nitrogen (TN) and ion selective probes for measuring ammonia and nitrates. Four statistical models are presented to illustrate the interrelations that can be made with quick-time measurements noting problems of interpretation. Correlation coefficients for the various regression analyses are presented for the four statistical models. These values pertain only to a specific municipal waste water. Pitfalls in using correlations include misinterpretation (e.g., BOD cannot measure persistence) and statistical artifiact (e.g., using unrelated microbial populations for BOD data). These models are established only for the purpose of automating plant operations and are not intended to replace existing laboratory procedures which have value in characterizing wastes. It is suggested, however, that the quick (real-time) measure of pollution replace BOD in the operation of wastewater treatment plants. (de Lara-Connecticut)
W75-05304

CONTROL OF ENVIRONMENTAL IMPACTS FROM ADVANCED ENERGY SOURCES,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 6G.
W75-05313

TOTAL MERCURY MONITOR,
Ionics, Inc., Watertown, Mass. (assignee)
I. A. Capuano.
United States Patent 3,826,614. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1282, July 30, 1974. 1 fig.

Descriptors: *Patents, *Mercury, *Analytical techniques, Equipment, *Monitoring, *Pollutant identification, Liquid wastes.
Identifiers: Total mercury monitor.

An apparatus and method are described for analyzing liquid streams for their mercury content including elemental mercury, ionic mercury and undissociated mercury compounds. The sample is automatically measured and treated with an acidic metal salt reagent containing an oxidant for oxidizing elementary mercury in the sample to ionic mercury. It is then treated with hydrazine to form a catalytic colloid. Elementary mercury is formed by the action of hydrazine and the catalytic colloid on the ionic and combined mercury. The results are indicated and/or recorded by transferring the elemental mercury to a photometric detector. (Orr-FIRL)
W75-05333

USE OF MACRORETICULAR RESINS IN THE ANALYSIS OF WATER FOR TRACE ORGANIC CONTAMINANTS,
Ames Lab., Iowa.
G. A. Junk, J. J. Richard, M. D. Grieser, D. Witiak, and J. L. Witiak.
Journal of Chromatography, Vol 99, p 745-762, November 6, 1974. 3 fig, 7 tab, 25 ref. OWRT A-046-IA(2).

Descriptors: *Water analysis, *Organic compounds, *Pollutant identification, Analytical techniques, Separation techniques, Adsorption, Gas chromatography, Alcohols, Acids, Aromatic compounds, Ethers, Chlorinated hydrocarbon

pesticides, Herbicides, Trace elements, Resins, Water chemistry, Water properties, Phenols.
Identifiers: Aldehydes, Alkylbenzenes, Esters, Ketones.

Organic impurities in water can be isolated by sorption on a small column of a macroreticular resin. Organic compounds are readily eluted by diethyl ether; the eluate is then concentrated by evaporation, and the organics are separated and determined by gas chromatography. Studies on a large number of model compounds (e.g., alcohols, alkyl benzenes, phenols, pesticides and herbicides, aldehydes, acids, aromatic halides, chlorinated phenols, esters, ethers, ketones, and various compounds containing halogens, N, or S) added to water in the 10 to 100 ppb range (20 parts per trillion for pesticides) demonstrated that this method is accurate and reliable. An extensive study of the procedure revealed several critical steps where proper technique and conditions are essential to avoid serious error. These include resin purification and handling, preparation of standard samples containing organic impurities, and the technique and apparatus used in concentrating the Amberlite XAD column eluate. (Witt-IPC)
W75-05340

THE DIFFERENTIATION OF SUBMICROGRAM AMOUNTS OF INORGANIC AND ORGANOMERCURY IN WATER BY FLAMELESS ATOMIC ABSORPTION SPECTROMETRY,
North Dakota Univ., Grand Forks.
R. J. Baltisberger, and C. L. Knudson.
Analytica Chimica Acta, Vol 73, No 2, p 265-272, December, 1974. 4 fig, 1 tab, 21 ref. OWRT B-020-NDAK(1).

Descriptors: *Mercury, *Water analysis, Surface waters, Analytical techniques, Chemical analysis, Metals, Water pollution sources, Water pollution, Trace elements, *Pollutant identificatin, Inorganic compounds, Organic compounds, Heavy metals.
Identifiers: *Atomic absorption spectrometry.

A method for the determination of the individual concentrations of Hg(II) and organomercury, RHg(II), in aqueous solutions is described. The mercury metal produced by reduction with Sn(II) is measured by the flameless atomic absorption method. The selective reduction of Hg(II) is achieved in the presence of RHg(II) in sulfuric acid media with Sn(II). The total Hg content is then measured after oxidation with acidic hydrogen peroxide solution just before injection into the Sn(II) solution of the mercury analyzer. The method is useful in the range 1-5 ppb, with a standard deviation of 1 oppb at 15 ppb, and is satisfactory for the analysis of Hg in river water. (Witt-IPC)
W75-05341

BENTHIC ANIMAL-SEDIMENT,
Maryland Univ., Prince Frederick. Natural Resources Inst.
M. K. Mountford, D. K. Phillips, and J. A. Mihuraky.
In: Report No ORO-4328, Vol 2, p 192-344, August 1973. 90 fig, 18 tab, 65 ref.

Descriptors: *Monitoring, *Nuclear powerplants, *Radioactivity, Aquatic environment, *Environmental effects, *Chesapeake Bay, Benthic fauna, *Estuarine environment, Aquatic animals, *Sediments, Hydrography, Surveys, Sampling, Temperature, Salinity, Sites, Speciation, Data collections, Biomass, Particle size, *Maryland.
Identifiers: *Calvert Cliffs site(Md).

Cooperative programs are obtaining radionuclide and heavy metal data relative to the benthic animal-sediment study. The extensive data collected is reduced to a compact format which includes information on the following subject areas: I Hydrographic data: temperature and salinity; II Benthic infauna data, A. species data in raw tabular form, B. Species checklist, C. Range of number of individuals/species/sq. m., D. dominant species by month and phyla, E. numeric 3-D, log plots on total number of individuals/stations/sq. m./cruise, F. species-diversity treatments, G. biomass data, and; III Sediment-grain size characteristics/station and sampling zones. (See also W75-05342) (Houser-ORNL)
W75-05343

BLUE CRAB SURVEY IN THE WATERS ADJACENT TO THE CALVERT CLIFFS NUCLEAR STEAM ELECTRIC STATION AND THE CHESAPEAKE BAY REGION,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05344

FISH SURVEY: OTHER TRAWL COLLECTIONS OFFSHORE OF THE CALVERT CLIFFS NUCLEAR POWERPLANT SITE,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05345

PUERTO RICO NUCLEAR CENTER, ANNUAL REPORT, 1973.
Puerto Rico Univ., San Juan.
Available from NTIS, Springfield, Va, 22161 as Rept No PRNC-176, $7.60 in paper copy and $2.25 in microfiche. Report PRNC-176, p 208, 1973.

Descriptors: *Nuclear Energy, *Training, *Universities, *Instruction, *Puerto Rico, Ecology, Marine biology, Radioactivity, Public health, Nuclear Engineering, Agriculture, Electric power.

From the beginning in October 1957, the Puerto Rico Nuclear Center has been operated by the University of Puerto Rico under contract with the Atomic Energy Commission. Its initial function was to provide training in nuclear technology that would contribute to the technological development of Latin America. From a Basic Course in Radioisotope Techniques the breadth of the training program has continued to increase to include active participation in the graduate programs of the University of Puerto Rico leading to the Ph.D. and M.S. degrees in fields such as Chemistry, Biology, Physics, Radiological Health, Nuclear Engineering, Agriculture, and others; participation in a Medical Residency Program in Radiation Oncology; offering a new 5 month Course in Nuclear Medicine; providing Nuclear Reactor Supervisor and Operator Training Courses; offering Summer Workshops on Electrical Power Generation for secondary teachers; providing thesis research opportunities for students from universities located in continental United States and other countries; and many other specialized training activities. (Houser-ORNL)
W75-05350

5B. Sources Of Pollution

TRAINING MANUAL ON THE BASIC TECHNOLOGY OF THE PULP AND PAPER INDUSTRY AND ITS WASTE REDUCTION PRACTICES,
Lakehead Univ., Thunder Bay (Ontario).
For primary bibliographic entry see Field 5D.
W75-04871

ENVIRONMENTAL CONTAMINANTS INVENTORY STUDY NO 1: STATISTICS ON THE USE OF PEST CONTROL PRODUCTS IN CANADA,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5G.
W75-04880

RECONNAISSANCE RESISTIVITY SURVEY AROUND A BRINE POND, ESTERHAZY, SASKATCHEWAN,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W75-04883

INFILTRATION OF WATER INTO THE SOIL PROFILE,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering; and North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W75-04918

INFILTRATION ROLE OF LARGE SOIL PORES: A CHANNEL SYSTEM CONCEPT,
Nevada Agricultural Experiment Station, Reno.
For primary bibliographic entry see Field 2G.
W75-04919

MECHANICS OF SURFACE RUNOFF ON HILLSLOPES,
Agricultural Research Service, Athens, Ga. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2E.
W75-04921

TRANSPORT PROCESSES OF PARTICLES IN DILUTE SUSPENSIONS IN TURBULENT WATER FLOW--PHASE III,
Illinois Univ., Urbana. Dept. of Nuclear Engineering.
B. G. Jones, N. M. Howard, C. Meek, and J. Thompkins.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 790, $5.25 in paper copy, $2.25 in Microfiche. Illinois Water Resources Center, Urbana, Research Report No 91, December 1974, 100 p, 4 tab, 45 fig, 33 ref. OWRT-B-067-ILL(2), 14-31-0001-3582.

Descriptors: *Dispersion, *Water pollution sources, *Sedimentation, *Turbulent flow, Air pollution, Instrumentation, Turbulence, *Path of pollutants, *Particle size, Model studies.
Identifiers: *Turbulent transport, *Particulate transport.

Understanding the basic mechanisms and predicting the behavior of particles suspended in turbulent fluid flow are essential to environmental conservation and to multiphase system design. Air and water pollution, sedimentation and erosion of river beds and coastal shorelines, and atmospheric fallout are some of the areas in which particle suspensions are of key importance. Detailed experimental measurements of dilute particle suspensions have been performed which examined the effects of particle size, shape and relative density on the statistical response of such particles in a turbulent fluid. Shape was of minor importance for spheres, cubes and tetrahedrons. However, size was important when the particle dimension was as large or larger than the fluid turbulence structure. Relative density influenced both free fall and inertial effects. An analytical model was developed which included these latter effects. It agrees well with observed particle dispersion measurements.
W75-04933

CLUSTER ANALYSIS AND DIVERSITY IN RECOVERY OF DAMAGED STREAMS,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5C.
W75-04934

NITROGEN, PHOSPHORUS AND EUTROPHICATION IN THE FINGER LAKES,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 5C.
W75-04936

THE GEOCHEMISTRY OF CERTAIN MINE AND SPRING WATERS, WESTERN SOUTH DAKOTA,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geology and Geological Engineering.
J. P. Gries, and P. H. Rahn.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 829, $3.75 as paper copy, $2.25 in microfiche. South Dakota Water Resources Institute, Brookings, Completion Report, December 1974. 38 p, 8 fig, 1 tab, 10 ref, 2 append. OWRT A-040-SDAK(1), 14-31-001-4042.

Descriptors: *Mining, Dissolved solids, *Mine water, Mine wastes, *Geochemistry, *Groundwater, Hydrogeology, Streamflow, *Mine drainage, *South Dakota, Limestones, Iron, Discharge(Water), Water temperature, Conductance, Hydrogen ion concentration.
Identifiers: *Black Hill(S. Dak), Madison Limestone.

Fourteen inactive or abandoned gold-silver, lead-silver, or lead-zinc mines were located in the Northern Black Hills which discharge water from their portals or shaft collars. Some discharge fairly evenly throughout the year; some show high seasonal variation; and some drain only during the spring and early summer months. From three to eight visits were made to each property between September 1, 1973 and September 1, 1974, depending upon the volume of discharge and accessibility during winter months. Determinates made include volume of discharge, water temperature, hydrogen ion concentration (pH), specific conductance, and total iron. Where significant discharge entered directly into a stream, measurements were made of the stream water above and below the point of entry of the mine drainage. A total of 23 measuring points was monitored. The only mine workings to show discharges with low pH and high total iron were those with generally very small flow (less than 5 gpm) from workings developed in highly pyritized porphyry or schist. Large discharges, regardless of rock type, were potable as far as pH, iron and total dissolved solids were concerned. Total discharge for the 14 properties varied seasonally between 300 and 400 gpm. Effects of these discharges upon streams large enough to support aquatic life were negligible. (Wiersma-South Dakota State)
W75-04938

WATER QUALITY OF THREE SMALL WATERSHEDS IN NORTHERN UTAH,
Forest Service (USDA), Logan, Utah. Forest Sciences Lab.
R. D. Doty, and E. Hookano, Jr.
U.S.D.A. Forest Service Research Note, INT-186, October 1974. 6 p 1 fig, 1 tab, 8 ref.

Descriptors: *Watersheds(Basins), *Natural streams, *Water quality, *Utah, Chemical properties, Physical properties, Bacteria, Water pollution sources, Forest watersheds, Rocky Mountain region, Alpine, Potable water, Chlorination, Irrigation, *Small watersheds, *Demonstration watersheds.

The chemical, physical, and bacteriological characteristics of streamflow from three small adjacent drainages in the Wasatch Mountains of northern Utah are tabulated and discussed. These watersheds are sufficiently undisturbed so that their chemical water quality essentially reflects their natural characteristics. The water quality from these watersheds is extremely good and excellent for irrigation. However, the presence of fecal bacteria during much of the year would make it necessary to treat this water to make it potable. Minimal chlorination probably would suffice. Suspended sediment is negligible. (Witt-IPC)
W75-04943

CARBON AND COLOR DISTRIBUTION IN VARIOUS SIZE FRACTIONS OF TREATED PULP MILL AND BOARD MILL WASTE EFFLUENTS,
Saskatchewan Univ., Dept. of Civil Engineering. Saskatoon.
C. P. Hwang.
Tappi, Vol 57, No 12, p 148-149, Dec 1974. 3 tab.

Descriptors: *Pulp wastes, *Particle size, *Carbon, *Color, Dispersions, Aeration, Activated sludge, Sewage treatment, Industrial wastes, Suspended solids, Colloids, Dissolved solids, Waste water treatment.
Identifiers: Board mills, Kraft mills.

The particle size distributions of carbon and color were determined for a bleached kraft pulp mill effluent after aerated lagoon treatment and for a board mill effluent after activated sludge treatment. Three tables show the distribution of total carbon, organic carbon, and color in the effluents between suspended, colloidal, and dissolved solids. The distribution of effluent constituents is important in estimating dispersion, transport, and decomposition problems after discharge, and also in estimating what additional removal may be possible by coagulation, sedimentation, filtration, adsorption, or biological treatment, individually or in any combination. (Sykes-IPC)
W75-04948

NITRATE AND CHLORIDE MOVEMENT IN THE PLAINFIELD LOAMY SAND UNDER INTENSIVE IRRIGATION,
Wisconsin Univ., Madison. Dept. of Soil Science.
F. J. Endelman, D. R. Keeney, J. T. Gilmour, and P. G. Saffigna.
Journal of Environmental Quality, Vol 3, No 3, p 295-298, July-September, 1974. 5 fig, 2 tab, 11 ref.

Descriptors: *Groundwater movement, *Nitrates, *Chlorides, *Leaching, *Fertilizers, Water pollution sources, Path of pollutants, *Wisconsin, Loams, Sands, Irrigation, Soil analysis.
Identifiers: Plainfield loamy sand(Wis), Hancock(Wis), Nitrate-nitrogen.

The results of a field experiment show that rainfall and/or irrigation can move NO2-N beyond the rooting zone of Plainfield loamy sand. Leaching under intensive irrigation was evaluated over an 11-day period. KNO3 and KCl were used as fertilizers. The NO3 and Cl concentration was determined in soil profile and lysimeter leachate samples collected daily. Water in the amount of 2.5 cm moved 19 cm in the surface and 28 cm in subsurface soil. Chloride concentrations were similar to those of NO3-N. (Carpenter-FIRL)
W75-04997

WATER QUALITY AFTER CLEARCUTTING A SMALL WATERSHED IN WEST VIRGINIA,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 4C.
W75-04998

PHOSPHOROUS ASSOCIATED WITH SEDIMENTS IN IRRIGATION AND DRAINAGE WATERS FOR TWO LARGE TRACTS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
D. L. Carter, M. J. Brown, C. W. Robbins, and J. A. Bondurant.
Journal of Environmental Quality, Vol 3, No 3, p 287-291, July-September, 1974. 5 tab, 18 ref.

Descriptors: *Phosphorus, *Quality control, *Irrigation, *Drainage, *Idaho, Sediments, Water pollution sources.
Identifiers: Snake River(Ida).

Phosphorus was measured in irrigation and surface drainage water. Present practices remove more phosphorus from the Snake River in irrigation than is returned in drainage; new practices could be implemented for phosphorus conservation. Due to particle size preparation in drainage streams, finer sediments return to the river containing higher phosphorus concentrations than the soils from which they were eroded. The importance of defining sampling methods and procedures is illustrated by comparative data on irrigation and drainage waters. (Carpenter-FIRL)
W75-04999

OIL SPILL TRAJECTORY STUDIES FOR ATLANTIC COAST AND GULF OF ALASKA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
J. W. Devanney, R. J. Stewart, and W. Briggs.
In: Primary, Physical Impacts of Offshore Petroleum Developments, MITSG 74-20, p 213-403. 87 fig, 13 tab, 28 ref.

Descriptors: *Oil spills, Movement, *Migration, Winds, Littoral drift, Ocean currents, Atlantic Ocean, Continental shelf, Northeast US, Ocean waves, Deep water, Computer models, *Alaska.
Identifiers: *Oil spill trajectories, Mid-Atlantic Ocean, South-Atlantic Ocean, *Gulf of Alaska, Buzzards Bay(Mass), Delaware Bay(Dela), Charleston Harbor(Md).

The likely behavior of oil spill trajectories from each of the thirteen potential Atlantic outer continental shelf production regions and each of the nine potential production areas in the Gulf of Alaska are analyzed by a simple computer model. Also examined in detail is the probable behavior of oil spills emanating from three potential nearshore terminal areas, Buzzards Bay, Delaware Bay, and Charleston Harbor. The emphasis in all these analyses is on the probability of a spill coming ashore, the time to shore, and in the terminal analyses, the wind conditions at the time the spill first reaches the shore. The analyses of the terminal areas are exemplary and indicate the type of work which should be done in any terminal area under consideration and should also include a series of offshore locations of varying distances from the coast to help assess the tradeoffs associated with placing terminals further at sea. No attempt has been made to establish anything but the grossest sort of feel for the problem and the next step would appear to require some focusing of effort with respect to a particular nearshore region, and a more definite specification of the functions required of a transshipment site. (See also W75-05032) (Auen-Wisconsin)
W75-05035

THE ROLE OF MASS TRANSPORT IN OIL SLICK WEATHERING,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
J. B. Lassiter, R. J. Powers, and J. W. Devanney.
In: Primary, Physical Impacts of Offshore Petroleum Developments, MITSG 74-20, p 404-448, 17 fig, 2 tab, 20 ref.

Descriptors: *Mass transfer, *Oil spills, Weathering, Diffusion, Sedimentation, Evaporation, Mathematical models, Ocean waves, *Path of pollutants.
Identifiers: *Oil slicks, Hydrocarbons, Benzene, Napthalene.

The vertical dispersion of soluble hydrocarbons beneath an oil slick was modeled mathematically as a classical diffusion problem with the following indications: The mass transfer of light aromatics from an oil slick progresses through three stages.

During the first stage, soluble hydrocarbons from the upper layers of the slick are evaporated into the adjacent air while those from the lower layers are dissolved in the water. During the second stage, evaporative hydrocarbons continue to diffuse from immediately beneath the slick. During the third stage, evaporation draws soluble hydrocarbons from the water back through the slick into the air. Benzene in slicks of 1 mm thickness lasts approximately 6 hours but biologically important concentrations can be found to a 3 or 4 m depth and can persist for a long time after the surface slick has disappeared. Napthalene leaves the slick very slowly and biologically important concentrations can remain to a depth of 1 meter. All compounds with a carbon number of less than 9 will be gone from the slick in a matter of hours while alkanes with carbon numbers of 9 and above will remain much longer. (See also W75-05032) (Auen-Wisconsin)
W75-05036

'EUTROPHICATION'--ITS CAUSES AND EFFECTS IN FRESH WATER LAKES,
New York State Dept. of Environmental Conservation, New Paltz.
For primary bibliographic entry see Field 5C.
W75-05038

THE INDICATOR ORGANISMS AND THEIR ECOLOGICAL VARIABILITY,
Water Economics Research Inst., Krakow (Poland). Dept. for Water Protection.
For primary bibliographic entry see Field 5C.
W75-05055

EFFECT OF TIME OF IRRIGATION ON THE DISTRIBUTION OF 1,2-DIBROMO-3-CHLOROPROPANE IN SOIL AFTER SHALLOW INJECTION,
California Univ., Davis. Dept. of Nematology.
L. R. Hodges, and B. Lear.
Pestic Sci, Vol 4, No 6, p 795-799, 1973.
Identifiers: *Distribution, Injection, Irrigation, *Pesticides, *Propanes, Soils, Dispersion, Organic compounds, *Path of pollutants.

The effect of irrigation time on the dispersion of 1,2-dibromo-3-chloropropane (DBCP) in soil after a shallow injection treatment was determined for Yolo fine sandy loam. When injections equivalent to 23.51 of DBCP/ha at a depth of 7-8 cm were subsequently followed by 15 cm of irrigation water, adequate distribution of DBCP was obtained if the soil was irrigated within 5 days. However, the most rapid and deepest penetration of fumigant was obtained by irrigating 2-5 days after application. There was insufficient downward movement of DBCP in non-irrigated soil.--Copyright 1974, Biological Abstracts, Inc.
W75-05065

VOLATILIZATION LOSSES OF PESTICIDES FROM SOILS,
California Univ., Riverside.
W. J. Farmer, and J. Letey.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Technology Series Report, EPA-660/2-74-054, August 1974. 80 p, 7 fig, 10 tab, 37 ref, 2 append. EPA Grant No. R 801835.

Descriptors: *Pesticides, *Organochlorine insecticides, Herbicides, *Volatilization, Lindane, Dieldrin, DDT, DDE, Diffusion, Adsorption, Water pollution sources, *Path of pollutants, Computer models.
Identifiers: Pesticide runoff models, Trifluralin, Vapor density, Transport processes, Mass flow.

The volatilization of pesticides following soil application can be predicted from considerations of the physical and chemical principles controlling concentrations at the soil surface. When these concentrations are maintained at a relatively high level, volatilization losses will be determined by the pesticide vapor pressure as modified by adsorptive interactions with the soil. For pesticides which have been mixed with the soil or when volatilization has been proceeding for a time so that concentrations at the soil surface are low, volatilization rates will be determined by the rate at which pesticides move through the soil to the soil surface. Under conditions when mass flow in liquid water is negligible, volatilization rates are predictable using solutions to the diffusion equations. When mass flow is operative the prediction of rates of volatilization are more complex. A computer model has been developed combining both diffusion and mass flow for predicting the volatilization of soil-incorporated pesticides. Temperature gradients in soil significantly affected the distribution of volatile pesticides in soil. Vapor phase diffusion toward areas of low temperature can occur simultaneously with mass flow in liquid water toward areas of high temperature. (EPA)
W75-05075

LOSSES OF FERTILIZERS AND PESTICIDES FROM CLAYPAN SOIL,
Missouri Univ., Columbia. Dept. of Agronomy.
G. E. Smith, F. D. Whitaker, and H. G. Heinemann.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.45. Environmental Protection Agency, Ecological Research Series Report, EPA-660/2-74-068, July 1974. 75 p, 12 fig, 16 tab, 28 ref, append. EPA Project R-801-666.

Descriptors: Water pollution, Agricultural chemicals, *Fertilizers, Nitrates, Phosphates, *Pesticides, Sediments, Erosion, Runoff, Eutrophication, Soil management, *Path of pollutants, *Soil analysis, Nutrients.
Identifiers: *Claypan soil.

Analyses of runoff and sediment were made from 33 instrumented plots at the Midwest Claypan Experiment Station. Nitrogen compounds, phosphates and some specific pesticides were determined where fertilizer treatments, cropping and cultural practices varied. The results show the losses of nitrogen and phosphate compounds that may be expected under practical field conditions on soils that have a minimum slope and where percolation rates are slow. Results from three seasons are reported. In all three years rainfall during the critical period, where there was minimum ground cover, was below long time averages. Optimum fertilization treatments that produced a vigorous canopy, or a good residue cover reduced both erosion and nutrient losses. In none of the three years did the optimum use of fertilizer or pesticides produce large losses of chemicals. The results point to systems of soil management that will produce optimum yields of grain crops with a minimum contamination of receiving water by chemicals. (EPA)
W75-05081

ESTIMATING NUTRIENT LOADINGS OF LAKES FROM NON-POINT SOURCES,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 5C.
W75-05082

PESTICIDES IN THE ILLINOIS WATERS OF LAKE MICHIGAN,
Environmental Protection Agency, Chicago, Ill.
R. A. Schacht.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.25. Environmental Protection Agency, Ecological Research Series Report, EPA 600/3-74-002, January 1974. 55 p, 2 fig, 8 tab, 8 ref, 2 append. EPA 16050 ESP.

Descriptors: *Pesticides, *Polychlorinated biphenyls, *Lake Michigan, *Fish, *Sediments, Insecticides, Organic pesticides, Chlorinated hydrocarbon pesticides, Aldrin, DDD, DDE, DDT, Dieldrin, Endrin, Heptachlor, Aroclors, Effluents, Tributaries, Lake sediments, Salmon, Carp, Yellow perch, Brown trout, Pollutants, Pollutant identification, Water pollution, Water quality, *Illinois.
Identifiers: Heptachlor epoxide, Lindane, Methoxychlor, Phthalates, Chicago(Ill), Waukegon(Ill), Alewife, Coho salmon.

This study was initiated to determine present levels of pesticides in Lake Michigan fish, sediments, and water. Data were collected on six species of Lake Michigan fish (yellow perch, chubs, carp, coho salmon, alewife, and brown trout); open lake and tributary stream and ravine sediments; and open water, tributary stream, and sewage treatment plant effluents. Samples were analyzed for the following: heptachlor, heptachlor epoxide, dieldrin, methoxychlor, lindane, aldrin, endrin, DDT and its analogs. Additional analyses were accomplished for polychlorinated biphenyls (PCB's), di-n-butyl phtalate (DBP), and di (2-ethylhexyl) phthalate (DOP). PCB's were found at levels as high or higher than DDT in Lake Michigan water, sediment, and fish. PCB's have been found to complicate the routine analysis of DDT which may have caused earlier DDT data in the literature to be reported at levels higher than actual. Both DDT and the polychlorinated biphenyls were found at levels which cause concern for aquatic life and warrants the controlled use of these compounds. (EPA)
W75-05083

LIVESTOCK AND THE ENVIRONMENT, A BIBLIOGRAPHY WITH ABSTRACTS,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 10B.
W75-05084

EVALUATION OF DRAINAGE FOR SALINITY CONTROL IN GRAND VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-05090

DEVELOPMENT OF CLASSIFICATION SCALE FOR CHARACTERIZING BILGEWATERS USED IN EVALUATING OIL REMOVAL TECHNIQUES,
General American Transportation Corp., Niles, Ill. General American Research Div.
For primary bibliographic entry see Field 5G.
W75-05091

ARTIFICIAL SEA SLICKS: THEIR PRACTICAL APPLICATIONS AND ROLE IN FUNDAMENTAL RESEARCH,
Naval Research Lab., Washington, D.C.
W. R. Barger, and W. D. Garrett.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 784, $3.25 in paper copy, $2.25 in microfiche. Report 7751, June 4, 1974. 13 p, 6 fig, 16 ref, append.

Descriptors: *Monomolecular films, *Oceans, *Surfaces, Waves(Water), Capillary action, Ocean waves, Chemistry, Gravity waves, *Oil spills, Oil pollution, Organic compounds, *Path of pollutants, Water pollution control.
Identifiers: *Air-sea interactions, *Oil-control films, Wave damping, Underwater visibility, Oleyl alcohol.

Artificial sea slicks are man-made, monomolecular, organic films adsorbed at the air-sea interface. They are formed from spontaneously spreading, water-insoluble polar liquids. Techniques for

generating artificial sea slicks from surface vessels and from the air were devised. The chemical structure of the film-forming material to be used in a specific sea slick application was determined by the air-sea parameter to be modified and by the desired longevity of the slick. Research into the chemical modification of air-sea interactions led to several practical applications for artificial sea slicks. The ability of organic surface films to damp capillary waves renders the area covered by the film highly visible and sensible under most environmental conditions. The attenuation of both capillary and high-frequency gravity waves by artificial sea slicks was examined under open-ocean conditions. The wave-damping property was used as a basis for the development of seamarkers that generate highly visible, persistent ripple-damped zones on the sea surface. Field research also demonstrated that slicks do not enhance underwater visibility but can markedly improve the clarity of objectives beneath the water when viewed through a air-water interface. Large artificial slicks were used as a tool to elucidate the mechanisms of wind-wave interactions and air-sea exchange processes. The most widely used application of film-forming organic chemicals is for the control and containment of oil spills. By greatly altering surface forces, these films cause the oil to draw back into a thicker layer that occupies a considerably reduced area of the water surface, thereby facilitating and increasing the efficiency of oil retrieval operations. (Sims-ISWS)
W75-05092

A REVIEW OF THE LITERATURE CONCERNING THE STEEL INDUSTRY AND POLLUTION. PART 1. THE BACKGROUND TO POLLUTION,
British Steel Corp., Sheffield (England). Information Services.
For primary bibliographic entry see Field 5G.
W75-05093

WEATHERING OF OIL AT SEA,
Esso Research and Engineering Co., Linden, N.J. Government Research Div.
J. W. Frankenfeld.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 789, $7.00 in paper copy, $2.25 in microfiche. Report No CG-D-7-75, September 1973. 175 p, 49 fig, 40 tab, 41 ref, 2 append. DOT-CG-23035-A.

Descriptors: *Weathering, *Oil pollution, *Oil spills, *Chemical degradation, Analytical techniques, Biochemistry, Chemical analysis, Environmental effects, Spectroscopy, Laboratory tests, Specific gravity, On-site investigations.

A study was conducted to trace the fate of petroleum products discharged in the marine environment and to determine the magnitude of the more important weathering variables on the physical and chemical changes which occur. Six carefully selected oils, four crudes and a heavy and a light fuel oil, were weathered under controlled, laboratory conditions in specially designed simulators and under 'real marine' conditions. The progress of weathering was monitored by measuring such physical changes as average boiling points (evaporation rates) and the increase in specific gravity. The effects of weathering parameters on chemical changes in both the floating oil slick and in the aqueous phase below the slick were also measured. The environmental variables investigated included air and water temperature, water wash rate, effects of salinity, effects of air movement and UV light, as well as weathering time (up to four months). The results indicated that the most important variables were the chemical characteristics of the petroleum products themselves. Variation between oils was much greater than those brought about by changes in weathering parameters. However, the environmental factors studied did have observable effects on the final disposition of the weather oils. Details of the analytical procedures and some additional data were presented in appendexes. (Sims-ISWS)
W75-05106

NUMERICAL MODELS FOR PRECIPITATION SCAVENGING,
Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
Y. Lee.
Available from the National Technical Information Service, Springfield, Va 22161 as COO-140752, $8.00 in paper copy, $2.25 in microfiche. PhD Disseration, April 1974. 89 p, 17 fig, 2 tab, 71 ref, 1 append. AEC Contract AT (11-1)-1407.

Descriptors: *Clouds, *Model studies, *Cloud physics, Precipitation(Atmospheric), Raindrops, Evaporation, Measurement, On-site investigations, Numerical analysis, Convection, Fallout, Efficiences, *Path of pollutants.
Identifiers: *Precipitation scavenging, Stratiform clouds, Diffusive attachment, Impact collection, Accretion, Cloud droplet-size spectra, Contaminant particles, Liquid water content, Microphysics.

Two models for precipitation scavenging were developed. The first was for scavenging in stratiform clouds incorporating heuristic approximations of diffusive attachment, impact collection, and accretion including particle and cloud droplet-size spectra. Rainout ratios and efficiencies were computed and, when compared with available field measurements, revealed that: (1) the attachment or removal rate is not constant, (2) the contaminant concentration in the cloud decreses exponentially with time, and (3) the fraction of air concentration of contaminant attached to cloud droplets is affected by processes of particle attachment and rainfall removal. The second model addressed the convective precipitation process in which raindrop growth and motion in spatial contaminant concentration gradients are important. Numerical solutions for raindrops growing by coalescence with cloud drops and moving in a cylindrically symmetric motion field within a steady-state cloud were found. Drop breakup and evaporation were taken into account. Because the updraft core is identified with the maxima of liquid water content and contaminant concentrations, (1) coalescence is most rapid where droplets are moving upward through the cloud and (2) the highest concentration of contaminant tends to be found with the larger drops near the axis of the cylinder. Because the small drops evaporate sooner than the large drops in the subcloud air, a negative correlation between contaminant concentration and rainfall rate was indicated. (Jones-ISWS)
W75-05112

WATERBORNE DEBRIS IN MARINE POLLUTION INCIDENTS,
Battelle Columbus Labs., Long Beach, Calif. Long Beach Research Facility.
J. A. Hancock, R. P. Jacobs, M. R. Knapp, and J. S. Glasgow.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 568, $11.50 in paper copy, $2.25 in microfiche. Report No. CG-D-108-74, March 1974. 460 p, 6 fig, 2 tab, 20 append. DOT-CG-23223-A-11.

Descriptors: *Wastes, *Oil spills, *Water pollution sources, Coasts, Data collections, Harbors, Water pollution control, Estuaries, Water pollution effects, Equipment, *Path of pollutants.
Identifiers: *Waterborne debris, Debris cleanup equipment.

Floating debris has greatly hindered the cleanup of spilled fluids in several pollution instances. This debris has hampered the use of pollution-response equipment and has presented a major materials-handling and disposal problem. The types of waterborne debris found in coastal, harbor, and estuarine areas were described. Regional variations of the types and quantities of debris, the sources of this debris, and natural effects on concentration and quantity were described. Current debris-handling practices used in oil spills were investigated. Equipment used for handling debris was identified and evaluated. Other equipment not now used for debris handling in spills, but showing potential, was considered. Necessary performance considerations for debris-handling equipment were listed. Effects of debris on pollution-response equipment were established. Current design features and protection techniques to minimize or negate debris effects were also investigated. (Sims-ISWS)
W75-05114

SEEPAGE-ENVIRONMENTAL ANALYSIS OF THE SLIME ZONE OF A TAILING POND,
Bureau of Mines, Spokane, Wash. Spokane Mining Research Center.
C. D. Kealy, R. A. Busch, and M. M. McDonald.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 989, $3.75 in paper copy, $2.25 in microfiche. Report of Investigation 7939, 1974. 89 p, 15 fig, 4 tab, 15 ref, 2 append.

Descriptors: *Seepage, *Finite-element analysis, *Water quality, Dissolved solids, Suspended solids, Groundwater, Trace elements, Mathematical models, Resistivity, Piezometers, Seismic studies, Permeability, Rainfall, Model studies, Data collections, *Washington.
Identifiers: *Tailings ponds, Slime zone, Grain-size analysis, Shelby tube sampling, Van Stone tailing pond(Wash).

Dissolved and suspended solids are present in the free water of tailings ponds. The influences of the slime zone in preventing these solids from reaching the environment outside the tailing pond were identified. The finite-element method was used to determine the rate of discharge of subsurface water from the Van Stone tailings pond in northern Washington. The slime zone was sampled and tested for the first time, and results were interpreted and incorporated into the mathematical model. Computer results were verified by installing and monitoring piezometers in the field and by a simulated laboratory model. Output from the numerical model defined critical seepage zones and revealed that proper pond design and maintenance can reduce pond seepage losses to a minimum. Minimization of seepage requires maintaining the pond water level over the slime zone. Sufficient physical, chemical, and limnological data were collected and analyzed to conclude that the only realistic reflection of synergistic effects is obtained by study of the indigenous biota in combination with quantitative chemical and physical data. Proper planning and management of the milling and waste disposal operations are the key to minimal pollution. (Schict-ISWS)
W75-05115

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME II - DESIGN REPORT.
Aerojet Electrosystems Co., Azusa, Calif.
For primary bibliographic entry see Field 5A.
W75-05119

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME III - SUBSYSTEM SPECIFICATIONS.
Aerojet Electrosystems Co., Azusa, Calif.
For primary bibliographic entry see Field 5A.
W75-05120

THE FATE OF NITRATE IN LAKE SEDIMENT COLUMNS,
Wisconsin Univ., Madison. Dept. of Soil Science.
R. L. Chen, and D. R. Keeney.
Water Resources Bulletin, Vol 10, No 6, p 1162-1172, December 1974. 4 fig, 3 tab, 14 ref. EPA Grant No R-801362.

Descriptors: *Path of pollutants, *Lake sediments, *Denitrification, *Leaching, *Nitrogen compounds, *Oxidation-reduction potential, Sediments, Lake beds, *Nitrates, Nitrites, Nitrogen, Sediment-water interfaces, Surface-groundwater relationships, Water quality, Seepage, Lakes, *Wisconsin.
Identifiers: Lake Mendota(Wis), Lake Tomahawk(Wis).

Undisturbed core samples of sediments (40 cm length) from Lakes Mendota and Tomahawk were leached from the bottom, at 1.4 cm/day, with a solution N15-nitrate (10 mg N/liter) to investigate the magnitude of denitrification and assimilatory nitrate reduction of nitrates reaching lake sediments by way of groundwater seepage. Oxidation-reduction potentials were measured daily in the core columns at 4-, 14-, 24-, and 34-cm depths. Water samples were collected daily and concentrations of soluble organic N, NH4-N, NO3-N, and NO2-N were determined. After 50 days of leaching, sediment cores were removed from the columns, sectioned at 10-cm intervals, and the amounts and forms of nitrogen were determined. While leaching removed considerable ammonium-N (NH4-N) and soluble organic N, essentially no N15 had passed through the columns. Oxidation-reduction potentials indicated that denitrification occurred in the lower depths. The N15 distributions of sediment nitrogen showed that 15 to 26% of added nitrate-N (NO3-N) was converted to organic N and ammonium-N. (Harmeson-ISWS)
W75-05155

MONITORING MARINE OUTFALLS BY USING ULTRAVIOLET ABSORBANCE,
Victoria Univ. (British Columbia). Dept. of Biology.
For primary bibliographic entry see Field 5A.
W75-05159

HYDROGEOCHEMISTRY OF CARBONATE GROUNDWATERS OF AN URBAN AREA,
Illinois Univ., Chicago. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W75-05163

DISPERSION OF DREDGE SPOIL DUMPED IN NEAR-SHORE WATERS,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
R. B. Gordon.
Estuarine and Coastal Marine Science, Vol 2, No 4, p 349-358, October 1974. 5 fig, 1 tab, 4 ref.

Descriptors: *Path of pollutants, *Dredging, *Dispersion, *Turbidity, Silts, Tidal streams, Measurement, Sediments, Suspended solids, *Connecticut.
Identifiers: *Dredge spoil, *Dumping operations, Marine silt, Residual turbidity, Spoil drop site.

Turbidity measurements made at the New Haven spoil ground in Long Island Sound showed that 99% of non-cohesive spoil of high silt content discharged from a scow in the presence of a tidal stream was transported to the bottom as a high speed, turbulent jet. Lateral spread of the jet was about 30% of the water depth. Impact with the bottom produced an outward spreading density current whose speed and thickness varied such that the Froude number of the flow remained about constant. When 2000 cu m of spoil was discharged in water 20 m deep, the density surge carried less than 18% of the spoil outside a circle of 30-m radius and essentially none beyond about 120 m. The residual turbidity in the water column, which drifted with the tidal stream, contained less than 1% of the material discharged; this settled at the fall velocity of the individual particles. (Roberts-ISWS)
W75-05167

THE GEOLOGY AND HYDROGEOLOGY OF THE NEW LEAD BELG, MISSOURI,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 2F.
W75-05175

SOURCES AND TRENDS IN WASTE WATER LOADINGS TO THE SAN FRANCISCO BAY REGION,
Sir George Williams Univ., Montreal (Quebec). Dept. of Economics.
J. A. Breslaw.
Water Resources Research, Vol 10, No 6, p 1085-1089, December 1974. 3 fig, 1 tab, 9 ref, 1 append.

Descriptors: *Path of pollutants, *Biochemical oxygen demand, *Heavy metals, *Nutrients, *Regression analysis, *Phenols, Estuaries, Nitrogen, Phosphorus, Heated water, Industrial wastes, Regional analysis, Tidal effects, Waste water(Pollution), Water pollution, *California.
Identifiers: *San Francisco Bay(Calif).

A study based on data obtained from the U.S. Army Corps of Engineers Permit Program and the regional quality control board indicated that the municipal BOD load discharged to San Francisco Bay in 1971 was less than it was in 1961. On the other hand, flows, total phosphorus, total nitrogen, and population have all shown increasing trends in the same time period. The major source of heavy metals appeared to be from municipal discharges instead of industrial sources. For each waste constituent a few plants were responsible for most of the aggregate loadings of that constituent. For the Bay as a whole, muncipalities were the major dischargers of all waste constituents with the exception of heat and phenols; however, industrial discharges were significant in some reaches. (Harmeson-ISWS)
W75-05186

A MODEL TO STUDY THE EFFECTS OF TIME-VARIABLE POLLUTANT LOADS ON STREAM QUALITY,
Saint Catharines (Ontario).
J. Warren, and J. K. Bewtra.
Water Research, Vol 8, No 12, p 1057-1061, December 1974. 7 fig, 4 ref.

Descriptors: *Path of pollutants, *Computer models, *Combined sewers, *Detention reservoirs, *Suspended solids, Biochemical oxygen demand, Interceptor sewers, Coliforms, Phosphates, Mathematical models, Alternative costs, Economics, Model studies, Pollution abatement, Water quality.

A deterministic computer model was used in a study of the effects of discharge from combined sewers on the quality of receiving bodies of water. Included in the model were cost functions for all systems components and the capability for studying the effects of varying treatment plant and interceptor sewer capacities on stream quality. Results of a series of model runs on three drainage areas showed the variation of total mass phosphate discharge, the peak instantaneous phosphate concentration, and the costs of varying system parameters. The computer model was proposed as a useful tool in predicting stream quality variations and arriving at feasible and economical solutions to combined sewer overflow problems. (Harmeson-ISWS)
W75-05187

MANAGEMENT OF WASTE FLUIDS IN SALAQUIFERS,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
R. G. Kazmann, O. K. Kimbler, and W. R. Whitehead.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR4, Proceedings Paper 10991, p 413-424, December 1974. 7 fig, 15 ref, 1 append. A-002-LA(8), A-011-LA(4), A-022-LA(4), A-027-LA(4).

Descriptors: *Aquifer management, *Waste disposal wells, *Groundwater movement, *Underground storage, Groundwater, Confined water, Percolating water, Aquifers, Sinks, Saline water, Injection wells, Waste disposal, Industrial wastes, Pollutants, Environmental engineering, Deep wells.
Identifiers: *Saline groundwater, *Salaquifers, Miscible displacement.

The disposal of liquid wastes into suitable aquifers that contain saline water (salaquifers) has proven to be technically feasible. The practice is widespread and the total number of waste-injection wells operating in the United States reached almost 270 by 1972. If the waste is heavier than the water in the storage aquifer, the waste will tend to move downdip until it reaches a boundary or the axis of a syncline. Thus, chances are very small that the waste will escape through the roof of the salaquifer. Therefore, the dip of the aquifer, the direction and rate of preexisting groundwater movement, and the density difference between native and injected fluids (assumed to be miscible) are the most significant parameters for evaluating possible safety (and success) of the project. (Prickett-ISWS)
W75-05191

TEMPERATURE INDUCED VARIATIONS OF KINETIC COEFFICIENTS FOR TEXTILE-DOMESTIC WASTE MIXTURES,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05264

GROWTH KINETICS OF NITRIFYING MICROORGANISMS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05267

DETERMINATION OF THE EFFECT OF CARBONACEOUS SUBSTRATE CONCENTRATION ON THE RATE OF NITRIFICATION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05268

NITROGEN REMOVAL OBTAINED THROUGH HETEROTROPHIC GROWTH IN TRICKLING FILTERS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05269

SEEPAGE FLOWS - GROUNDWATER POLLUTION INVESTIGATIONS,
Rutgers - The State Univ., New Burnswick, N.J. Dept. of Civil and Environmental Engineering.
E. L. Bourodimos, and T. J. Harlukowicz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 959, $3.75 in paper copy, $2.25 in microfiche. Partial Completion Report, January 1975. 41 p, 6 fig, 6 tab, 55 ref. OWRR A-027-NJ(4). 14-31-0001-3830.

Descriptors: *Groundwater movement, *Soil water movement, Groundwater, Permeability, Porosity, Dispersion, Percolation, Water pollution sources, *Seepage, *Path of pollutants.
Identifiers: Soil isotrophy.

Soil structure, ground water flows and pollutant dispersal from field and laboratory tests were investigated. Soil structure characteristics at the

Adelphia Experimental Station were evaluated through measurements in situ and field data analysis in the laboratory. An attempt was made to evaluate the longitudinal concentration profiles and dispersion coefficient in a soil column from field samples with a step input pollutant substance. Fluorometer techniques and Rhodamine WT were employed in the laboratory research tests. Due to significant soil absorption rates the dispersion measurements were not conclusive with the fluorometry method available. Measurements in situ of coefficients of permeability and groundwater fluctuations and hydraulic gradients were successfully completed.
W75-05273

PROCEEDINGS OF THE FIRST ANNUAL NSF TRACE CONTAMINANTS CONFERENCE.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as CONF 730 802. Held August 8-10, 1973, Oak Ridge, Tennessee, Published by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, 775 p. NSF AG-395 W7405-eng-26.

Descriptors: Model studies, *Trace elements, *Distribution patterns, *Pollutant identification, *Path of pollutants, *Trace elements, *Heavy metals, Conferences, Lead, Cadmium, *Analytical techniques, Zinc, Industrial wastes, Sampling, Mercury, Sediments, Estuaries, Nickel, Aqueous solutions, Absorption, Oysters, Arsenic, Aerosols, Spectroscopy, Chromatography, Colorimetry, X-rays, Fluorescence, Human physiology, Organic compounds, Corn(Field), Toxicity.
Identifiers: Molybdenum.

This volume is a compilation of much of the available knowledge on the subject of trace contaminants. Papers included in the book were presented at the First Annual NSF Trace Contaminants Conference held in Oak Ridge, Tennessee, August 8-10, 1973. Discussion material has been added to most of these papers to improve their content and readability. The book gives a comprehensive coverage of the topic by dividing the papers into groups corresponding to the sessions of the conference: a tri-university report on the status of environmental contamination by lead; problems with modeling transport and biological translocation; problems with measurement of sources and environmental levels; sampling strategy and analytical measurements; transport and ecosystem modeling; ecological and biomedical effects and measurements; measuring environmental distribution and cycling; and problems with and opportunities for implementing the use of results from RANN programs. An author and subject index are also included. (Jernigan-Vanderbilt)
W75-05277

ANALYTICAL STUDIES OF THE SPECIATION OF MERCURY, ARSENIC AND ANTIMONY,
University of South Florida, Tampa. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-05278

DETERMINATION OF TRACE ORGANIC CONTAMINANTS IN NATURAL WATERS BY HIGH-RESOLUTION LIQUID CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-05280

HUMAN HAIR AS AN INDICATOR OF TRACE METAL ENVIRONMENTAL EXPOSURE,
Michigan Univ., Ann Arbor. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-05283

PRELIMINARY DETERMINATIONS OF TRACE METALS IN HI-VOL PADS AND SOILS AROUND THE SOUTH END OF LAKE MICHIGAN,
Metropolitan Sanitary District of Greater Chicago, Ill. Research and Development Dept.
For primary bibliographic entry see Field 5A.
W75-05291

DISTRUBUTION OF HEAVY METALS IN A BORROW PIT,
Purdue Univ., Lafayette, Ind. Dept. of Bionucleonics.
T. O. Peyton, and A. W. McIntosh.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 589-598, 3 fig, 3 tab, 3 ref.

Descriptors: *Heavy metals, *On-site collections, *Borrow pits, Ponds, Highways, Cadmium, Lead, Zinc, Aquatic environment, Air pollution, Sediments, Analytical technique, Spectroscopy, *Pollutant identification, *Indiana, *Path of pollutants, *Distribution patterns.

Two systems, one of them a borrow pit and the other a small pond, lying along the Indiana Toll Road were chosen for the study of input and distribution of cadmium, lead, and zinc, in aquatic systems. The borrow pit, located in Gary, Indiana, is exposed to automative and industrial aerial deposition, while the pond, situated near Michigan City, Indiana, receives mainly automotive inputs. Initial samples from the 0-10 cm layer of sediment indicated elevated metal levels, with maximum values of 3.3 ppm cadmium, 998 ppm zinc, and 493 ppm lead in the Gary pit and 1.40 ppm cadmium, 251 ppm zinc, and 126 ppm lead in Michigan City pond (dry weight basis). Initial correlation coefficients between % organic matter and heavy metal concentrations in the Gary pit sediment were high. Cadmium: lead: zinc ratios in pit sediment, while similar to ratios in emissions from a nearby metal refining industry, also reflected a lead input from automotive sources. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05292

INVESTIGATION OF ENRICHMENT OF MOLYBDENUM IN THE ENVIRONMENT THROUGH COMPARATIVE STUDY OF STREAM DRAINAGES, CENTRAL COLORADO,
Colorado Univ., Boulder. Dept. of Geological Science.
D. D. Runnells, D. Brown, and R. Lindberg.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 599-614, 8 fig, 1 tab, 10 ref. NSF(GI-3481X).

Descriptors: *Molybdenum, *Soil-water-plant relationships, *Mining, *Metals, Vegetation, Environmental effects, Industrial wastes, Mineral industry, Mine drainage, Mills, Sediments, *Colorado, Conifers, Grasses, *Path of pollutants, *Pollutant identification.

To define the natural background levels of molybdenum, Colorado areas which are geographically and environmentally similar to those which are experiencing man's influence, but which themselves have not been greatly disturbed, were chosen for investigation. Stream sediments and soils in the vicinity of streams were samples in four sites: (1) the stream draining the area of the world's largest molybdenum mine, (2) a nearby river draining a non-mineralized and undisturbed area, (3) the river below the juncture of these two streams and (4) streams draining a highly mineralized but undisturbed area. Sediments of the non-mineralized stream ranged from 2 to 6 ppm while those of the mineralized, undistrubed area ranged from 8 to 30 ppm. Soils from a mineralized undisturbed area can be an order of magnitude greater than those of a non-mineralized area. Glaciation may tend to blur these distinctions. The mixing of the highly mineralized, disturbed materials with the stream from the non-mineralized area gave intermediate values. Plant materials offer less well defined differences in the content of molybdenum from area to area. Conifer do not seem to reflect all the abundance of molybdenum in alpine environments. Stream sediments are the best indicator of molybdenum mineralization. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05293

ARSENIC DISTRIBUTION IN WATERS AND SEDIMENTS OF THE PUGET SOUND REGION,
Washington Univ., Seattle. Dept. of Oceanography.
E. A. Crecelius, and R. Carpenter.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 615-625, 4 fig, 3 ref.

Descriptors: *Arsenic compounds, *Heavy metals, Surface waters, *Environmental effects, *Path of pollutants, Copper, Industrial waters, Sediments, Air circulation, Sea water, Freshwater, *Washington, *Distribution patterns.
Identifiers: *Puget Sound(Wash).

The sources, sinks and overall biogeochemical cycle of both natural and manderived arsenic are being examined in the Puget Sound area. The natural distribution of arsenic in the sediments and waters of Puget Sound is modified by a large copper smelter which releases approximately 300 tons/year of arsenic in stack dust to the atmosphere, and roughly an equal amount in liquid effluent directly in Puget Sound. The smelter also dumps solid slag containing 1% as directly into Puget Sound. Arsenic concentrations in sediments 5-10 miles away from the smelter are 2-3 time background values. Dissolved arsenic concentrations in surface waters near the smelter are 1000 times background levels. The smelter dust which is released to the atmosphere is wind transported over 30 miles and contributes arsenic to lakes and soils over this area. The arsenic levels in the sediments of lakes downwind of the smelter have increased several fold since the smelter began operating around 1900. This report summarizes some of the interesting results of two years of analyses for arsenic in the sediments, waters, suspended matter and organisms of Puget Sound and nearby lakes and rivers. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05294

DYNAMIC REDISTRIBUTION OF METHYLMERCURY IN A POND ECOSYSTEM,
Oak Ridge National Lab., Tenn.
J. W. Huckabee, and R. A. Goldstein.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 626-639, 3 fig, 1 tab, 7 ref.

Descriptors: *Mercury, *Path of pollutants, *Model studies, *Tracers, *Detritus, Metals, Food chains, Transfer, Biomass, Ecosystems, Ponds, *Pollutant identification, *Distribution patterns.
Identifiers: *Methylmercury.

A linear, eight-compartment model was developed to describe the dynamic redistribution of methylmercury (MeHg) in a pond ecosystem following a pulse input. The eight compartments were water,

sediment, seston, benthic invertebrates, mosquitofish, bluegill, largemouth bass, and carp. Methylmercury transfers resulting from predation were assumed to be donor dependent. Eight millicuries of 203 Hg-tagged MeHg (1.81 mg of Hg) was introduced into a 1011.8 sq m pond to test the model. The pond was stocked with mosquitofish, Gambusia affinis; bluegill, Lepomis macrochirus; largemouth bass, Micropterus salmoides; and carp, Cyprinus carpio. The water, suspended detritus, plankton, invertebrates, fish and sediments were sampled periodically and assayed for 203 Hg activity. Preliminary analyses indicated the need to model biomass as well as MeHg dynamics where there were large fluctuations in trophic level biomass, since predation rate between trophic levels is a function of the relative sizes of the levels. Seston, especially plankton-organic detritus, was found to be the major reservoir of MeHg in the system during the time frame of the experiment. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05295

PATTERNS OF TRACE-ELEMENT DISTRIBUTION IN A FORESTED WATERSHED,
Oak Ridge National Lab., Tenn.
R. I. VanHook, W. F. Harris, G. S. Henderson, and D. E. Reichle.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 640-656, 4 fig, 5 tab, 12 ref.

Descriptors: *Forest watersheds, *Path of pollutants, *Metals, Vegetation, *Soil-water-plant relationships, Ecosystems, Transfer, Model studies, Soil contamination, Mass spectrometry, *Trace elements, Forests, *Pollutant identification, *Tennessee.
Identifiers: Biogeochemical cycles.

Concentrations of Al, B, Ba, Br, Cd, Cl, Cr, Mn, Ni, Pb, and Zn were determined in leaf, twig, branch, bole, and root components of the major tree species (chestnut oak, tulip poplar, shortleaf pine, hickory, black gum, dogwood, and sourwood) on Walker Branch Watershed in east Tennessee. Concentrations of Cd, Pb, and Zn decreased from young (twig) to old (bole) vegetative components; these patterns were not as obvious for the other elements studied. Hickory concentrated more elements than did any other tree species. Shortleaf pine exhibited higher levels of Al, Br, and Cl than the other tree species examined. Decomposing litter exhibited the highest concentrations of all elements for any biotic component examined in the forest; Cd, Pb, and Zn were characteristically found in greatest amounts in humic materials. Zones of accumulation were observed in lower soil horizons for all elements studied. This continuing research on trace-element dynamics in the environment emphasized biogeochemical cycles in ecosystems. The ultimate objective is the development of an environmental transport model and data sets which couple the hydrologic cycle with regulating ecological processes for watershed units of the landscape. The first stage of this research is presented as the quantification of trace-element concentrations in major biotic and abiotic components of a forested ecosystem. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05296

ACCUMULATION OF AVAILABLE MOLYBDENUM IN AGRICULTURAL SOILS IRRIGATED WITH HIGH-MOLYBDENUM WATERS,
Colorado State Univ., Fort Collins. Dept. of Agronomy.
D. R. Jackson, W. L. Lindsay, and R. D. Heil.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 657-667, 6 fig, 6 ref.

Descriptors: *Molybdenum, *Soil-water-plant relationships, *Irrigation, *Transfer, *Path of pollutants, Forages, Cattle, Anion exchange, Alfalfa, *Colorado, Livestock, Industrial wastes, Vegetation, Agriculture, *Pollutant identification.

Some of the irrigation waters in the front range of Colorado and elsewhere are relatively high in molybdenum. The purpose of this research was to determine whether this molybdenum might accumulate in forages to the extent of being hazardous to grazing livestock. Anion exchange resin was used as a soil test to monitor available molybdenum in several soil profiles. Resin extractable molybdenum was highly correlated with the molybdenum concentration in alfalfa. Aqueous suspensions of three calcareous soils were made at soil-to-water ratios of 1:1, 1:5, 1:10 and 1:50 to determine the effect of dilution on water-soluble molybdenum. At the 1:50 ratio as much as 75% of the total soil molybdenum was solubilized. Results showed that molybdenum applied to calcareous soils low in indigenous molybdenum remained labile. Therefore, applications of high-molybdenum irrigation waters may result in excessive levels of molybdenum in forages. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05297

ROOT DEVELOPMENT AND NUTRIENT UPTAKE BY CORN GROWN IN SOLUTION CULTURE,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-05305

THE EFFECT OF PARK USE ON SURFACE WATER QUALITY,
New Hampshire Univ., Durham. Water Resources Research Center.
C. T. K. Ching, and G. E. Frick.
In: Growth and Change, A Journal of Regional Development, Vol 5, No 4, p 15-20. October, 1974, 1 fig, 2 tab, 3 ref. OWRT A-026-NH (3) 14-31-0001-3229.

Descriptors: *Water quality, *Environmental effects, *Parks, *Attitudes, Surveys, Climates, *New Hampshire, *State parks, Recreation, Lakes.
Identifiers: Attitudinal surveys, Summer homes, *Pawtuckaway State Park (NH), Pawtuckaway Lake(NH).

Pawtuckaway State Park has been operating since 1966. This large rural park fronts on a portion of Pawtuckaway Lake which is 800 acres in size. Numerous clusters of seasonal houses are adjacent to the shoreline and the park. During the summer of 1971 an intensive study was made of (1) lake water quality as affected by park usage, and (2) the attitudes of private water-oriented landowners toward the park. Both the water quality analysis and the attitudinal survey indicated that the establishment of Pawtuckaway State Park has not had an adverse effect on the quality of the immediate environment. Coliform bacteria, a water quality indicator, occasionally exceeded the State standard at the beach area. However, neither climate, attendance, weekend use (As high as 8,000 people) nor time were significant determinants of the coliform level. The majority of the 90 landowners interviewed held favorable attitudes toward the park, including an opinion that the park improved their property values.
W75-05306

HOW TO INCORPORATE WATER QUALITY AND POLLUTION CONSIDERATIONS INTO THE MODEL OF THE WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05321

LATERALLY INTEGRATED NUMERICAL WATER QUALITY MODEL FOR AN ESTUARY,
Rhode Island Univ., Kingston. Dept. of Oceanography.
M. L. Spaulding.
Journal of Fluids Engineering, Vol 96, No 2, p 103-110, June, 1974. 12 fig, 23 ref.

Descriptors: *Estuaries, *Water quality, *Water pollution sources, Biological oxygen demand, Storm drains, Mathematical models, *Rhode Island, *Path of pollutants.
Identifiers: Narragansett Bay(RI).

A two-dimensional, laterally integrated, estuarine, numerical water quality model was developed and applied to the dissolved oxygen-biochemical oxygen demand system of Narragansett Bay, Rhode Island. It exhibited agreement with the existing data in predicting vertical structure. An application of the model to storm-sewage overflow for the Bay also exhibited a favorable comparison to the existing data. (Leibowitz-FIRL)
W75-05323

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS, VOL. 2.
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05342

ECOSYSTEM MODELING: EFFECTS OF TEMPERATURE ON ESTUARINE MICROCOSMS,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5C.
W75-05346

SECOND ANNUAL REPORT, DOT-CIAP PROGRAM,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2B.
W75-05349

PUERTO RICO NUCLEAR CENTER, ANNUAL REPORT, 1973.
Puerto Rico Univ., San Juan.
For primary bibliographic entry see Field 5A.
W75-05350

5C. Effects Of Pollution

CONTINUOUS-FLOW STUDIES OF PHOSPHORUS AS A LIMITING NUTRIENT FOR CAYUGA LAKE PHYTOPLANKTON.
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
J. P. Barlow, B. J. Peterson, and A. E. Savage.
In: Proceedings of 16th Conference Great Lakes Research, 1973, International Association for Great Lakes Research, Ann Arbor, Michigan, 1974. p 7-14, 3 fig, 3 tab, 21 ref. OWRT A-035-NY(3).

Descriptors: *Laboratory tests, *Phosphorus, *Limiting factors, *Nutrients, *Phytoplankton, *New York, Fluorescence, Photosynthesis, Algae, Biological communities.
Identifiers: *Cayuga Lake(NY), Turbidostats, Species composition, Chemostats.

In a continuous-flow culture, it is possible by manipulating supply rate and nutrients in the medium to subject populations to exactly controlled nutrient concentration and displacement rates. Moreover, its operation provides conditions that facilitate measurement of dynamic processes that are ordinarily difficult to determine, such as cell division rates, nutrient uptake rates or changes in species composition. Experiments are described in which samples of the natural phytoplankton community from Cayuga Lake, New York were maintained in chemostats using filtered lake water as a medium. When P-enriched lake water was supplied the added P was rapidly assimilated and the equilibrium population that resulted, although as much as ten-fold larger, was still P-limited and nearly unchanged in species composition. When, however, the same initial populations were maintained under P-sufficient conditions in a turbidostat, there were rapid changes in species composition, the populations eventually becoming dominated by small diatoms. These experiments thus suggest that most of the Cayuga Lake components of the summer phytoplankton community are P-limited and that relatively large changes in P would have to be made before other nutrients became limiting. (Jones-Wisconsin)
W75-04891

CHLOROPHYLL A DISTRIBUTION IN LAKE HURON AND ITS RELATIONSHIP TO PRIMARY PRODUCTIVITY,
Canada Centre for Inland Waters, Burlington (Ontario).
W. A. Glooschenko, J. E. Moore, and R. A. Vollenweider.
In: Proceedings 16th Conference Great Lakes Research, 1973, International Association Great Lakes Research, Ann Arbor, Michigan, 1974., p 40-49. 9 fig, 2 tab, 26 ref.

Descriptors: *Chlorophyll, *Distribution, *Lake Huron, *Primary productivity, Seasonal, Trophic level, Photosynthesis.
Identifiers: *Saginaw Bay(Lake Huron).

The spatial and temporal distribution of chlorophyll-a, primary production and assimilation number (production/chlorophyll ratio) in Lake Huron, including Saginaw Bay, were investigated. Water samples were collected from 46 stations on eight cruises between April and December 1971. Except for Saginaw Bay and U.S. inshore waters south of the bay mouth, chlorophyll-a values were quite low with maxima rarely exceeding 3 micrograms/l. The seasonal cycle of chlorophyll-a was weakly bimodal with maxima in mid-late spring and mid-autumn. The summer minimum was not pronounced. Sharp gradients of chlorophyll-a occurred in Saginaw Bay, where the highest chlorophyll-a values yet observed in the Great Lakes were noted. Between April and December, the mean chlorophyll-a value for the lake (excluding Saginaw Bay) was between 1 and 2 microgram/l, indicating extreme oligotrophy. Primary production measurements showed the same pattern as chlorophyll-a with highest values in Saginaw Bay. Integral photosynthesis values, mg/sq m/hr or year, were roughly half that of Lake Ontario. Assimilation numbers, mgC/mg chlorophyll-a hr were positively correlated with temperature. Highest numbers were in Saginaw Bay, indicating its enriched nutrient status. (Jones-Wisconsin)
W75-04892

ENVIRONMENTAL TESTING OF CITRATE: BIOASSAYS FOR ALGAL STIMULATION,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
A. G. Payne.
In: Proceedings 16th Conference Great Lakes Research, 1973 International Association Great Lakes Research, Ann Arbor, Michigan, 1974. p 100-115. 2 fig, 5 tab, 9 ref.

Descriptors: *Bioassay, *Algae, *Growth rates, *Sodium compounds, Detergents, Eutrophication, Sewage, *Lake Erie, *Lake Michigan, Standing crops, Biodegradation, Inhibitors, Chelation.
Identifiers: *Citrate, *Biostimulation, Selenastrum capricornutum, Microcystis aeruginosa, Cleveland(Ohio), Buffalo(NY), Chicago(Ill).

Sodium citrate has been under investigation by the industry as a possible detergent builder; it is currently being used in several liquid detergent brands. Possible effects of sodium citrate on eutrophication was investigated throughout an algal growing season using the Algal Assay Procedure Bottle Test on 17 locations, including Lakes Erie and Michigan. The algae selected for study were bacteria-associated Selenastrum capricornutum and Microcystis aeruginosa. Growth was followed by cell counts. Sewage generally stimulated algal growth to higher maximum standing crops than the control. Citrate added to sewage normally had no additional effect on algal maximum standing crops and no stimulation by addition of citrate along was detected in any water. Citrate added to sewage prevented die-off of Microcystis in four waters and citrated added without sewage treatment and at relatively high levels of 1 and 10 mg/l caused some growth inhibition of Selenastrum in seven waters. It is postulated that these effects were due to chelation of trace metals. Citrate added to sewage caused an increase in growth rate in eight situations and a decrease in growth rate in six situations. In most instances, the different growth rates caused no differences in maximum standing crops. (Jones-Wisconsin)
W75-04893

WATER QUALITY RELATIONSHIPS IN THE GREAT LAKES: ANALYSIS OF A SURVEY QUESTIONNAIRE,
Michigan Univ., Ann Arbor. School of Natural Resources.
J. W. Bulkley, and A. P. Mathews.
In: Proceedings 16th Conference Great Lakes Research, 1973, International Association Great Lakes Research, Ann Arbor, Michigan, 1974, p 872-889. 13 tab, 6 ref. NOAA 04-4-158-23.

Descriptors: *Water quality, *Great Lakes, *Institutions, *Data collections, *Surveys, Local governments, Water pollution sources, Waste treatment, State governments, Land use, Human population, Density, Land resources, Comprehensive planning.
Identifiers: Provincial agencies, Questionnaires.

A questionnaire survey conducted among 650 governmental units in the Great Lakes areas has identified the levels of water quality, the perceived factors contributing to the destruction of water resources, and possible solutions to deteriorating water quality. One-way frequency distributions obtained, based on 300 questionnaires, indicate that water quality perceived is medium or lower in 92% of the cases, while it is low or very low in 35%. Inadequate municipal sewage treatment and inadequate industrial effluent treatment was identified to be the most common factors causing the destruction of water resources. The primary agencies responsible for maintenance of water quality in the local areas were the state and provincial. Analysis of two-variable relationships have been made with a view to link the chain of causal factors influencing water quality in the Great Lakes; it is found to vary with the type of land use and population density, decreasing with both increasing degree of industrialization and with increasing population density. A causal sequence model in which population density appears as the intervening variable between land use and water quality is proposed and this seems to correlate with the data. (Jones-Wisconsin)
W75-04894

IMPACT OF DETERGENT PHOSPHATE REDUCTIONS ON WATER QUALITY,
State University Coll., Buffalo, N.Y. Great Lakes Lab.
R. A. Sweeney.
In: Proceedings 16th Conference Great Lakes Research, 1973, International Association of Great Lakes Research, Ann Arbor, Michigan, 1974, p 967-976. 6 fig, 1 tab, 11 ref. EPA 801229.

Descriptors: *Detergents, *Pollution abatement, *Phosphates, *Legislation, Water quality, Streams, Algae, Biomass, Biochemical oxygen demand, Nutrient removal, Sewage treatment, Eutrophication, *New York, On-site investigations.
Identifiers: *Erie County(NY).

Stream quality was measured at 164 stations on 28 major streams during June through August 1970-1972 in Erie County, New York. Twelve sites in remote regions served as controls. During this period, the phosphate content of detergents sold in the county was limited by legislative action to a maximum of 8.7% P as of April 30, 1971 and 0.5% P as of January 1, 1972. The ortho and total P content of the influent to and effluent from municipal sewage treatment plants decreased by 25% and 20%, respectively in 1971 and 55% and 45% in 1972. At the same time, the ortho and total phosphorus in the streams declined by 47% nad 33% in 1971 and 67% and 60% in 1972. Algal biomass decreased by 27% in 1971 and 55% by 1972. BOD improved by 20% ain 1971 and 27% in 1972. BOD only, increased by 90% in 1972 at the control locations. There was no major difference in rainfall or discharge between the study periods. Since no improvement in sewage treatment plants and collection systems occurred, it was concluded that the phosphate detergent limitation resulted in stream quality improvement and eutrophication abatement. (Jones-Wisconsin)
W75-04895

MICROBIOLOGICAL EXAMINATION OF LAKE ONTARIO SEDIMENTS: I. DISTRIBUTION OF AEROBIC AND ANAEROBIC HETEROTROPHS IN SEVERAL LAKE ONTARIO SEDIMENTS,
Canada Centre for Inland Waters, Burlington (Ontario).
J. B. Bell, and B. J. Dutka.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 1-8. 3 fig, 4 tab, 9 ref.

Descriptors: *Bacteria, *Lake Ontario, *Sediments, *Distribution, *Organic matter, Aerobic conditions, Anaerobic conditions, Depth, Oxidation-reduction potential, Density, Cores, Correlation analysis.

Bacteriological studies on Lake Ontario deep water sediments were initiated to investigate distribution of aerobic and anaerobic heterotrophs and their relationships to organic matter. Relationship between Eh and bacterial densities was also investigated. Cores were collected in the Rochester, Mississauga and Niagara Basins from areas typical of deep water environment. The sampled areas each had fine silty clay mud accumulations and the highest organic carbon content in the basin. A fourth core was collected from a shallow silty clay mud location in the Kingston Basin, at the junction of the St. Lawrence River and Lake Ontario where the highest organic carbon content in Lake Ontario is found. Total heterotroph populations are proportional to organic matter present. Majority of sediment bacteria are facultative, as the obligate aerobes are eliminated by the reduced oxygen tension after the first few centimeters. Facultative bacteria, by utilizing available oxygen, affect Eh of sediment profile. The uniformity of bacterial densities, Eh and organic matter distribution throughout the samples cores suggests uniform conditions in the silty clay mud sediments

of the deep water basins in Lake Ontario. (See also W75-04897) (JonessWisconsin)
W75-04896

MICROBIOLOGICAL EXAMINATION OF LAKE ONTARIO SEDIMENTS: II. HETEROTROPH METHODOLOGY COMPARISON.
Canada Centre for Inland Waters, Burlington (Ontario).
J. B. Bell, and B. J. Dutka.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 9-14. 4 fig, 5 ref.

Descriptors: *Bacteria, *Lake Ontario, *Sediments, *Laboratory tests, Biomass, Distribution, Temperature, Analytical techniques, Cores, Aerobic conditions, Anaerobic conditions.
Identifiers: Spread plate technique, Membrane filtration technique, Mesophilic bacteria.

Heterotrophic bacterial densities in sediment samples collected from four basins in Lake Ontario were investigated by use of membrane filtration and spread plate techniques. Bacterial populations thus enumerated are directly influenced by the medium used, incubation temperature, incubation period, and oxygen concentrations. Densities obtained by membrane filtration and spread plate techniques were highly comparable. Aerobic densities were almost identical in the tested samples while anaerobic densities, although maintaining similar distribution patterns, showed greater disparity between test samples, and illustrated nonspecific technique dominance. Total bacterial populations, aerobic and anaerobic, were coincident at the sediment-water interface. The deeper the section of sediment tested for aerobic populations, the greater the difference between 4 and 20C. Anaerobic populations showed less 4-20 C variation, with the 20 C populations never exceeding the 4 C populations by more than one order of magnitude. Either there are equal populations of mesophiles and psychrophiles with very strict temperature requirements throughout the sediments or more probably the great majority of the anaerobic bacteria are mesophiles. Apparently there are very few if any true psychrophilic bacteria in Lake Ontario sediments. The spread plate technique was method of choice. (See also W75-04896) (Jones-Wisconsin)
W75-04897

EFFECT OF PAPER PLANT POLLUTION AND SUBSEQUENT ABATEMENT ON A LITTORAL MACROINVERTEBRATE COMMUNITY IN LAKE ONTARIO: PRELIMINARY SURVEY,
State Univ., Coll., Oswego, N.Y. Lake Ontario Environmental Lab.
J. G. Bocsor, and J. H. Judd.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 21-34. 2 fig, 2 tab, 30 ref. NOAA-SG-2-35281.

Descriptors: *Pulp wastes, *Water pollution effects, *Biological communities, *Cladophora, Abatement, Pulp and paper industry, Littoral, Invertebrates, *Lake Ontario, Seasonal, New York, Effluents, Amphipods, Diptera, Larvae, Oligochaetes, Gastropods, Systematics, Ecological distribution.
Identifiers: Biological diversity, Oswego(NY), Gammarus fasciatus, Hirudinea, Turbellaria, Trichoptera, Cricotopus, Naididae.

Biological parameters were used to determine the effects of seasonal changes in environmental conditions and the effects of pollution and its abatement on the structure and level of organization of the littoral invertebrate community in the immediate area of the Hammermill Paper Company, Oswego, New York on Lake Ontario. The diversity, meaning the relative number of species, will be a measure of the level of organization of that community. The community was composed of three major taxa: Amphipoda, represented only by Gammarus fasciatus, Diptera larvae, and Oligochaeta. Specimens of Gastropoda, Hirudinea, Turbellaria, and Trichoptera were also found but these were not abundant. In all, about 35 species were identified. It seems that the level of diversity has been depressed by the introduction of paper mill wastes over a long period. Comparisons were made between two stations nearest the effluent duct, and one at a distance of 150 m, using the index of Fisher et. al., to summarize community diversity. These showed that diversity was depressed by the effluent. An analysis of community structure was made using the log series distribution as a model. (Jones-Wisconsin)
W75-04898

THE DISTRIBUTION OF DIATOMS ON THE SUPERFICIAL SEDIMENTS OF LAKE ONTARIO,
Waterloo Univ. (Ontario). Dept. of Biology.
H. C. Duthie, and M. R. Sreenivasa.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 45-52. 2 fig, 2 tab, 9 ref.

Descriptors: *Spatial distribution, *Diatoms, *Lake sediments, *Lake Ontario, Plankton, Paleolimnology, Ecological distribution, Eutrophication, Littoral, Profundal zone.
Identifiers: Species diversity, Stephanodiscus hantzschii, Stephanodiscus astraea, Stephanodiscus tenuis, Tabellaria fenestrate, Melosira islandica, Melosira binderana, Fragilaria crotonensis, Cyclotella atomus, Achanthes haukiana, Achnanthes ovalis, Asterionella formosa.

Composition of sedimentary diatom flora, horizontal distribution of species, relations of the sedimentary diatom flora to that of plankton and any correlations with chemical or other environmental factors were determined. Over 100 diatom taxa were identified from samples of the top 3 cm of sediment at five inshore and six offshore stations in Lake Ontario. The diversity of the samples was generally low; highest values were found among the inshore samples. At the inshore stations, 38-57% of the individuals per sample were typical of eutrophic conditions with higher values off Toronto, Ontario and near Rochester, New York. The largest group of diatoms in all offshore samples except one were those classified as eurytopic-eutrophic and ranged from 50 to 64% of the total count. The exception was in the shallow northeastern basin where the eutrophic category was the largest. Diatoms typical of eutrophic conditions declined in a series of offshore samples from 29% in the extreme westerly sample to 1% in the deep southeastern basin. It may be concluded that the sediment diatom flora can be used with caution to interpret present and past ecological conditions in Lake Ontario. (Jones-Wisconsin)
W75-04899

DISTRIBUTION OF CHLOROPHYLL A AND RELATED VARIABLES IN ONTARIO WATERS OF LAKE ST. CLAIR,
Lake Erie Fisheries Research Station, Wheatley (Ontario).
J. H. Leach.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 80-86. 5 fig, 1 tab, 12 ref.

Descriptors: *Distribution, *Chlorophyll, *Lakes, Nutrients, Eutrophication, Great Lakes, Currents(Water), Winds, Chemical properties, Agricultural runoff, Sewage effluents, Municipal wastes, Phytoplankton, Biomass, Silica, Lake Ontario.
Identifiers: *Lake St. Clair.

Information collected between April and November 1971 on distribution of chlorophyll-a and selected environmental variables in Ontario waters of Lake St. Clair are reported. Several drainage canals and small rivers enter the lake along the east and south shores draining a large area of agricultural land intensively cultivated. Effluents from several towns, villages, approximately 2000 cottages, and municipalities drain into the lake. Current structure, established by the flow of Lake Huron water through the delta system and wind direction, is the primary influence. Gradients in concentrations of chlorophyll and chemical variables increase from northwest to southeast. Because of nutrient inputs from agricultural drainage and sewage discharge and greater stability in water mass, the southeastern area is more eutrophic than the remainder of the Ontario section of the lake. The rate at which eutrophication increases in the remainder of the lake will depend largely on the quality of water entering through the St. Clair River. The nutrient demand in the southeastern area seems to be in excess of that required for phytoplankton biomass. In view of the shallowness of the lake it is likely that submerged aquatic plants and attached algae are competing for available nutrients. (Jones-Wisconsin)
W75-04900

METHANE PRODUCTION IN LAKE ERIE SEDIMENTS: TEMPERATURE AND SUBSTRATE EFFECTS,
Ohio State Univ., Columbus. Dept. of Microbiology.
G. E. Mallard, and J. I. Frea.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 87-93. 3 fig, 1 tab, 15 ref.

Descriptors: *Methane, *Sediments, *Temperature, Inhibition, Bacteria, *Lake Erie, Lake sediments.
Identifiers: Hydrogen gas, Methanol, Ethanol, Propanol, Butanol, Formate, Acetate, Propionate, Butyrate.

The effect of temperature and the addition of various compounds--hydrogen gas, methanol, ethanol, propanol, butanol, formate, acetate, propionate and butyrate--on the production of methane by organisms in sediment from Lake Erie were determined. Incubation temperature used were 10, 28, and 37 C. All cultures were grown in the laboratory. In the temperature studies, the sediment along was used as substrate. In the substrate studies, additional substrates were added aseptically to each bottle after gas addition and before the inoculum. More methane is produced at 37 C than at 28 C. No methane is produced at 10 C unless the culture is first primed by growth at higher temperatures. Methane production is enhanced by the addition of methanol, acetate, ethanol, propanol, butyrate and hydrogen gas. The addition of butanol, formate and propionate appears to inhibit normal methane production. All of these substrates would normally be found in the lake sediments. The concentrations of each compound would change seasonally as does the amount of total organics in the lake. It is clear that a variety of compounds are able to stimulate methane production. (Jones-Wisconsin)
W75-04901

BACTERIA-PHYTOPLANKTON RELATIONSHIPS IN LAKE ERIE,
Canada Centre for Inland Waters, Burlington (Ontario).
A. S. Menon, W. A. Glooschenko, and N. M. Burns.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 94-101. 5 fig, 19 ref.

Descriptors: *Bacteria, *Phytoplankton, *Lake Erie, *Seasonal, *Spatial distribution, Organic

matter, Density, Eutrophication, Mesotrophy, Stratification, Hypolimnion, Chlorophyll, Diatoms, Metabolism, Cycling nutrients.

Seasonal distribution of bacteria and phytoplankton at selected stations in Lake Erie was determined and type of relationships which exist between them during the period from late May to early December 1971 was established. Six stations were chosen to cover the three Lake Erie basins. The number of bacteria were determined on all samples by filtering 1-5 ml of water sample through a 0.45 micron membrane filter. The chlorophyll-a value was used as a measure of phytoplankton. A number of different, simple relationships existed between bacteria and phytoplankton, of which four different types were found in this study. Generally, bacteria appeared to be dependent on the nutrients derived from the excretion and degradation of phytoplankton. It appears that a large number of various factors determine which of the simple bacteria-phytoplankton-carbon relationships can exist at any one time. It is apparent from these findings that future research on the factors responsible for the different types of relationships between bacteria and phytoplankton will gain further insight into the metabolic cycle and the problem of eutrophication of the Great Lakes system. (Jones-Wisconsin)
W75-04902

BENTHIC MACROFAUNA IN THE COASTAL ZONE OF SOUTHEASTERN LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
S. C. Mozley, and L. C. Garcia.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 102-116. 3 fig, 4 tab, 30 ref.

Descriptors: *Benthic fauna, *Coasts, *Lake Michigan, Nuclear powerplants, Biological communities, Great Lakes, Depth, Diptera, Oligochaetes, Sediments, Indicators, Baseline studies, Environmental gradient, Spatial distribution, *Michigan.
Identifiers: *Benton Harbor(Mich), Species diversity, Pontoporeia effinis, Sphaerium striatinum, Limnodrilus hoffmeisteri, Stylodrilus heringianus, Sphaerium, Pisidium.

Area around a large atomic power plant, on the shore of Lake Michigan, was studied to assess the inshore water quality and biological communities near the plant before it begins operation. In July 1970, the first of a continuing series of benthos surveys was conducted in southeastern Lake Michigan in an area centered 16 km south of Benton Harbor, to determine benthic species composition and abundance. Application of a standard species diversity index to the samples gave moderate to high values, indicating good quality of benthic environment. Where low values occurred, they were attributable to the severity of the natural environment rather than pollution. A preliminary hypothesis indicates that a zonation of the benthic environment is a general feature of exposed coastal zones in the Great Lakes and this zonation is reflected in both total numbers and species composition of the benthic fauna. The most important factors in this zonation are water movements and their control of sedimentation processes. Thermal stratification and variation may have supplementary effects on species compositions. In spite of general eutrophication in southern Lake Michigan, the benthic community is relatively diverse and well balanced. (Jones-Wisconsin)
W75-04903

NUTRIENT DISCHARGES TO GREEN BAY, LAKE MICHIGAN FROM THE LOWER FOX RIVER,
Wisconsin Univ., Green Bay. Coll. of Environmental Sciences.
P. E. Sager, and J. H. Wiersma.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 132-148.

Descriptors: *Eutrophication, *Organic matter, *Nutrients, *Discharge(Water), *Lake Michigan, Municipal wastes, Ammonia, Seasonal, Phosphorus, Anaerobic conditions, Nitrates, Chemical oxygen demand, Chlorophyll, Phosphates, Waste assimilative capacity, Nitrogen, Biochemical oxygen demand, *Wisconsin.
Identifiers: *Green Bay(Lake Michigan), *Fox River(Wis), Lake Winnebago(Wis).

The annual variation in nutrient discharges to Green Bay from the Fox River was determined and the relative importance of nutrient inputs to the Fox River from municipal sources and from Lake Winnebago assessed. To assess the downstream variation in nutrient concentrations and algal abundance, ten sampling stations were set up in a grid pattern over the lower bay, extending out 9.5 miles. Seasonal variations in discharge of nutrients and organic matter from the Fox River to Green Bay were related to the quality of Lake Winnebago discharges and to processes of assimilation, sedimentation and release in the river. Lake Winnebago's effects on the river included increased levels of ammonia-nitrogen in spring, total phosphate in summer and orthophosphate in fall. Anoxic conditions in portions of the river indicated excessive organic loading. Maximum loadings of phosphates and organics during winter and spring reflected high flows, reduced assimilation and releases from the drainage system. As a nutrient source for lower Green Bay, Lake Winnebago contributes nitrogen and phosphorus compounds to lower Fox River in excess of or approximately equal to that contributed by municipal treatment plants. (Jones-Wisconsin)
W75-04904

NUTRIENT ENRICHMENT AND ITS EFFECT ON PHYTOPLANKTON PRODUCTION AND SPECIES COMPOSITION IN LAKE SUPERIOR,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
C. L. Schelske, L. E. Feldt, M. A. Santiago, and E. F. Stoermer.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 149-165. 4 fig, 6 tab, 15 ref. AEC CO0-2003-13.

Descriptors: *Nutrients, *Phytoplankton, *Productivity, *Lake Superior, Phosphorus, *Eutrophication, Silica, Trace elements, Vitamins, Chlorophyll, Photosynthesis, Nitrogen, Biological communities, On-site tests, Limiting factors.
Identifiers: *Species composition, Cyclotella glomerata, Cyclotella stelligera, Cyclotella comensis, Species diversity.

Whether phosphorus is a limiting nutrient in Lake Superior and whether other nutrients would increase phytoplankton growth and productivity were determined. The study was divided into two phases: measurement of environmental parameters at a number of lake stations and a series of nutrient enrichment experiments, conducted at Station 11. Nutrient enrichment experiments were conducted by adding nutrients to lake water with natural phytoplankton assemblages contained in plastic bags in Lake Superior during August 1971. Additions of small concentrations of phosphorus (7.5 micrograms/l) stimulated phytoplankton growth threefold and fivefold by addition of 30 micrograms P/l, plus silica, trace metals, vitamins and EDTA. Predicted effects of nutrient enrichment based on phosphorus alone will be very conservative. These data indicate that phosphorus, when combined with small quantities of trace metals, vitamins and chelating agent, has a greater effect on phytoplankton growth than phosphorus alone. Concentrations of chlorophyll and carbon fixation rates also increased in the treatment--one containing phosphorus and one containing phosphorus, silica and nitrogen. Phytoplankton assemblages in the experiments were dominated by three Cyclotella species--C. glomerata, C. stelligera and C. comensis. The data indicate that the experimental results would have been representative of the entire study area. (Jones-Wisconsin)
W75-04905

CHEMICAL CONTROL OF AQUATIC WEEDS AND ITS EFFECT ON THE NUTRIENT AND REDOX STATUS OF WATER AND SEDIMENT,
Wisconsin Univ., Madison. Dept. of Soil Science.
G. V. Simsiman, G. Chesters, and T. C. Daniel.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 166-180. 6 fig, 31 ref.

Descriptors: *Chemcontrol, *Aquatic weed control, *Nutrients, *Oxidation-reduction potential, Sediments, Herbicides, Diquat, Anaerobic conditions, *Wisconsin, Oxygenation, Phosphates, Sulfur, Decomposing organic matter, Nitrogen, Phosphorus, Dissolved oxygen, Ammonia, Laboratory tests, Eutrophication.
Identifiers: Endothall, Watermilfoil, Elodea, *Lake Mendota(Wis).

Observation of the effect of weedkill on the growth of algal blooms, nutrients, and redox status are described. The experiment was conducted in simulated sediment-water systems in a temperature controlled plant growth room provided with fluorescent and incandescent light and well venti lated. Sediment and water were obtained from Lake Mendota, Madison, Wisconsin. After matted growth of watermilfoil (Myriophyllum spicatum) and Elodea (Elodea canadensis) were established and guppies introduced, herbicida treatments were made, namely: control, diqua (1.5 ppm), endothall (3.0 ppm), combination o diquat (0.375 ppm) and endothall (0.75 ppm) and combination of diquat (0.75 ppm) and endothal (1.5 ppm). Anoxic conditions developed earlier i the diquat- and combination treated sediment water systems than in the endothall-treate systems. Reduction process and anoxia occurre concomitantly. Anoxia was followed by rapi reoxygenation because of algal blooms. Accumu lation of dissolved orthophosphate-P and sulfu occurred during weed decompostion but only trac amounts of ammonia-nitrogen were found. Ino ganic N and F released from the decomposin weeds were readily available for algal assimilatio and/or sorption by the sediment. Diquat alone or combination with endothall caused more rapi weedkill, thereby promoting more drastic change in the aquatic environment than endothall alon (Jones-Wisconsin)
W75-04906

BACTERIAL AND PHYSICAL CHARA TERISTICS OF LAKE ONTARIO SEDIMEN DURING SEVERAL MONTHS,
Canada Centre for Inland Waters, Burlingto (Ontario).
J. M. Vanderpost.
In: Proceedings 15th Conference on Great Lak Research, April 5-7, 1972, Wisconsin Univ Madison, International Association Great Lak Research, p 198-213. 7 fig, 12 tab, 36 ref.

Descriptors: *Sediments, *Bacteria, *Physi properties, *Lake Ontario, Cores, Aerobic ba teria, Anaerobic bacteria, Sulfur bacteria, Se mentology, Nitrogen fixation, Dating, Nitroge Carbon, Organic matter, Carbonates, Hydrog ion concentration, Oxidation-reduction potenti Sands, Silts, Clays, Sedimentation rates, Dep Color, Seasonal, *Lake sediments.

Beginning in July 1971 and continuing through February 1972, sediment cores were obtained monthly at one station in Lake Ontario in an attempt to demonstrate whether seasonal ariations occurred in heterotrophic bacterial total counts ad several bacterial biotype distributions in Lake Ontario sediments. Six core subsections were analyzed for total aerobic and anaerobic heterotrophic bacteria, sulfur-oxidizing, sulfate-reducing, ammonifying, nitrogen-fixing denitrifying, and putrefactive bacteria. Total nitrogen, total carbon, organic carbon, organic matter, carbonate carbon, pH, Eh, the Ambrosia horizon and sand, silt and clay percentages were measured. Color was noted. Eh became less negative down to 12 cm deep after the fall overturn in October. Numbers of bacteria and percentages of organic carbon and water decreased logarithmically in the sediment. The bacterial populations related directly to organic carbon and were slightly affected by Eh. The results indicate that these bacteria do not exhibit seasonal population variations. Recent investigations indicate that the rate of sedimentation of organic carbon is fairly uniform over the whole of the main basin of Lake Ontario providing an explanation for the apparent lack of seasonal varition in these sedimentary bacterial populations. (Jones-Wisconsin)
W75-04908

VARIATIONS IN THE PHYSICO-CHEMICAL PROPERTIES OF LAKE SUPERIOR,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
C. E. Adams, Jr.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 221-236. 10 fig, 2 tab, 16 ref.

Descriptors: *Physicochemical properties, *Lake Superior, *Distribution, Alkalinity, Conductivity, Hydrogen ion concentration, Calcium, Chemical properties, Seasonal, Sodium, Dissolved solids, Silica, Optical properties.

Temporal and spatial distributions of physicochemical properties of Lake Superior and its immediate environment were investigated and interrelationships between those properties and the physical, chemical and biological controls determined. Several water samples were collected at standard depths except for stations with water depths less than 20 m, where surface, middepth and near bottom samples were taken. Comparison of present chemical data, based on analyses of more than 5000 samples collected in 1968-1969, with previous data indicated little or no increase in dissolved constitutents in Lake Superior. Slight increases of alkalinity and specific conductance from 1968-1969 suggested that slight gradients in those parameters existed between eastern and western basins. Local, intense increased of alkalinity, sodium and specific conductance at the lake's western end for short periods of time caused measurable buildups of dissolved materials and had a direct influence on the long term accumulation of dissolved solids. Curves of annual distributions indicate that alkalinity, pH and calcium progress through definite seasonal cycles. The relationship of those variations to the thermal cycle is shown. The distributions should provide a systematically developed base for evaluating cultural influence on Lake Superior and other similar aquatic systems. (Jones-Wisconsin)
W75-04909

TRACE ELEMENT DETERMINATIONS ON LAKE MICHIGAN TRIBUTARY WATER SAMPLES USING SPARK SOURCE MASS SPECTROMETRY.
Argonne National Lab., Ill.
M. A. Wahlgren, D. N. Edgington, F. F. Rawlings, and J. L. Rawls.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 298-305. 3 fig, 6 tab, 8 ref.

Descriptors: *Trace elements, *Lake Michigan, *Tributaries, *Analytical techniques, Spectrometers, Technology, Spectroscopy, *Pollutant identification.
Identifiers: *Spark source mass spectrometry.

Emission and absorption spectroscopy are used for trace element surveys of natural waters. Emission spectroscopy is a multielement analysis but lacks sensitivity and is subject to matrix interferences. The spark source mass spectrometer offers the potential of high and fairly uniform sensitivities for almost all chemical elements in a single multielement analysis. Although electrically conductive metallic samples are better suited for the instrument, techniques have been developed to make conducting electrodes from biological and geological specimens by mixing with graphite powder. To evaluate the applicability of this method, a set of 22 samples from tributaries to the South Basin and Green Bay regions and from a nearshore Lake Michigan region have been analyzed for 37 selected trace elements of radiological, biological and geochemical interest. Consideration of elements of the periodic table indicates potential for determining concentrations of upper limits for approximately 60 elements in a single sample. To accomplish this, the instrument would require higher resolution than currently attained with RF source sparking and the addition of automated plate scanning facilities. With automated plate scanning and a more comprehensive computer program, it is possible to better utilize the interelement and matrix interference information recorded on the photographic plate. (Jones-Wisconsin)
W75-04910

REGIONAL CHARACTERIZATIONS OF THE THERMAL PROPERTIES OF LAKE ONTARIO,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 2H.
W75-04911

DELINEATION OF GREAT LAKES ESTUARIES,
Ohio River Valley Sanitation Commission, Cincinnati.
For primary bibliographic entry see Field 2H.
W75-04912

RECREATIONAL USES OF GREEN BAY: BAY/NON-BAY USERS COMPARED,
Wisconsin Univ., Green Bay. Leisure Sciences Collateral.
For primary bibliographic entry see Field 6B.
W75-04913

FACTORS AFFECTING POTENTIAL EVAPOTRANSPIRATION,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2D.
W75-04916

SNOW INTERCEPTION AND REDISTRIBUTION IN THE FOREST,
Forest Service(USDA), Fort Collins, Colo., Rocky Mountain Forest and Range Experimental Station.
For primary bibliographic entry see Field 2C.
W75-04917

CLUSTER ANALYSIS AND DIVERSITY IN RECOVERY OF DAMAGED STREAMS,
Kansas Water Resources Research Inst., Manhattan.
R. L. Kaesler.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 792, $4.75 in paper copy, $2.25 in microfiche. Contribution No 141. September 1974. 77 p, 27 fig, 10 tab, 41 ref.

Descriptors: Streams, Virginia, Tennessee, Rivers, *Biota, Distribution patterns, Potomac River, *Correlation analysis, Water pollution effects, Path of pollutants.
Identifiers: *Cluster analysis, *Clinch River(Va-Tenn), Stream recovery, Dendrograms.

Methods of agglomerative cluster analysis were applied to data from surveys of the Clinch River in Virginia and Tennessee taken after devastating industrial spills and floods. Results of the cluster analysis agreed closely with results of analysis of diversity and density. Moreover, cluster analysis was particularly useful in detecting the effects of type of substrate, time of sampling, longitudinal succession, and especially flooding. Data on the distribution of the biota of streams may be unnecessarily expensive and time-consuming to collect because of redundancy of information provided by various groups of organisms. Using correlation coefficients computed between corresponding elements of Q-mode similarity matrices, it was found that in the upper Potomac River aquatic insects gave the best agreement with the total biota of any subset tested ($r = 0.603$). In the Clinch River, similarities among stations based on occurrences of Ephemeroptera and Coleoptera agreed most closely with similarities based on the total insect fauna, but the two orders were not closely similar to each other. This result suggests that study of both groups may reveal most of the information provided by the total insect fauna. Associations among stations based on occurrences of Gastropoda were closely similar to those based on the total noninsect macroinvertebrate fauna.
W75-04934

BIOCHEMISTRY OF ESTUARINE ECOSYSTEM WITH EMPHASIS ON HEAVY METALS AND SHELLFISH,
Maryland Univ., College Park. Dept. of Chemistry.
M. Keeney.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 793, $3.25 in paper copy, $2.25 in microfiche. Maryland Water Resource Research Center, College Park, Technical Report No 28, December 1974. 9 p, 2 fig, 4 ref. OWRT B-017-Md(1), 14-31-000-3894.

Descriptors: *Oysters, *Enzymes, *Metabolism, *Carbohydrates, *Nutrient requirements, *Heavy metals, Biochemistry, Absorption, Aquatic animals, Shellfish, Water pollution effects.
Identifiers: Malate dehydrogenase, Glucose, B-glucuronidase, Oyster shell fistula.

The main purpose was to obtain basic information on the biochemistry of estuarine animals in order to understand the mechanism and effects of heavy metal uptake on these animals. Two Ph.D. theses connected with this project have been completed and the abstracts of the theses are included. One was concerned with characterization of malate dehydrogenase in the oyster. This is a key enzyme in glucose metabolism. Glucose is the major energy pool in the oyster via glycogen storage in the winter and then utilization during the warm weather spawning season. The other thesis reported the occurrence and partial purification of B-glucuronidase in the oyster. A paper on the formation of a fistula in the oyster shell as a tool to study oyster metabolism and nutrition has been published. The manuscript is included as part of this report.
W75-04935

NITROGEN, PHOSPHORUS AND EUTROPHICATION IN THE FINGER LAKES,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.

R. T. Oglesby, W. R. Schaffner, and E. L. Mills.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 780, $3.75 in paper copy, $2.25 in microfiche. Technical Report No 94, January 1975. 27 p, 3 tabs, 14 fig, 19 ref. OWRT B-038-NY(1), 14-31-0001-4109.

Descriptors: *Water quality, *Lakes, *Eutrophication, *Phosphorus, *Phytoplankton, *Standing crops, *Chlorophyll, Limnology, Land use, Data collections, Nutrients, Summer, Winter, Seasonal, Runoff, Human population, Dissolved oxygen, Hydrology, Estimating, Management, Simulation analysis, Mathematical models, *New York.
Identifiers: *Finger Lakes(N.Y.), Sampling, Water transparency, Linear regressions, Loadings, Confidence intervals, Parabolic functions.

Phosphorus has been identified as that element exerting primary control over summer phytoplankton standing crops in New York's Finger Lakes. A model relating the specific loading (Lsp) of 'biologically available' phosphorus to winter total P concentrations, the latter to mean summer chlorophyll integrated for the upper 10 m of the water column and Lsp to summer chlorophyll has been developed for the Finger Lakes based on limnological, demographic and land use data compiled during 1972-73. The relationships were all well described by linear regressions and confidence intervals about the lines are given. The dependence of transparency (Secchi disc) on chlorophyll concentrations in the upper 10 m formed a parabolic (log-log) function.
W75-04936

SOME FACTORS AFFECTING THE DISTRIBUTION OF CRENOBIA ALPINA (DANA), POLYCELIS FELINA (DALYELL) AND PHAGOCATA VITTA (DUGES) (PLATYHELMINTHES) IN CAERNARVONSHIRE, NORTH WALES,
Reading Univ. (England). Dept. of Zoology.
J. F. Wright.
Freshwater Biol Vol 4, No 1, p 31-59. 1974. Illus.
Identifiers: Calcium, Crenobia-alpina, *Distribution, Food, Oxygen, Phagocata-vitta, *Platyhelminthes, Polycelis-felina, *United Kingdom(Wales), *Water temperature, Hydrogen ion concentration.

The distribution of C. alpina, Polycelis felina and Phagocata vitta was examined in 5 streams in North Wales (United Kingdom). The significance of Ca content and pH of the water was assessed from a survey of 93 streams, and limited observations on the O2 content of a stream were also made. Laboratory experiments involving tolerance to high temperature and current velocity were carried out on each of the 3 spp. and the results were used in the interpretation of the field data. P. vitta appeared to be confined to cool water of low Ca content (less than or equal to 14.4 mg/l) in North Wales, despite its ability to live and reproduce in hard water under laboratory conditions. C. alpina was shown to be capable of living permanently in cool springs with a gradient of 50% while Polycelis felina was limited to gradients of 27% or less in the streams investigated. In 2 of the streams examined in detail, where populations of C. alpina and P. felina were very important components of the fauna, species composition fluctuated dramatically alongside rapid changes in stream gradient. C. alpina was dominant over P. felina on the steeper gradients while P. felina became the dominant species on gradients in the region of 16% and less in circumstances where the temperature regime could not have been the limiting factor for C. alpina. Interspecific competition appears to be an attractive hypothesis to explain the dominance of P. felina over C. alpina at low gradients in streams where high temperature is not limiting to either species.--Copyright 1974, Biological Abstracts, Inc.
W75-04980

AN IMPROVED CHEMICAL DELIVERY APPARATUS FOR USE IN INTERMITTENT-FLOW BIOASSAYS,
Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.
For primary bibliographic entry see Field 5A.
W75-04994

BIOLOGICAL ASSESSMENT OF DIESEL SPILL IN THE VICINITY OF ANACORTES, WASHINGTON, MAY 1971,
Texas Instruments, Inc., Dallas.
J. A. Watson, J. P. Smith, L. C. Ehrsam, Jr., R. H. Parker, and C. J. Blanton.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-228 118, $7.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Office of Oil and Hazardous Materials, Washington, D.C., August 31, 1971. 200 p, 36 fig, 16 tab, 68 ref, 3 append. EPA Contract 68-01-0017.

Descriptors: *Oil spills, *Oil pollution, *Benthos, *Environmental effects, *Biological communities, Water pollution sources, Water pollution effects, Disasters, Oil wastes, Gas chromatography, Analytical techniques, Chemical analyses, Publications, Sampling, Sediments, Microorganisms, Bioassay, Laboratory tests, On-site data collections, Water analysis, *Pollutant identification.
Identifiers: *Anacortes(Wash), *Diesel oil, Shore traverse.

A survey to assess the biological damage resulting from the 26 April 1971 diesel spill at Anacortes, Washington, was conducted between 9 May and 12 May 1971. A total of 19 traverses was occupied on Guemes, Huckleberry, Saddlebag, Hat, Orcas, and Lummi Islands and Padilla Bay. Analyses of samples of hydrocarbon content using gas chromatography clearly indicate diesel contamination of sediments and water in the high-impact areas. The evidences for environmental damage are both visual (oozing of oil from intertidal sediments) as revealed by photographs and verbal documentation and circumstantial as revealed by the detailed analysis of the faunal data collected during this study. Several common intertidal invertebrates (chitons, limpets, large and small pelecypods, and large gastropods) and one fish (the common stickleback) were completely absent from the high-impact areas, although they were often collected or observed in 1958 and 1966 in the same region and locally reported to be common before the spill. The control area on Orcas Island, was the richest of all regions sampled. Diversity indices illustrated that the lowest diversities were obtained from the areas of largest visible amounts of oil. (Katz)
W75-05001

ESTIMATION OF HEAVY METAL POLLUTION IN TWO NORWEGIAN FJORD AREAS BY ANALYSIS OF THE BROWN ALGA ASCOPHYLLUM NODOSUM,
Trondheim Univ. (Norway). Inst. of Marine Biochemistry.
For primary bibliographic entry see Field 5A.
W75-05002

PESTICIDE EFFECTS OF FISHES AND BIRDS IN RICE FIELDS OF SURINAM, SOUTH AMERICA,
Canadian Wildlife Service, Edmonton (Alberta).
K. Vermeer, R. W. Risebrough, A. L. Spaans, and L. M. Reynolds.
Environmental Pollution, Vol 7, No 3, p 217-236, November 1974. 2 fig, 16 tab, 19 ref.

Descriptors: *Fishkill, *Pesticides, *Snails, *Pest control, *Birds, *Rice, Path of pollutants, Mortality, Endrin, Organic pesticides, Methanol, Pollutant identification, Analytical techniques, South America, Water pollution effects.
Identifiers: *Surinam, Egrets, Herons, Jacanas, Snail kites, Sodium pentachlorophenol, Rice culture.

The effects of pesticides on fishes and birds in rice fields of Surinam were investigated from October to December 1971. Large fish kills were observed after the spraying of NaPCP for the purpose of reducing the populations of Pomacea snails. Fifty snail kites which feed exclusively on these snails were found dead after extensive application of NaPCP, and high pentachlorophenol residues were found in tissues of 17 of those that were analysed. Egrets, herons and jacanas were found sick or dead during the period of pesticide application. The levels of pentachlorophenol and endrin in these birds suggested that ingestion of contaminated food was a probable cause of the sickness and mortality observed. (Katz)
W75-05003

SOME ASPECTS OF THE TOXICITY OF P,P'-DDT, P,P'-DDE AND P,P'-DDD TO THE FRESHWATER PLANARIA, POLYCELIS FELINA (TRICLADIDA),
Hull Univ. (England). Dept. of Zoology.
H. H. Kouyoumjian, and R. F. Uglow.
Environmental Pollution, Vol 7, No 2, p 103-109, September 1974. 1 fig, 2 tab, 13 ref.

Descriptors: *DDD, *DDE, *DDT, *Chlorinated hydrocarbon pesticides, Aquatic animals, *Bioassay, *Pesticide residues, Lethal limit, Environmental effects, Water pollution effects, *Toxicity.
Identifiers: *Planaria(Polycelis felina).

The effects of p,p'DDT,p,p'-DDE and p,p'-DDD on the freshwater Triclad, Polycelis felina, were studied. The 96 h LC50 of the three chemicals were 1.05, 1.23 and 0.74 ppm, respectively. The chemicals appeared to exert their effects through the nervous system as revealed by the loss of coordinated movement and the retardation of the flip-over times of treated animals. DDT also tended to inhibit asexual fission at concentrations much lower than the observed 96 h LC 50. The carrier solvent acetone had no permanent effect on the gross behavior of the animals. P. felina responded consistently to experimental treatment and the observed intraspecific variation in the resistance to organochlorine chemicals, by animals of approximately the same size, was low. The use of this and other species of flatworms as bioassays of organochlorine chemicals is discussed. (Katz)
W75-05004

IMPACT OF PESTICIDES ON PHYTOPLANKTON IN EVERGLADES ESTUARIES,
Florida State Univ., Tallahassee.
S. A. Moore, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 618, $4.75 in paper copy, $2.25 in microfiche. South Florida Environmental Project: Ecological Report No. DI-SFEP-74 - 15, March, 1973. 92 p, 14 fig, 17 tab, 156 ref.

Descriptors: *Chlorinated hydrocarbon, Pesticides, *Dieldrin, *Aroclor, *DDT, *Bioassay, *Phytotoxicity, *Phytoplankton, *Polychlorinated biphenyls, Toxicity, Biochemistry, Water quality control, Nannoplankton, Estuaries, Methodology, Tracers, Radioisotopes.
Identifiers: *Everglades.

6-hour and 24-hour bioassays were conducted to determine the effect of selected organochlorine compounds on natural communities of estuarine phytoplankton. The effect of organochlorine concentration was a reduction of utilization of bicarbonate by the phytoplankton thereby reducing the photosynthetic production of organic materials. PCB phytotoxicity occurred at levels less than 5 micro g PCB/liter. DDT phytotoxicity first occurred at concentrations of 10 micro g DDT/liter.

Phytotoxicity of dieldrin is inconclusive with contradictory results. Nannoplankton and netplankton difference in Aroclor 1242 sensitivity was observed. Biochemical modes for organochlorine action are discussed in conjunction with difficulties in interpreting the effects of organochlorine compounds to phytoplankton. An objection to basing water quality standards on organochlorine concentrations is raised. (Katz)
W75-05005

ORGANOCHLORINE RESIDUES IN BROWN PELICAN EGGS: RELATION TO REPRODUCTIVE SUCCESS,
Bureau of Sport Fisheries and Wildlife, Laurel, Md. Patuxent Wildlife Research Center.
L. J. Blus, B. S. Neely, Jr., A. A. Belisle, and R. H. Prouty.
Environmental Pollution, Vol 7, No 2, p 81-91, September 1974. 3 tab, 2 fig, 27 ref.

Descriptors: *DDE, *Dieldrin, Birds, *Bird eggs, *Environmental effects, *Reproduction, Chlorinated hydrocarbon pesticides, Organic pesticides, Hatching, Nests, Gas chromatography, Pollutants, *Pesticide residues, Pollutant identification.
Identifiers: *Brown Pelican, Nest success.

To determine the influence of residues of organochlorine pollutants on reproductive success in the brown pelican, sample eggs were taken from 93 nests and analysed for residues. Nest success was recorded and related to residues of DDE and dieldrin in sample eggs from the same nests. DDE seemed primarily responsible for nest failure but couldn't be satisfactorily separated from the deleterious effects of dieldrin. Maximum DDE residues in eggs from a successful nest were 2.37 micro g/g, and 8.48 micro g/g from an unsuccessful nest. Maximum values for dieldrin were 0.54 micro g/g and 0.99 micro g/g respectively. Residues of DDD, DDT or PCBs in sample eggs were not significantly related to nest success. (Katz)
W75-05006

EFFECTS OF INCREASING TEMPERATURE ON SOCIAL BEHAVIOUR IN GROUPS OF YELLOW BULLHEADS (ICTALURUS NATALIS),
Woods Hole Oceanographic Institution, Mass.
W. O. McLarney, D. G. Engstrom, and J. H. Todd.
Environmental Pollution, Vol 7, No 3, p 111-119, September 1974. 3 fig, 4 tab, 13 ref.

Descriptors: *Bullheads, Behaviour, *Heated water, *Temperature, *Thermal pollution, Laboratory tests, Water pollution effects, *Fish behaviour, Ecosystems.
Identifiers: *Aggressive behaviour(Fish).

Groups of two yellow bullheads (Ictalurus natalis), a socially complex fish, were kept in 50-gallon aquaria and subjected to 1C temperature increments every other day, over the range 24-33C. Total activity, and with it the incidence of aggressive behavior, increased with temperature over the entire range, with one notable exception. At about 30C activity decreased to a level below that observed at the lowest temperature studied. The mode, as well as the frequency, of aggressive behavior changed with temperature. Aggressive behavior units were divided into two categories - display or warning units, which do not result in injury to either fish, and damaging units which frequently do cause injury. Starting at 30C, the relative frequency of damaging units became much greater. It is suggested that this change in behavior is due to the loss of ability by yellow bullheads at high temperatures to distinguish individuals of their own species. A possible implication of this sort of phenomenon in natural ecosystems is discussed. (Katz)
W75-05007

OCCURRENCE OF DDT AND PCB COMPOUNDS IN BALTIC HERRING AND PIKE FROM THE TURKU ARCHIPELAGO,
Turku Univ. (Finland). Inst. of Biochemistry.
R. R. Linko, J. Kaitaranta, P. Rantamaki, and L. Eronen.
Environmental Pollution, Vol 7, No 3, p 193-207, November 1974. 3 tab, 2 fig, 23 ref.

Descriptors: *DDT, *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, DDD, DDE pesticides, Analytical techniques, Herrings, Pesticides, Pesticide residues, Pikes, Methodology, Pollutant identification.
Identifiers: *Tissue analysis, Clupea harengus, Esox lueius, *Bioaccumulation, *Baltic Sea(Gulf of Bothnia).

The contamination of Baltic herring and pike from six different areas of the Turku archipelago (the southwestern coast of Finland) with DDT and its metabolites DDE and DDD, and PCBs was studied. Herring muscle contained an average 0.38 ppm DDT compounds and 0.31 ppm PCBs on a fresh tissue basis. However, the values obtained for individual fish specimens showed large variations, depending mainly on the differences in the fat content of the fish. The range of DDT and PCB concentrations in herring from the Turku archipelago was similar to that found in herring from the Gulf of Bothnia. Pike muscle contained on average only 0.04 ppm DDT compounds and 0.05 ppm PCBs on a fresh tissue basis. The results show local differences in the residue concentrations of the fish. The chlorinated hydrocarbons were found to accumulate in the liver and ovary of the pike and, to a lesser degree, in the testis and kidney. In the ovary fat the DDT compounds concentration rose to 100 ppm and that of PCBs to 190 ppm. (Katz)
W75-05008

AN ATTEMPT AT EVALUATING THE STABILITY OF AN AQUATIC ECOSYSTEM,
Moscow State Univ. (USSR).
V. D. Fedorov, and S. A. Sokolova.
Hydrobiological Journal, No 2, p 6-8, 1973. 1 tab, 8 ref.

Descriptors: *Stability, *Aquatic environment, *Statistical models, Water properties, *Mathematical studies, *Evaluation, *Ecosystems, Plankton, Environmental effects.
Identifiers: *White Sea(Karelia), USSR.

The stability of the ecosystem off the Karelian Coast of the White Sea was estimated mathematically. The estimate describes the limiting behavior of the system and indicates the cause and effect relations existing between its components. 'Stability' of a system rests on the ability of a system to keep constant over time the characteristics that reflect the nature of its structural and functional organization. (Katz)
W75-05009

EFFECT OF TEMPERATURE AND TROPHIC CONDITIONS ON THE DURATION OF CLADOCERA DEVELOPMENT,
Belorussian State Univ., Minsk(USSR).
N. M. Kryuchkova.
Hydrobiological Journal, No 2, p 39-47, 1973. 3 fig, 2 tab, 37 ref.

Descriptors: *Growth rate, *Temperature, *Mathematical models, *Daphnia, Water pollution effects, Productivity, Zooplankton, Metabolism, *Crustaceans, Growth stages, Embryonic growth stage, Environmental effects, Statistical models.
Identifiers: *Krog's 'Normal Curve'.

The rate of embryonic and postembryonic development of Cladocera at different temperatures is approximated by Krog's 'normal curve'. The forage conditions of the female have no effect on the duration of the embryonic development of the crustaceans and only a slight effect on the duration of their postembryonic development. (Katz)
W75-05010

ETIOLOGY OF THE HAFF (YUKSOV-SARTLAN) DISEASE,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
T. I. Birger, A. Ya. Malyarevskaya, and O. M. Arsan.
Hydrobiological Journal, No 2, p 71-80, 1973. 2 tab, 102 ref.

Descriptors: *Toxicity, *Fishkill, *Fish diseases, *Cyanophtya, *Toxins, Water pollution effects, Diseases, Animal pathology, Algae, Eutrophication, Public health, Human diseases, Epidemics, Path of Pollutants, Biochemistry, Pollutant identification.
Identifiers: *Haff disease, *B1-Avitaminosis, *Thiaminase.

The etiology of the Haff disease is discussed, as it appears in affected fish as well as in consumers of diseased fish. The disease in humans occurs as a result of eating toxic fish which apparently come from waters with high concentrations of blue green algae. A suggested mechanism of action is that high levels of thiaminase from ingestion of blue-green algae lead to B1-avitaminosis and death in fish. Toxins from the algae accumulate in the fatty portions of the fish which are consumed by humans and lead to the disease. (Katz)
W75-05011

A REVIEW OF SOME EFFECTS OF CONTAMINANTS ON MARINE ORGANISMS,
National Marine Fisheries Service, Seattle, Wash. Pacific Fishery Products Technology Center.
M. A. Steinberg.
In: Indo-Pacific Fisheries Council Proceedings, 15 th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 8-23, 83 ref.

Descriptors: *Pesticides, Pollutants, *Polychlorinated biphenyls, Aquatic life, *Environmental effects, *Heavy metals, *Toxicity, Publications, *Water pollution effects, Mode of action, Aquaculture, Detergents, Dissolved oxygen, Mercury, Lead, Copper, DDT, *Reviews.
Identifiers: Synergistic effects, Sub-lethal doses, Coal tar, Bioaccumulation, Literature.

The effects of some pesticides, PCBs, heavy metals, solids and petroleum products on aquatic organisms are reviewed. The need to understand the mode of action of these toxicants on biological systems as well as the possible synergistic effects of pollutants on single species and entire ecosystems is stressed. The significance of exposure to sub-lethal doses of pollutants in respect to the safe-guarding of aquatic resources is considered and the development of proper experimental design in this field of research is discussed. (Katz)
W75-05012

WATER POLLUTION AS A CONSTRAINT TO THE DEVELOPMENT OF MARINE FARMING,
Nansei Regional Fisheries Research Lab., Maruishi (Japan).
M. Fujiya.
In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974 p 31-36.

Descriptors: *Aquiculture, *Water pollution sources, Pollutants, *Water pollution control environmental effects, Commercial fish, Marine fish, Polychlorinated biphenyls, Water quality control, Life cycles, Fish farming, Mercury.
Identifiers: *Coastal fisheries, *Sub-lethal effects, *Japan, Marine farming.

The study of sub-lethal effects of pollution on every stage of the life cycle of an organism is necessary to protect the resources of coastal fisheries and aquaculture in Japan. Protection by pollution control laws is dependant on proper biological studies of this sort. A review of the current pollutants, their effects, and current status of water pollution control and recommendations for future research activities are presented. (Katz)
W75-05013

ACCUTE TOXICITY AND DETOXIFICATION OF KRAFT PULP MILL EFFLUENT,
International Pacific Salmon Fisheries Commission, New Westiminster (British Columbia).
R. W. Gordon, and J. A. Servizi.
International Pacific Salmon Fisheries Commission, Progress Report No 31, 1974. 26 p, 7 fig, 5 tab, 8 ref.

Descriptors: *Pulp wastes, *Toxicity, *Waste water treatment, *Bioassay, *Sockeye salmon, Laboratory tests, Analytical techniques, Toxicants, Biochemical oxygen demand, Water quality, Industrial wastes, Salmon, Suspended solids, Methodology, Effluents, Resistance, Soaps, Hydrogen ion concentration, Mortality, Fishkill, Lethal limit, Pulp and paper industry, Additives.
Identifiers: *Detoxification, *Resin acids, Dehydroabietic acid, Saponified resin acids, Biobasin, Aerated lagoon.

A laboratory simulation of a plug flow aerated lagoon was used to determine whether combined effluent of a kraft pulp mill, a mixture of biobasin and bypass effluents, could be consistently detoxified by additional treatment. Results indicated that detoxification was variable when estimated treatment times in the bench unit simulation were 29 and 58 hours. The toxic compounds remaining were identified as resin acids and toxic neutral compounds by chromatography. At 99 hours treatment time, detoxification met federal standards and BOD reduction averaged 83%. (Katz)
W75-05014

INFLUENCE OF TRINITROTOLUENE ON MICROORGANISMS AND BIOCHEMICAL SELF-PURIFICATION PROCESSES IN WATER,
Ts. I. Rogovskaya.
Available from the National Technical Information Service, Springfield, Va. 22161, AD-781 172, $3.25 in paper copy, $2.25 in microfiche. Translated from Mikrobiologiya, Vol 20, issue 3, 1951, p 265-272. Army Foreign Science and Technology Center, Charlottesville, Va., July 18, 1973. 11 p, 6 tab, 2 ref.

Descriptors: *Self-purification, *Water purification, *Biodegradation, *Toxicants, *Organic compounds, Nitrification, Industrial wastes, Water pollution, Water quality, Domestic wastes, Chemical reactions, Sewage, Biochemistry, Methodology, Microorganisms.
Identifiers: *Trinitrotoluene(TNT).

The influence of trinitrotoluene (TNT) on microorganisms and biochemical self-purification processes in water is examined as well as the nature of the process of decomposition of trinitrotoluene. Results of tests using household fecal sewage indicated that TNT may decompose as a result of biochemical processes, but only when in weak concentrations. In concentrations on an order of 0.5 - 1.0 mg/l, TNT exerts a negligible inhibitory effect on the biochemical processes of self-purification in water. A maximum concentration of TNT that is permissible for discharge into a reservoir without substantially inhibiting self-purification processes is 1 mg/l, or when purification is carried out, .10 mg/l. (Katz)
W75-05015

ESTIMATING PHYTOPLANKTON PRODUCTION FROM AMMONIUM AND CHLOROPHYLL CONCENTRATIONS IN NUTRIENT-POOR WATER OF THE EASTERN TROPICAL PACIFIC OCEAN,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. H. Thomas, and R. W. Owen, Jr.
Fishery Bulletin, Vol 69, No 1, p 87-92, 1971. 1 fig, 2 tab, 25 ref. NSF GB-8618, NMFS 14-17-0007-963, 14-17-0007-989.

Descriptors: *Marine algae, *Pacific Ocean, *Limiting factors, *Productivity, Ammonia, Chlorophyll, Tropical regions, Nutrients, Mathematical models, Nitrogen, Primary productivity, Standing crops, Growth rates.

How concentrations of a limiting nutrient in sea water and some measure of the standing crop of phytoplankton can be used to estimate phytoplankton production is described. Enrichment and uptake experiments with various concentrations of ammonium have provided values for the half-saturation constant and the maximum growth rate, which can be used to calculate actual growth rates with the hyperbolic model relating growth rate to limiting nutrient concentration. Estimated production is compared with observed C-14 production, and the two sets of values agree reasonably well when all errors in the estimation are considered. Chlorophyll and production samples were taken from the depth of the 50% light level, which was in the upper mixed layer and varied from 9 to 16 m. Simulated in situ production was measured by adding 20 microcuries sodium-14 carbonate solution. Ammonium was measured ashore in frozen samples. This evidence supports the hypothesis that phytoplankton production in the upper mixed layer is controlled by ammonium as the limiting nutrient and shows that the hyperbolic model describes this control very well. (See also W75-05016) (Jones-Wisconsin)
W75-05019

THE EFFECT OF PLANT SPACING, NITROGEN FERTILIZER AND IRRIGATION ON THE APPEARANCE OF SYMPTOMS AND SPREAD OF VIRUS YELLOWS IN SUGAR BEET CROPS,
G. D. Heathcote.
J Agric Sci, Vol 82, No 1: p 53-60, 1974. Illus.
Identifiers: Aphids, Crops, *Fertilizers, Irrigation, *Nitrogen, *Sugar beets, Symptoms, *Virus yellows, Water pollution effects.

Satisfactory comparisons of the incidence of virus yellows in sugar beet fields or experimental plots with different amounts of N fertilizer can be made from visual symptoms early in the growing season, but not later because dressigns of N fertilizer may then mask or delay the appearance of symptoms. Sugar beet plants in the field infected with beet mild yellowing virus (BMYV) are less likely to show symptoms than those with beet yellows virus (BYV), and plants with BMYV in the glasshouse often fail to show clear symptoms. Crop yield will be affected by the spread of viruses and colonization of plants by aphids, which in turn are affected by such factors as plant density, N supply and irrigation. Where ample N fertilizer is used a small increase in the percentage of plants infected with yellows can be expected, and aphids will be more numerous. Irrigation may also increase yellows incidence (e.g. from 16% to 20% of plants at Broom's Barn Experimental Station, Suffolk, England, in 1967), but any loss of potential yield from increased virus incidence will be small compared with that gained from the use of fertilizer or irrigation. Plant density can appreciably affect yellows incidence. At Broom's Barn in 1972, 51% of plants in crops with 17,5000 plants/ha contracted BMYV but only 15% of plants in crops with 126,500 plants/ha. The less dense crop lost 3-4% more of its potential yield due to yellows than the dense crop; this represents a difference due to virus of about 0.25t sugar/ha.—Copyright 1974, Biological Abstracts, Inc.
W75-05020

PRIMARY, PHYSICAL IMPACTS OF OFFSHORE PETROLEUM DEVELOPMENTS.
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11125, $11.25 in paper copy, $2.25 in microfiche. Report MITSG 74-20, April 1974. 443 p, 206 fig, 28 tab, 72 ref.

Descriptors: *Oil wells, *Offshore platforms, *Environmental effects, *Exploration, *Continental shelf, Oil spills, Oil pollution, Weathering, Evaporation, Diffusion, Transportation, Atlantic Ocean, *Alaska, Computer models, Economics, Leases, Taxes, Costs, Oil fields, Oil-water interfaces, Ocean currents, Refraction(Water waves).
Identifiers: *Gulf of Alaska.

The initial physical effects of potential oil development on the Atlantic and Gulf of Alaska continental shelves are conjectured in four studies. The first study considers a range of hypothetical oil finds and analyzes, by an offshore development computer model, investors' development strategy, the resulting oil and gas production, the number of platforms, drilling activity, and transport. The model also estimates the cost of oil and gas to the nation, investor profits and lease, royalty, and tax payments. The second study relates these production activities to the probability of oil spills and spill volume, and includes probability densities on the number and size of spills, tanker spills over 42,000 gallons and vessel spills less than 42,000 gallons, offshore production spills, and their causes. The third contribution considers hypothetical oil spill trajectories for the Atlantic coast and the Gulf of Alaska, including the mid- and south-Atlantic region, relative to wind, non-wind related currents, drift bottle data, and an assessment of impact on specific areas. The final study examines mass transport and its effect on the composition of petroleum in an oil slick. It simulates spreading, vertical diffusion of benzene and napthalene, oil slick sedimentation, and considers the effect of breaking waves. (See W75-05033 thru W75-05036) (Auen-Wisconsin)
W75-05032

SIMULATION OF HYPOTHETICAL OFFSHORE PETROLEUM DEVELOPMENTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 3E.
W75-05033

ANALYSIS OF OIL SPILL STATISTICS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
J. W. Devanney, and R. J. Stewart.
In: Primary, Physical Impacts of Offshore Petroleum Developments, MITSG 74-20, p 84-212. 48 fig, 13 tab, 13 ref.

Descriptors: *Oil spills, *Probability, *Frequency analysis, Offshore platforms, Transportation, Barges, Shores, Pipelines, Oil fields.
Identifiers: *Oil spill incidence, Tankers, Oil shore terminals, Offshore moorings.

Estimates, by statistical analysis, are generated of the probabilities of spillage by number and size of individual spill for a range of hypothetical offshore petroleum developments (under present technological conditions) on the Atlantic and Gulf of Alaska continental shelf. The spill densities are derived using a Bayesian approach and assumed spill incidence is generated by a Poisson process in which the exposure variable is volume handled and spill size by a Gamma process. Available data was used to generate probability densities on the parameters of these processes starting with non-informative conjugate priors. Spillage is divided into five categories, including tankers and barges, onshore terminals, single buoy moorings, offshore

production, and offshore pipelines, and further, by large and small spills; large spills are categorized as those over 42,000 gallons, small spills under 42,000 gallons. While the size range of an individual spill is extremely large, the great majority of all spills are at the lower end of that range. However, most of the oil is spilled in a few very large spills. The incidence of spill probability in large and small oil fields is also analyzed for each category. (See also W75-05032) (Auen-Wisconsin)
W75-05034

OIL SPILL TRAJECTORY STUDIES FOR ATLANTIC COAST AND GULF OF ALASKA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5B.
W75-05035

'HUMAN-ACCELERATED EUTROPHICATION OF FRESH-WATER LAKES,' PROCEEDINGS OF A CONFERENCE,
Brooklyn Botanic Garden, Ossining, N.Y.
Teatown Lake Reservation.
Held at Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, December 1973. 42 p.

Descriptors: *Water pollution control, *Ponds, *Lakes, Herbicides, Aquatic weed control, Water pollution sources, Harvesting, Nutrient removal, Biocontrol, Nutrients, Sedimentation, Algal control, Erosion, Permits, Management, *New York, Sediment control, Runoff, Water level fluctuations, Monitoring, Oxygenation, Food chains, Mechanical equipment, Dredging, Public health, Building codes, Septic tanks, Zoning, Land use, Sewage disposal, Indicators, Sealants, Coliforms.
Identifiers: Artificial lakes, Simazine, Princip 80W.

This conference was sponsored by a lake preservation organization to hear and question experts on the causes, control, and prevention of accelerated eutrophication in natural and man-made lakes. An aquatic biologist for the N.Y. State Department of Environmental Conservation discussed eutrophication--its causes and effects in fresh water lakes. A USDA-SCS conservationist discussed lake formation, sedimentation, and algae control. A CIBA-GEIGY Corporation representative presented the registration status of Simazine and its application for control of submerged vascular weeds and algae in ponds. An aquatic biologist for Resource Management presented the history of aquatic herbicides, biological control, and practical aspects of the use of chemicals in water weed control. A dredging firm representative talked on lake dredging options and mechanical water weed harvesters. An aquatic biologist described restoration of eutrophic lakes by artificial hypolimnion oxygenation. The assistant commissioner of Health for Environmental Services of Westchester County outlined requirements, sewage disposal systems, permits required for chemical treatment of aquatic vegetation, authorized chemicals, dredging permits, sources of lake enrichment, and building regulations. An environmental editor contributed views on land use and zoning, septic effluents and the responsibility for adequate control. A diagnostic consultant presented indicators of eutrophication: visual, chemical, physical, and biological. (See W75-05038 thru W75-05046) (Auen-Wisconsin)
W75-05037

EUTROPHICATION'--ITS CAUSES AND EFFECTS IN FRESH WATER LAKES,
New York State Dept. of Environmental Conservation, New Paltz.
A. A. Greene.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 4-7.

Descriptors: *Eutrophication, *Water pollution sources, *Lakes, Chemcontrol, Aquatic weed control, Fisheries, Water pollution treatment, *New York, Nutrient removal, Biocontrol, Government finance, Copper sulfate, Carp, Oil spills.
Identifiers: Water chestnut, Duckweed.

Each lake must be considered as a living entiety with its own set of problems and its own physical, chemical, and biological characteristics. Eutrophication control efforts should be balanced with the intended use of the lake. While chemicals are effective for weed control in spot treatment applications, their major drawback is that they only treat the symptoms of the problem. Eutrophic conditions in lakes, such as increased productivity and turbidity, hinder game fish and contribute to the incidence of summer and winter fishkill. Nutrient removal is the best method for controlling eutrophication, and is most effective when the sources are eliminated. Harvesting and removal of plants which contain nutrients has worked in some cases; fish harvest is another method of nutrient removal. The water chestnut control program in New York State is based on killing the plant before it produces seeds and has proven very successful. After ten years the control program is now reduced to minor hand pulling and hand spraying of chemicals. Questions regarding state and federal assistance for runoff control and aquatic weed control, copper sulfate applications for algal control, Chinese grass carp, and damage from gasoline and oil spills are answered. This presentation is directed to laymen. (See also W75-05037) (Auen-Wisconsin)
W75-05038

LAKE FORMATION, SEDIMENTATION, CONTROL OF ALGAE, QUESTIONS,
Soil Conservation Service, New City, N.Y.
R. S. Jonas.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,'proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 8-12.

Descriptors: *Lakes, *Management, *Sedimentation, *Aquatic weed control, Erosion, Depth, Shores, *New York, Ducks(Domestic), Runoff, Nutrients, Light penetration, Organic wastes, Algal toxins, Surface sealing, Septic tanks, Sediment control.
Identifiers: Light limitation, Westchester County(N.Y.).

This presentation was directed to a group of citizens concerned about lake quality. Causes of eutrophication are erosion or movement of soil into lakes and aquatic growth spurred by nutrient import. The deeper a lake is, the easier it is to manage. In designing a pond a steep shoreline and maximum depth are recommended. Recommendations for management of submerged plants in a newly-created lake are light limitation by various methods. The best sealant for a leaky pond is duck effluent. Ninety-five percent of sediment import from disturbed soil can be controlled by rigid control of construction methods, and by revegetation of all disturbed areas as soon as possible with at least temporary cover; another good method is construction of sediment retention basins. Aquatic growth is affected by three major factors: temperature, nutrients, and sunlight. A method of aquatic plant control is water level fluctuation; another suggestion is to cover a small area with plastic, moving it every three weeks, in which time the weeds will be killed. Lake reclamation may be effected by mechanical methods by removing the bottom material, both vegetative and sedimentary. (See also W75-05037) (Auen-Wisconsin)
W75-05039

THE REGISTRATION STATUS OF SIMAZINE FOR SUBMERGED VASCULAR WEEDS AND ALGAE CONTROL IN PONDS,
Ciba-Geigy Corp., Greensboro, N.C.
For primary bibliographic entry see Field 5G.
W75-05040

HISTORY OF AQUATIC HERBICIDES, BIOLOGICAL CONTROL, PRACTICAL ASPECTS OF THE USE OF CHEMICALS IN WATER WEED CONTROL,
Resource Management, Inc., Freehold, N.J.
For primary bibliographic entry see Field 5G.
W75-05041

LAKE DREDGING OPTIONS AND MECHANICAL WATER WEED HARVESTERS,
Folsom Marine Service Corp., Plymouth, N.H.
For primary bibliographic entry see Field 5G.
W75-05042

RESTORATION OF EUTROPHIC LAKES BY ARTIFICIAL HYPOLIMNETIC OXYGENATION,
Union Carbide Corp., Tarrytown, N.Y. Aquatic Environmental Sciences.
A. W. Fast.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 21-34, 18 fig.

Descriptors: *Eutrophication, *Hypolimnion, *Oxygenation, Nutrients, Bottom sediments, Phosphorus, Aeration, Destratification, Thermal stratification, Nitrogen, Chlorophyll, Cold-water fish, *New York, Mechanical equipment.
Identifiers: *Lake rehabilitation, Liquid oxygen, Compressed air, *Lake Waccabuc(NY).

In unproductive lakes, oxygen concentrations in the hypolimnion are usually greater than 5 ppm, and these lakes support cold water fishes. Hypolimnetic oxygen concentrations in productive, eutrophic lakes, on the other hand, are zero. Associated with hypolimnetic oxygen depletion, is resolution of nutrients (such as phosphorus from the bottom sediments. Several procedures have been used to alleviate eutrophication: reducing nutrient inflow, dredging and removal of sediments, chemical treatment, weed removal, and artificial oxygenation. Lake aeration systems are divided into two categories: destratification and hypolimnion aeration. A Limno aeration system was installed and tested in Lake Waccubuc, New York, while Lake Oscaleta, New York, was the control. Results conclusively demonstrated that the Limno system can oxygenate the hypolimnion without appreciably changing the thermal conditions in the lake. Phosphorus, nitrogen, and chlorophyll content were measured throughout the summer. A second type of hypolimnetic oxygenation system uses liquid oxygen and a water pump rather than compressed air. Hypolimnetic free carbon dioxide was more uniform; concurrently, pH had decreased slightly, but alkalinity had remained unchanged and the physical appearance of the lake improved. This presentation was directed to a group of citizens concerned about lake quality. (See also W75-05037) (Jones-Wisconsin)
W75-05043

PUBLIC HEALTH REQUIREMENTS, SEWAGE DISPOSAL SYSTEMS, PERMITS REQUIRED FOR CHEMICAL TREATMENT OF AQUATIC VEGETATION, AUTHORIZED CHEMICALS, DREDGING PERMITS, SOURCES OF LAKE ENRICHMENT, BUILDING REGULATIONS,
Westchester County Dept. of Health, White Plains, N.Y. Div. of Environmental Health Services.
For primary bibliographic entry see Field 5G.
W75-05044

LAND USE AND ZONING, SEPTIC EFFLUENTS AND THE RESPONSIBILITY FOR ADEQUATE CONTROL,
Yorktown School System, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 5G.
W75-05045

INDICATORS OF EUTROPHICATION: VISUAL, CHEMICAL, PHYSICAL, BIOLOGICAL,
Limnology Information and Freshwater Ecology, Inc., Carmel, N.Y.
P. Roland.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 40-41.

Descriptors: *Indicators, *Eutrophication, *Trophic level, Algae, Aquatic weeds, *Bioindicators, Coliforms, Public health, Oil pollution, Dissolved oxygen, Hydrogen ion concentration, Ammonia, Phosphates, Pollutant identification.

Evidence of eutrophication is clearly seen in the extent of emergent and submergent weeds and the densities and types of algal growth. In addition to these indicators there are chemical and other biological methods to determine the extent and distribution of nutrient levels within a body of water. The number of coliform bacteria, although not an indicator of trophic state, are used by health departments to determine potential health hazards of a recreational lake. Oil on water, although not itself a nutrient, causes adjunctive problems, the oil slick on the water prohibits oxygen absorption from the atmosphere. Chemical determination of dissolved oxygen should be conducted frequently at testing locations. Another indicator to determine the trophic state of a lake is pH. As an example, basic values may reveal production of tremendous quantities of ammonia. While phosphates are abosrbed rapidly by growing terrestrial plants, in an aquatic environment the mobility and movement of photobiotic plants (also algae) and the mixing of waters determine the phosphate uptake. Sometimes these chemicals are released from the sediment or introduced by cultural developments surrounding the water body. This presentation was directed to a group of citizens concerned with lake quality. (See also W75-05037) (Jones-Wisconsin)
W75-05046

A GUIDE TO THE MEASUREMENT OF MARINE PRIMARY PRODUCTION UNDER SOME SPECIAL CONDITIONS,
United Nations Educational, Scientific and Cultural Organization, Paris(France).
For primary bibliographic entry see Field 5A.
W75-05047

PHOSPHORUS AND HYPOLIMNIAL DISSOLVED OXYGEN IN LAKE ERIE,
Canadian Wildlife Service, Ottawa (Ontario).
M. Gilbertson, H. H. Dobson, and T. R. Lee.
In: Project Hypo. An Intensive Study of the Lake Erie Central Basin Hypolmnion and Related Surface Water Phenomena. Environmental Protection Agency, Fairview Park, Ohio, Technical Report TS-05-71-208-24, February 1972, p 141-145, 2 fig, 4 tab, 7 ref.

Descriptors: *Lake Erie, *Phosphorus, *Hypolimnion, *Dissolved oxygen, Eutrophication, Lakes, Water pollution effects.

The possible interrelationship between phosphorus contributions to Lake Erie and oxygen depletion in the hypolimnion of the Central Basin, as an indicator of the lake's trophic state is discussed. Estimates of phosphorus loadings from the human population of the Lake Erie Basin and its use of detergents and estimates of the oxygen depletion rates in the Central Basin from 1931 to the present are compared. Phosphorus loadings are graphically shown, in total, and by detergent phosphorus, and human excrement alone. To comply with the International Joint Commission's proposed phosphorus loading limitations, it would appear that a reduction to at least 12,000 tons in the municipal contribution of phosphorus is required to return oxygen conditions in the lake to a level approximating conditions prevailing in 1955. In order to return to conditions which are economically and aesthetically satisfactory, woul mean an estimated reduction in the total phosphorus loading to a level of some 11,100 tons/year. If that objective is met, and the lake responds in the same manner to decreasing phosphorus loads as it appears to have behaved to increasing loads, then the probable oxygen depletion rate will drop below 2 mg/l/month and may approximate hypolimnial conditions prior to 1931. (See also W72-12990 thru W72-12997) (Auen-Wisconsin)
W75-05050

THE EFFECT OF SEWAGE FROM THE TOWN OF KRYNICA ON THE BENTHIC INVERTEBRATES COMMUNITIES OF THE KRYNICZANKA STREAM,
Polish Academy of Sciences, Krakow. Zaklad Ochrony Przyrody.
W75-05051

SURFACE NITROGEN AND PLANKTON IN SKAHA LAKE, BRITISH COLUMBIA (CANADA),
British Columbia Univ., Vancouver. Dept. of Biology.
D. L. Findley, D. I. Findley, and J. R. Stein.
Freshwater Biology, Vol 3, p 111-122, 1973. 6 fig, 27 ref.

Descriptors: *Nitrogen, *Surface waters, *Plankton, *Cyanophyta, *Nitrogen fixation, *Canada, Analytical techniques, Seasonal, Phytoplankton, Zooplankton, Temperature, Phosphates, Nitrates, Ammonia.
Identifiers: *Skaha Lake(British Columbia), Gloeotrichia echinulata, Acetylene reduction.

Utilization of the acetylene reduction method as a survey tool for potential in situ nitrogen fixation assays is described and results correlated with several biological and chemical parameters in an effort to better understand the relationship between nitrogen fixation and its effects on eutrophication. Oligotrophic Skaha Lake is fourth of the six larger lakes in the Okanagan Valley located in the dry interior of southcentral British Columbia. Plankton samples were taken from the top meter and phytoplankton and zooplankton populations counted. Acetylene reduction assays were performed in situ and indicated an increase in ammonia-nitrogen before and after peak acetylene reduction. The presence of complex interrelations between plankton and nitrogen levels in surface waters is indicated. Generally inorganic nitrogen was high in the winter (0.4-0.5 ppm) and low in summer (less than 0.1 ppm). However, in late July and August a large increase in nitrogen (1.5 ppm) was recorded. This correlated with the Gloeotrichia echinulata bloom and the increase in nitrogen fixation, or nitrogenase activity (measured as acetylene reduction). It was calculated that the cyanophyte bloom could have contributed a minimum of 2350 kg nitrogen to the lake in August 1970 which is about 62% of the nitrate-nitrogen occurring at any time. (Jones-Wisconsin)
W75-05053

THE UTILIZATION OF NITROGEN FROM THE DECOMPOSITION OF MATTER IN CULTURES OF SCENEDESMUS DIMORPHUS,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
C. E. Boyd.
Archiv fur Hydrobiologie, Vol 73, No 3, p 361-368, 1974. 4 fig, 1 tab, 13 ref.

Descriptors: *Cycling nutrients, *Nitrogen, *Decomposing organic matter, *Nutrient requirements, Cultures, Scenedesmus, Aquatic plants, Mud, Productivity, Alabama, Inorganic compounds.
Identifiers: *Nitrogen sources, *Scenedesmus dimorphus, Nitrogen mineralization.

Since availability of inorganic nitrogen is an important factor regulating aquatic productivity and nitrogen is often associated with eutrophication, information on the regeneration of inorganic nitrogen from decaying organic matter is valuable in both theoretical and practical considerations of aquatic resources. This study was initiated to evaluate muds, aquatic plant residues, and organic compounds as nitrogen sources for Scenedesmus dimorphus in laboratory cultures. Pure cultures of S. dimorphus did not readily utilize glutamic acid or proteose peptone directly as sources of nitrogen. However, when decomposer organisms were added nitrogen was mineralized at a sufficient rate to produce good growth. Decaying aquatic plants were used as the only source of nitrogen in S. dimorphus cultures. Phytoplankton (Microcystis, Anabaena, and Euglena) and a macrophyte (Najas) produced the best algal growth, while the macrophytes Typha and Eichhornia supported little algal growth. Intermediate growth was obtained with the macrophytes Elodea and Spirogyra. The suitability of decaying plants as nitrogen sources was generally greater in plants with higher nitrogen contents. Insufficient nitrogen was mineralized from muds to produce significant growth of S. dimorphus under the culture conditions employed. (Jones-Wisconsin)
W75-05054

THE INDICATOR ORGANISMS AND THEIR ECOLOGICAL VARIABILITY,
Water Economics Research Inst., Krakow (Poland). Dept. for Water Protection.
L. Turoboyski.
Acta Hydrobiologica, Vol 15, No 3, p 259-274, 1973. 1 tab, 8 ref.

Descriptors: *Bioindicators, *Ecological distribution, *Water pollution, Benthic flora, Benthic fauna, Bacteria, Fungi, Cyanophyta, Euglenophyta, Diatoms, Scenedesmus, Chlorophyta, Protozoa, Oligochaetes, Mollusks, Mayflies, Stoneflies, Crustaceans.
Identifiers: Saprophagic organisms.

The water pollution is evaluated on the basis of the communities of organisms and this evolution is considered indispensable in biological analysis. The dominance of one of the four main ecological groups of aquatic organisms may characterize the water of the sapronbionic organisms as very strongly polluted; of the saprophilous organisms as strongly polluted; of saproxenous organisms as slightly polluted (organic compounds almost mineralized); of the saprophobous organisms as very slightly polluted or pure. The species of organisms within these ecological groups are classified. A number of indicator species of plant and animal organisms of the micro- and macrobenthos from various rivers were selected, their zonal association and resistance to different kinds of pollution were determined according to the communities of indicator organisms and on the basis of chemical investigations. A number of organism species were classified as individual ecological groups. The organisms of the physiological groups of consumers are discussed. The frequency of occurrence of individual systematic indicator units are presented and their environmental background characterized in the form of specific of wastes. (Jones-Wisconsin)
W75-05055

EXPERIMENTAL LAKES AREA: WHOLE-LAKE EXPERIMENTS IN EUTROPHICATION,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler, and E. J. Fee.
Journal Fisheries Research Board of Canada, Vol 31, No 5, p 937-953, 1974. 9 fig, 51 ref.

Descriptors: *Lakes, *Eutrophication, Nutrients, Phosphates, Nitrates, Phytoplankton, Carbon, Phosphorus, Nitrogen, Hypolimnion, On-site investigations, *Canada.
Identifiers: *Experimental Lakes Area(Canada).

A realistic eutrophication study is a whole-lake experiment in which budgets of major nutrients are accurately manipulated. By changing the nutrient budgets in a precisely known way, one can observe the actual response of a whole, natural system to known enrichments with different rates of a single nutrient or different combinations of nutrients. Results give a clear answer about the environmental importance of the nutrient. Lake 227, fertilized with phosphate and nitrate, showed an enormous increase in phytoplankton, in spite of low carbon concentrations; carbon necessary for algal blooms was found to invade from the atmosphere. Lake 304, eutrophied by fertilization with phosphorus, nitrogen, and carbon in 1971 and 1972, recovered rapidly when phosphorus fertilization was terminated. Lake 226 was split in half with a curtain; one-half was fertilized with carbon and nitrogen and the other was fertilized with phosphorus, carbon, and nitrogen. The half receiving phosphorus developed an algal bloom and the other half did not. Lake 302, which had carbon, nitrogen, and phosphorus added to the hypolimnion, did not develop algal blooms in summer. These studies illustrate that phosphorus control is an efficient primary step in preventing or checking eutrophication problems. (Jones-Wisconsin)
W75-05057

HYDROBIOLOGICAL OBSERVATIONS ON THREE RHODESIAN RESERVOIRS,
Rhodesia Univ., Salisbury. Div. of Biological Sciences.
D. S. Mitchell, and B. E. Marshall.
Freshwater Biol. Vol 4, No 1, p 61-72, 1974, Illus.
Identifiers: Algae, *Eutrophication, Hydrobiological studies, Oxygen, *Phytoplankton, Reservoirs, Rhodesia, Seasonal, Sewage, Stratification, Cyanophyta, Africa, Water pollution effects, Primary productivity.

Hydrobiological studies were carried out on 3 Rhodesian reservoirs in 1970-71. Lake McIlwaine receives sewage effluent and has become highly eutrophic. Mazoe and Mwenje dams are not enriched, but Mwenje shows certain eutrophic features, probably because it is the most recently constructed. Seasonal variation was investigated and the 3 lakes conform to the warm monomictic type, with stratification in summer and isothermal conditions in winter. Mwenje which remains de-oxygenated in winter, probably because of trapped organic matter in the bottom waters. Alkalinity, conductivity and pH also remain stratified in Mwenje during winter. De-oxygenation does not persist in McIlwaine despite its eutrophic condition, which appears to be a result of complete mixing brought about by its weak thermal structure and its open exposed morphometry. Mazoe shows no peculiar thermal features and the basic monomictic pattern is clearly defined in this lake. Diurnal variation of physicochemical conditions was also investigated and found to be slight. No evidence of polymixis or hypolimnetic mixing was found. Phytoplankton populations in the 3 lakes are clearly related to their chemical nature. Lake McIlwaine has a large population of blue-greens, reflecting its eutrophic nature, while the other 2 have more diverse populations reflecting their mesotrophic status. Primary productivity, in turn, related to phytoplankton populations. Productivity as measured by O2 production is high in the Lake McIlwaine and is about 3 times higher than in the other lakes.--Copyright 1974, Biological Abstracts, Inc.
W75-05059

EXPERIMENTAL DREDGING TO CONVERT LAKE BOTTOM FROM ABIOTIC MUCK TO PRODUCTIVE SAND,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
For primary bibliographic entry see Field 5G.
W75-05060

OCCURRENCE OF MORPHOLOGICALLY ABNORMAL SYNEDRA POPULATIONS IN LAKE SUPERIOR PHYTOPLANKTON,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
L. E. Feldt, E. F. Stoermer, and C. L. Schelske.
In: International Association Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 34-39, 1973. 2 fig, 11 ref. AEC AT(11-1)-2003.

Descriptors: *Diatoms, *Evolution, *Lake Superior, Phytoplankton, Plant morphology, Speciation.
Identifiers: *Morphological modification, *Synedra, Diatom mutants, Synedra radians, Synedra ulna var. chaseana.

Diatoms are the most important component of phytoplankton assemblages in Lake Superior. Since diatom taxonomy is based largely on the structure of their hard parts, sports or 'lusus formen' may be a source of taxonomic confusion. Numerous examples of a variant population of Synedra have been noted in which the central portion of the valve is strongly incised and the entire frustule is longitudinally asymetric in collections from Lake Superior. Although its identity cannot be firmly established, the organism appears to be a teratological form, perhaps related to S. radians. On the basis of samples available, this entity first appeared and has remained most abundant at stations in the western basin, but has become increasingly widespread and abundant in other regions of the lake in recent years. It was present in 4 of 21 samples collected in 1968, 23 of 30 samples collected in 1970 and in all samples collected in 1971. It was not present in samples available from 1966. The occurrence of a few specimens of S. ulna var. chaseana in the samples examined, which have undergone similar morphological modification, is also noted. (Jones-Wisconsin)
W75-05062

THE 'OLIGOTROPHICATION' OF LITTLE OTTER LAKE, PARRY SOUND DISTRICT,
Ministry of Environment, Rexdale (Ontario). Limnology and Toxicity Branch.
M. F. P. Michalski, and N. Conroy.
In: International Association Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 934-948, 1973. 9 fig, 5 tab, 14 ref.

Descriptors: *Eutrophication, *Phosphorus, *Pollution abatement, *Lakes, Industrial wastes, Secchi disks, Phosphates, *Canada, Self-purification, Nutrient removal, Oligotrophy.
Identifiers: *Little Otter Lake(Ontario).

Little Otter Lake, a small lake in the Precambrian Shield, south of Parry Sound, Ontario was subjected to an industrial waste discharge during July and August of 1971, which contained high concentrations of a polyphosphate descaling agent. Approximately 265 kg of phosphorus was discharged to the lake. In 1971 the lake developed classical symptoms of accelerating eutrophy, including a dense algae bloom dominated by Anabaena limnetica, reduced Secchi disc transparencies, high concentrations of chlorophyll-a, and total phosphorus (44-110 micrograms per liter). The situation was somewhat unique because the only significant input was phosphorus and the lake was essentially a closed system during the summer. In August of 1971, the polyphosphate discharges were discontinued, reducing the loading. Concomitant improvements in water quality in 1972 included a reduction in phytoplankton densities to levels typical of oligotrophic Precambrian Shield lakes, an increase in Secchi disc transparencies and a decrease in total phosphorus and chlorophyll-a concentrations. Other key nutritional values were essentially the same in 1970 through 1972. Some caution must be exercised in predicting benefits that will accrue for all situations based on the Little Otter Lake results, as the lake is not a typical example of a continuously affected system. (Jones-Wisconsin)
W75-05063

ANAEROBIC METABOLISM IN LAKE WASHINGTON SEDIMENTS,
Washington Univ., Seattle, Dept. of Oceanography.
M. M. Pamatmat, and A. M. Bhagwat.
Limnology and Oceanography, Vol 18, No 4, p 611-627, 1973. 9 fig, 2 tab, 39 ref. AEC RLO-2225-T26-9. EPA 16070 EKZ, AEC AT(45-1)-2225.

Descriptors: *Analytical techniques, *Anaerobic conditions, *Metabolism, *Sediments, *Washington, Hydrogen, Bacteria, Oxygen, Energy, Heat, Benthos, Entropy, *Pollutant identification, Lake sediment.
Identifiers: *Dehydrogenase activity, *Lake Washington(Wash), Calorimetry, Triphenyltetrazolium chloride.

A method of measuring dehydrogenase activity with the use of triphenyltetrazolium chloride was adapted and results compared with those of direct microcalorimetry. Results show that TTC can be used for estimates of the naturally occurring rates of anaerobic metabolism, at least by bacteria, in subsurface sediments. The method was used aboard ship in Lake Washington at the same time that the oxygen uptake by replicate sediment cores was being measured. Dehydrogenase activity varies from place to place and differs between layers of the same core. Although there is a general trend of decreasing activity with sediment depth, some subsurface layers have relatively high activity. Dehydrogenase activity, which was detected down to the deepest layers of sediment cores, 21 to 31 cm, appears to be more a function of plankton remains than of total organic carbon in the sediment. The integrated metabolic heat release based on dehydrogenase activity of the entire core was invariably greater than the metabolic heat release calculated from the rates of oxygen uptake. Thus, it appears that the rate of total oxygen uptake by the sediment surface underestimates benthic community metabolism in the sediment column. (Jones-Wisconsin)
W75-05064

OBSERVATIONS OF THE VERTICAL DISTRIBUTION OF THE BENTHOS IN A MALAYSIAN STREAM,
Malaya Univ., Kuala Lumpur (Malaysia). School of Biological Sciences.
J. E. Bishop.
Freshwater Biology, Vol 3, p 147-156, 1973. 2 fig, 2 tab, 46 ref.

Descriptors: *Spatial distribution, *Benthos, *Streams, *Analytical techniques, Bottom sampling, Depth, Sediments, Biological communities, Technology, Invertebrates.
Identifiers: *Malaysia, Sungai Gombak(Malaysia).

The vertical distribution of the benthos in a region of stable sediments in a small river, Sungai Gombak, in the hill-forest zone in Malaysia was measured by a specifically designed apparatus of simple design, utilizing the colonization of a known volume of supplied substrate. The apparatus consists of a rectangular box 20 x 10 x 10 cm, made of

23 gauge galvanized iron sheeting. Distribution of the invertebrates by group was spread irregularly over the four depths with the 0-10 and 20-30 cm levels generally containing higher proportions than other strata. Size distribution of the fauna at each depth showed few differences between depths. The apparatus is capable of sampling the benthic fauna to a depth of 50 cm by providing a natural substrate for colonization. The results obtained from an area of visually uniform sediments demonstrate that stream animals occur in significant numbers deep in the bottom sediments and that, at most, only about half the benthos lives in the upper 10 cm which is usually 'quantitatively' sampled in stream surveys. The significance of a deep-living fauna in regulating community density, in recolonizing denuded areas, and in optimizing utilization of available food resources is discussed. (Jones-Wisconsin)
W75-05066

PHOSPHATE, ALGAE AND TACONITE TAILINGS IN THE WESTERN ARM OF LAKE SUPERIOR,
Texas Univ. at Dallas, Richardson. Inst. of Environmental Sciences.
R. H. Plumb, and G. F. Lee.
1973, 59 p. 12 fig, 7 tab, 25 ref.

Descriptors: *Eutrophication, *Lake Superior, *Industrial wastes, Sorption, Leaching, Phosphates, *Minnesota, *Wisconsin.
Identifiers: *Taconite tailings, Duluth(Minn), Superior(Wis), Reserve Mining Company.

The Reserve Mining Company operates a taconite beneficiation plant at Silver Bay, Minnesota, Lake Superior's north shore. Findings of several chemical and biological investigations of phosphate associated with taconite tailings are presented. Taconite tailings samples were obtained by quiescent settling of total taconite tailings and were defined as material that would not settle more than 12.5 cm in seven hours. Phosphate was not leached from taconite tailings during the long-term laboratory leaching studies. In fact, tailings have the capacity to remove 2-7 micrograms phosphate-phosphorus per gram tailings from solution by the sorption process. The fact that Selenastrum responded to tailings plus phosphate but not to tailings alone demonstrated that tailings are non-toxic and non-stimulatory. The phosphate associated with tactonic tailings is shown not to be biologically available. Data suggest that the discharge of taconite tailings is not exerting a localized stimulation or inhibition effect on the algal population. Cause of the algal population maximum in the nearshore survey area is the increased phosphate flux from the Duluth-Superior population center. Laboratory and field studies clearly show that Reserve Mining Company's discharge of taconite tailings is not contributing to eutrophication of Lake Superior. (Jones-Wisconsin)
W75-05067

SEDIMENTS AND SEDIMENT-WATER NUTRIENT INTERCHANGE IN UPPER KLAMATH LAKE, OREGON,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
W. D. Sanville, C. F. Powers, and A. R. Gahler.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.10. Environmental Protection Agency, Ecological Research Series Report, EPA-660/3-74-015, August 1974. 45 p, 5 fig, 16 ref, append.

Descriptors: *Sediments, *Nutrients, Water quality, *Lake sediments, Eutrophication, Agricultural chemicals, *Oregon, *Cyanophyta.
Identifiers: *Upper Klamath Lake(Ore), Aphanizomenon flos-aquae.

Upper Klamath Lake, a very large, shallow lake in south-central Oregon, has a history of nuisance blue-green algae blooms, predominantly Aphanizomenon flos-aquae. Lake water and sediment interstitial water chemistry were monitored during 1968 and 1969, and for a short time in 1970. Nutrient concentrations in interstitial water of sediment exposed to direct agricultural drainage were several orders of magnitude greater than in cases where sediments were no so located. Nutrient concentrations showed considerable seasonal variation in both interstitial and lake waters. Variations in lake and interstitial waters frequently, but not always, exhibited inverse relationships. The larger fluctuations appeared to correlate with density of A. flow-aquae. Although strong evidence of biological uptake of sedimentary nutrients was found, dredging of the lake would probably not be effective as a restorative measure because of the high nutrient concentrations present at depth in the sediment. (EPA)
W75-05079

ESTIMATING NUTRIENT LOADINGS OF LAKES FROM NON-POINT SOURCES,
Wisconsin Univ., Madison. Water Resources Center.
P. D. Uttormark, J. D. Chapin, and K. M. Green.
For sale by the Superintendent of Documents, U.S. Printing Office, Washington, D.C. 20402, Price $1.90. Environmental Protection Agency, Ecological Research Series Report, EPA-660/3-74-020, August 1974. 112 p, 6 fig, 2 tab, 81 ref. EPA Program Element 1BA031, Grant R-801343.

Descriptors: *Nutrients, *Eutrophication, Control, Management, Drainage, Nitrogen, Phosphorus, Agriculture, Estimating, Chemical properties, Runoff, Groundwater, Fallout, Sewage, Precipitation(Atmospheric), Seepage, Urban runoff, Forests, Marshes, Wetlands, Septic tanks, Lakes, *Water pollution control, Path of pollutants.
Identifiers: *Lake management, Nutrient load, Nutrient sources.

Data describing nutrient contributions from non-point sources were compiled from the literature, converted to kg/ha/yr, and tabulated in a format convenient for estimating nutrient loadings of lakes. Contributing areas are subdivided according to general use categories, including agricultural, urban, forested, and wetland. Data describing nutrient transport by groundwater seepage and bulk precipitation are given along with data for nutrient contributions from manure handling, septic tanks, and agricultural fertilizers. Nutrient content of urban runoff was the highest; forested areas were lowest. Nutrient export data for agricultural lands were tabulated as seepage through vertical soil profile, overland runoff, and transport by streams draining agricultural watersheds. The latter group was judged to be most applicable for estimating nutrient loading of lakes. Marshes appear to temporarily store phosphorus and nitrogen during the growing season and release them at a later time; net nutrient runoff is estimated to be near zero. Nutrient contributions to lakes from groundwater seepage require site-specific information for assessment. Phosphorus and nitrogen transport by groundwater can be significant. Atmospheric contributions of nitrogen are large in some areas. The technique of estimating nutrient loadings of lakes requires considerable judgement in selecting runoff coefficients; however, the approach provides insight into potential management options. (EPA)
W75-05082

ARSENIC CONTAMINATION OF DRINKING WATER AND FOOD-STUFFS CAUSING ENDEMIC CHRONIC POISONING,
R. Zaldivar.
Beitr Pathol. 151(4): 384-400. Illus. 1974.
Identifiers: *Potable water, Adults, *Arsenic, Carcinoma, Cell, Children *Chile(Antofagasta), *Endemic chronic poisoning, Foodstruffs, Infarction, Keratosis, Leukoderma, Melanoderma, Pollution, Squamous, Thrombosis, Water pollution effects, *Human poisoning.

An investigation on patients with chronic As poisoning from the city of Antofagasta, Chile, and concentrations of As in drinking water was performed. During the period 1968-1971, a total of 457 patients (208 males, 249 females) bearing cutaneous lesions (leukoderma, melanoderma, hyperkeratosis, squamouscell carcinoma) were registered. Children (0-15 yr of age) accounted for 69.2% of male cases, and for 77.5% of female cases. These patients exhibited high As content in the hair. The mean concentration of As in drinking water in the period 1968-1969 was 0.58 ppm vs. 0.08 ppm in 1971, differing by a factor of 7.2. Such differences was due to a filter plant which started operation in May 1970. The average incidence rates per 100,000 population for cases with cutaneous lesions in 1968-1969 were 145.5 for males and 168.0 for females. The incidence rates decreased in 1971 to 9.1 for males and 10.0 for females. Among the 337 registered children, 5 died showing thrombosis of brain arteries, thrombosis of mesenteric artery, restriction of lumen of coronary arteries, and/or myocardial infarction. Of the 64 registered adult males, 2 developed multiple skin carcinomata with lymph node metastases.--Copyright 1974, Biological Abstracts, Inc.
W75-05177

PLANKTON POPULATIONS OF LAKE LEAKE AND TOOMS LAKE: OLIGOTROPHIC TASMANIAN LAKES,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
R. L. Croome, and P. A. Tyler.
Br Phycol J. 8(3): 239-247. Illus. 1973.
Identifiers: *Australia(Tasmania), Cyclotella-Stelligera, Lake Leake, Lakes, *Oligotrophic lakes, *Plankton populations, Tooms Lake, Standing crops.

The characteristic feature of Lake Leake and Tooms Lake (Australia) is their great similarity in physical and chemical limnology. This similarity extends to the plankton populations in general terms, both lakes being dominated by Cyclotella stelligera Cleve et Grun. and having few other species. Floristic differences are minimal. Distinct differences exist in plankton periodicity, principally in that of C. stelligera. The extreme oligotrophy of the lakes, already suspected from their low nutrient levels, is confirmed by the extremely meager standing crops.--Copyright 1974, Biological Abstracts, Inc.
W75-05183

MERCURY LEVELS IN LAKE POWELL: BIOAMPLIFICATION OF MERCURY IN MAN-MADE DESERT RESERVOIR,
New Mexico Univ., Albuquerque.
For primary bibliographic entry see Field 5A.
W75-05185

SOURCES AND TRENDS IN WASTE WATER LOADINGS TO THE SAN FRANCISCO BAY REGION,
Sir George Williams Univ., Montreal (Quebec). Dept. of Economics.
For primary bibliographic entry see Field 5B.
W75-05186

A MODEL TO STUDY THE EFFECTS OF TIME VARIABLE POLLUTANT LOADS ON STREAM QUALITY,
Saint Catharines (Ontario).
For primary bibliographic entry see Field 5B.
W75-05187

SURVIVAL TIME AND LETHAL EXPOSURE TIME FOR THE BLACKNOSE DACE EXPOSED

TO FREE CHLORINE AND CHLORAMINE SOLUTIONS,
Maryland Univ., Prince Frederick. Center for Environmental and Estuarine Studies.
C.-H. Tsai, and J. A. Tompkins.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 958, $3.75 in paper copy, $2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No. 30, (1974). 24 p, 4 fig, 5 tab, 18 ref. OWRT B-006-Md(5). 14-01-0001-1910.

Descriptors: *Chlorine, Ammonium compounds, *Mortality, *Toxicity, *Lethal limit, Water pollution effects, Bioassay.
Identifiers: *Chloramines, *Blacknose dace, Ammonium chloride, Exposure time(Fish), Survival time(Fish).

The survival time and lethal exposure time were determined by continuous flow bioassay for the blacknose dace, Rhinichthys atratulus, exposed to four concentrations each of free chlorine solutions, 0.15, 0.74, 1.38 and 6.60 mg/l and of chloramine solutions, 0.19, 0.51, 1.31 and 5.25 mg/l as total chlorine. The lethal exposure time is shorter than the survival time for the concentrations tested. The difference between the median lethal exposure time and median survival time decreases with a decrease in total chlorine concentrations and becomes similar at the concentration 0.09 mg/l for the free chlorine solutions and 0.21 mg/l for the chloramine solutions. Using either the median survival time or median lethal exposure time as the toxicity index, free chlorine is more toxic than chloramines to the blacknose dace at high concentrations, but less so in low concentrations.
W75-05272

PROCEEDINGS OF THE FIRST ANNUAL NSF TRACE CONTAMINANTS CONFERENCE.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-05277

UTILITY OF PLACENTAL TISSUE AS AN INDICATOR OF ENVIRONMENTAL EXPOSURE,
Vanderbilt Univ., Nashville, Tenn.
For primary bibliographic entry see Field 5A.
W75-05284

STABLE ISOTOPE STUDIES OF HUMAN LEAD METABOLISM,
California Univ., Los Angeles.
For primary bibliographic entry see Field 5A.
W75-05285

A NETWORK TO DETERMINE CAUSALITY BETWEEN ABNORMAL TRACE ELEMENT LEVELS IN COGENITAL DEFECTS,
Vanderbilt Univ., Nashville, Tenn.
For primary bibliographic entry see Field 5A.
W75-05286

BIOLOGY OF MOLYBDENUM: PLATELET BIOCHEMISTRY AND FUNCTION - POSSIBLE USE IN EVALUATING TRACE METAL EFFECTS,
Colorado Univ., Denver. Dept. of Medicine and Pediatrics.
For primary bibliographic entry see Field 5A.
W75-05287

BEHAVIORAL EFFECTS OF METHYLMERCURY,
Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
For primary bibliographic entry see Field 5A.
W75-05288

THE EFFECT OF MERCURIALS ON DNA-MEDIATED TRANSFORMATION IN BACILLUS SUBTILIS,
Rochester Univ., N.Y. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W75-05289

THE UPTAKE AND SOME PHYSIOLOGICAL EFFECTS OF CADMIUM ON CORN,
Illinois Univ., Urbana. Dept. of Agronomy.
D. E. Koeppe, R. J. Miller, R. A. Root, J. E. Bittell, and C. Malone.
In: Proceedings of the First Annual NSF Trace Contaminants Conferenc August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 553-563, 7 fig, 20 ref.

Descriptors: *Cadmium, *Corn(Field), *Absorption, *Plant physiology, *Toxicity, Oxidation, Plant pathology, Zinc, Nickel, Manganese, Cobalt, Analytical techniques, Electron microscopy, Cations, Water pollution effects, Pollutant identification.

Cadmium was readily taken up from hydroponic solution by corn with toxicity symptoms being observed at cadmium concentrations as low as 1 ppm. Chlorosis, the initial symptom of cadmium toxicity, gave way to necrosis as length of treatment was extended, which correlated well with a decrease in chlorophyll content. In vivo respiration and ATP levels suggest that mitochondrial activity was adversely affected by low levels of cadmium. Electron micrographs of treated roots show abnormal mitochondria at low cadmium concentrations (approximately 2 ppm). Mitochondria isolated from 3-day-old etiolated corn shoots were also adversely affected by cadmium, exhibiting swelling, inhibition of substrate oxidation, and uncoupling of phosphorylation at low (one-half inhibition was generally less than .1 mM) cadmium concentrations. The binding of cadmium to membranes of isolated mitochondria was found to be similar to Zn(+2), having a greater affinity than Ni(+2), Mn(+2), or Co(+2), while the maximum number of binding sites was about the same for all 5 cations. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05290

THE TOLERANCE OF STIGEOCLONIUM TENUE KUTZ. TO HEAVY METALS IN SOUTH WALES,
University Coll. of Wales, Aberystwyth. Dept. of Botany and Microbiology.
R. O. McLean.
Br Phycol J. Vol 9, No 1, p 91-95. 1974, Illus.
Identifiers: *Cladophora-Glomerata, Copper, *Heavy metals, Iron, Lead, Manganese, Nutrition, *Stigeoclonium-Tenue, *Tolerance levels, *Wales, Zinc, Water pollution effects.

The distribution of S. tenue Kutz. and Cladophora glomerata Kutz. in relation to metal pollution by Cu, Pb, Fe, Zn and Mn was studied in 169 river stations in the spring months of 1972. Equal tolerance to Cu, Pb and Zn was demonstrated in both algae, but Stigeo-clonium showed greater tolerance to Fe, even in conditions of poor nutrient status.--Copyright 1974, Biological Abstracts, Inc.
W75-05336

PHOSPHORUS INPUTS AND ALGAL BLOOMS IN LAKES,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
R. W. Bachmann, and J. R. Jones.
Iowa State Journal of Research, Vol 49, No 2, Pt 1, p 155-160, 1974. 2 fig, 25 ref. OWRT A-049-IA(1).

Descriptors: *Phosphorus, *Eutrophication, *Lakes, Standing crops, Plankton, Algae, Secchi disks, Chlorophyll, *Iowa, Nitrogen, Rainfall, Tributaries, Sediments.
Identifiers: Lake West Okoboji(Iowa), Lake East Okoboji(Iowa), Spirit Lake(Iowa), Lower Gar Lake(Iowa).

Many lakes have high densities of plankton algae that reduce water transparency and degrade water quality. As an index of trophic status, the average concentrations of planktonic chlorophyll-a were measured in July and August in four lakes in northwestern Iowa during each of three years. Annual inputs of total phosphorus and inorganic nitrogen for each year were estimated by sampling the rainfall and the inputs of tributary streams. The annual inputs of each element were divided by the lake volumes to find the potential concentrations. The findings confirm that the trophic status of lakes is determined to a large extent by the annual inputs of phosphorus. Responses to changes in annual phosphorus input probably reflect the strong tendency for phosphorus to become bound in the sediments providing little carryover. The summer standing crops of plankton algae in a diverse group of lakes were significantly related to the annual inputs of total phosphorus divided by lake volumes. Based on the relationship between Secchi disk transparency and chlorophyll-a concentrations, phosphorus inputs would have to be reduced below about 0.02 mg/l before significant increases in water transparency would be achieved as a result of reduced algal standing crops. (Jones-Wisconsin)
W75-05337

MINIMUM INTERFERENCE BETWEEN PLANKTON SPECIES AND ITS BENEFICIAL EFFECT,
Woods Hole Oceanographic Institution, Mass.
E. M. Hulburt, and D. Horton.
Marine Biology, Vol 23, No 1, p 35-38, 1973. 1 fig, 2 tab, 10 ref. OWRT B-004-NC(14), 14-01-0001-1038.

Descriptors: *Phytoplankton, *Plant growth, *Competition, Biological communities, *North Carolina, Crop response, Growth rates, Productivity, Environmental effects, Mode of action.
Identifiers: *Pamlico Sound(NC).

Surveys were made in Pamlico Sound, North Carolina to observe conditions affecting phytoplankton growth. Close examination of the sequences of change reveals a roughly 10-fold fluctuation in the concentrations of both Peridinium triquetrum and Katodinium rotundatum. There was an equal division of biomass species. A similar sharing is indicated at other locations. Each species, with one exception, overlapped another or several others at locations of maximum abundance or maximum growth. This degree of overlap, with the severe restriction that it must be sought only where maximum growth obtains, seems considerable and indicates the manner in which each species benefited from a minimum of interference from other species. It is concluded that one group of phytoplankton species was not prevented from growing by the presence of a second group of species. The first group benefited from that which produced growth and from a minimum of interference with its growth. Minimum interference between species is further indicated by the sharing of the biomass by two species growing in unison, and by the overlapping distributions of species at their locations of maximum growth. (Jones-Wisconsin)
W75-05338

ECOLOGICAL EFFECTS OF NUCLEAR STEAM ELECTRIC STATION OPERATIONS ON ESTUARINE SYSTEMS, VOL. 2.
Maryland Univ., Prince Frederick. Natural Resources Inst.

Available from NTIS, Springfield, Va. 22161 as Rept. No. ORO-4328-2, $15.25 in paper copy, $2.25 in microfiche. Report No. ORO-4328-2, p 192-453, August 1973. 100 fig, 37 tab, 17 ref.

Descriptors: *Assessment, *Ecosystems, *Chesapeake Bay, Water Pollution, *Water pollution sources, *Nuclear powerplants, Effluents, Aquatic life, Benthic fauna, Benthic flora, Crabs, Fish, Model studies, Ecology, Water quality, Data collections, Sampling, Analytical techniques, *Maryland.
Identifiers: *Calvert Cliffs Site(Md).

An annual assessment is presented of the effects of the Calvert Cliffs Nuclear Powerplant on aquatic environment of Chesapeake Bay. Pre-operational and Post-operational data collections will be compared to properly assess the influence of the Calvert Cliffs plant on the aquatic life of Chesapeake Bay. Annual data are collected and reported for benthic annual-sediments, blue crab, finfish, ecosystem modeling, and field water quality data. (See W75-05343 thru W75-05346) (Houser-ORNL)
W75-05342

BENTHIC ANIMAL-SEDIMENT,
Maryland Univ., Prince Frederick. Natural Resources Inst.
For primary bibliographic entry see Field 5A.
W75-05343

BLUE CRAB SURVEY IN THE WATERS ADJACENT TO THE CALVERT CLIFFS NUCLEAR STEAM ELECTRIC STATION AND THE CHESAPEAKE BAY REGION,
Maryland Univ., Prince Frederick. Natural Resources Inst.
S. D. Sulkin, and R. E. Miller.
In: Report No ORO-4328-Vol 2, p 345-399, August 1973. 10 fig, 10 tab.

Descriptors: *Nuclear powerplants, Effluents, Environmental effects, Aquatic environment, *Sites, *Chesapeake Bay, Aquatic animals, *Crabs, Estuarine environment, Movement, Distribution, Dispersion, Temperature, Life cycles, *Maryland, Water pollution effects.
Identifiers: *Blue crabs, *Calvert Cliffs site(Md).

The blue crab program carried out off the Calvert Cliffs site at established transect stations is part of a larger study conducted within the Chesapeake Bay System. Recent data have modified concepts concerning blue crab movements and distribution. High wintering over densities of juvenile blue crabs in the Calvert Cliffs region occurred during the winter of 1969-70; however, during the winters of 1970-71 and 1971-72 the juvenile population was more dispersed. Apparently low temperatures are a limiting factor in halting dispersal. During the winter of 1969-70 a late movement may have occurred from the lower Bay and the timing with low temperatures halted the movement of a large number of juveniles in the Calvert Cliffs region. Movement of Juveniles from the lower Bay apparently began earlier in subsequent years and resulted in a more wide spread distribution in the Bay system before low limiting temperature prevailed. Thus, the Calvert Cliffs region is not a consistent wintering over area. The region does tend to support high densities of adult blue crabs, especially during the late summer and fall periods when large numbers of females are migrating south to the spawning grounds in the Bay mouth area. (See also W75-05342) (Houser-ORNL)
W75-05344

FISH SURVEY: OTHER TRAWL COLLECTIONS OFFSHORE OF THE CALVERT CLIFFS NUCLEAR POWERPLANT SITE,
Maryland Univ., Prince Frederick. Natural Resources Inst.
T. S. Y. Koo, and D. E. Ritchie, Jr.
In: Report No ORO-4328-2-Vol 2, p 400-420, August 1973. 9 tab.

Descriptors: *Surveys, Environmental effect, *Nuclear powerplants, Estuarine environment, Fish, *Fish behavior, *Chesapeake bay, Migration, Fish population, Seasonal, Distribution, Data collections, Operations, Ecosystems, Comparative productivity, Water pollution, *Maryland.
Identifiers: *Calvert Cliffs site(Md).

Bottom fishes in the vicinity of the Calvert Cliffs powerplant site, as well as their seasonal distribution and relative abundance were investigated. Larger invertebrates, such as crabs, shrimps, jellyfishes, that were caught incidental to fish species, were recorded also. With the accumulation of data over a span of several years, it is hoped a general picture of bottom fishes in the vicinity of the nuclear powerplant site may be established before the plant goes into operation. (See also W75-05342) (Houser-ORNL)
W75-05345

ECOSYSTEM MODELING: EFFECTS OF TEMPERATURE ON ESTUARINE MICROCOSMS,
Maryland Univ., Prince Frederick. Natural Resources Inst.
D. R. Heinle, D. A. Flemer, and R. E. Ulanowicz.
In: Report No ORO-4328-2-Vol 2, p 421-453, August 1973. 3 ref.

Descriptors: *Model studies, *Ecosystems, *Nuclear powerplants, Effluents, *Environmental effects, Aquatic environment, *Chesapeake Bay, Estuarine environment, Data collections, Water quality, Temperature, Salinity, Dissolved oxygen, Analytical techniques, Evaluation, Standards, Profiles, *Maryland.
Identifiers: Microcosms, *Calvert Cliffs Site(Md).

Progress in studies of estuarine microcosms is reported. Two types of structures for these studies have been developed; namely, rigid plexiglass cubes of 2 cu. m. volume and 750 liter polyethylene drums. Analytical methods involving a significant deviation from traditional methods of ecosystems modeling are reported. One experiment in which temperature was the major environmental variable was conducted. Water quality data from Calverts Cliffs are tabulated by cruise date as recorded in the field and are shown in Appendix A. Temperature, salinity, and oxygen data from routine seven station cruises are given. (See also W75-05342) (Houser-ORNL)
W75-05346

PUERTO RICO NUCLEAR CENTER, ANNUAL REPORT, 1973.
Puerto Rico Univ., San Juan.
For primary bibliographic entry see Field 5A.
W75-05350

5D. Waste Treatment Processes

CITY OF SPARKS, NEVADA, FEASIBILITY STUDY FOR SPANISH SPRINGS INTERCEPTOR,
Spink Corp., Reno, Nev.
Sparks Department of Public Works, Nevada, December 1972. 33 p, 5 fig, 9 tab, 6 ref.

Descriptors: *Planning, *Sewers, *Sewerage, *Interceptor sewers, *Nevada, Feasibility studies, Land use, Water requirements, Conveyance structures.
Identifiers: *Sparks(Nevada), Spanish Springs Valley, North Truckee Meadows.

The extent was studied of the sewerage facility needs for the North Truckee Meadows and Spanish Springs Valley along with the most feasible alternative for providing these requirements. The facilities to be constructed must be consistent with a program for a coordinated areawide water and sewer system as part of the comprehensive planned development of the area. Information has been obtained on the limits of the area to be served, population projections, land use, water consumption and use, topography, underground conditions, per capita sewage contributions, alternative conveyance systems, design, cost and present economic and analysis recommendations. The 1970 census indicates that the Sparks area increased 47% in population over the last ten years. A two-part approach is made to determine requirements: the first part would consist of an analysis of sewage contribution within the existing system and; the second part of the analysis would be applied to the study areas which had a smaller planned land use. Two alternative phases are also presented: phase one would start construction from the present (1973) to that time when existing facilities have reached their design capacity (20 years was assumed with the intention of servicing only the Truckee Meadow area); phase two would involve a second stage of interceptor construction at a future date to provide service to Spanish Springs Valley. (Poertner)
W75-04863

REPORT TO THE GOVERNOR AND THE LEGISLATIVE COMMISSION FINAL ALTERNATE PLAN, LAS VEGAS WASH/BAY POLLUTION ABATEMENT PROJECT,
Clark County Board of County Commissioners, Nev.
July 1974. 33 p, 2 fig, 1 tab, 10 append.

Descriptors: *Lake basins, *Reclaimed water, *Water reuse, *Monitoring, *Nevada, *Pollution abatement, Water pollution control, Abatement, Groundwater resources, Salinity.
Identifiers: *Lake Mead, *Saline groundwater collection, Clark County(Nevada), Las Vegas(Nevada).

Clark County, Nevada's six-point plan to abate pollution of Lake Mead is described. The plan covers: (1) advanced wastewater treatment, (2) beneficial use of reclaimed water, (3) cooperation with developers of the saline groundwater collection system, (4) recreational potential of Las Vegas Wash/Bay, (5) market potential for the sale of reclaimed water, and (6) a monitoring program for Las Vegas Wash/Bay. Areawide salinity control is under investigation. On June 6, 1974, Clark County received a grant offer for $1,287,885 from the Environmental Protection Agency which represents an extremely significant funding milestone for the pollution abatement project. Another aspect of this investigation will determine if remote sensing devices can be used to measure chlorophyll concentrations. Three consultants have been retained to develop, plan and execute a continuing water quality monitoring program for Lake Mead. The report includes three documents which describe the proposed salinity control investigation; these are: (1) a parent document providing non-technical information relating to the recent history of the pollution abatement project and a description of alternative recommendations, (2) a Facilities Plan prepared by Nevada Environmental Consultants, and (3) an addendum to the Environmental Assessment prepared by VTN/Jones and Stokes. (Poertner)
W75-04868

TRAINING MANUAL ON THE BASIC TECHNOLOGY OF THE PULP AND PAPER INDUSTRY AND ITS WASTE REDUCTION PRACTICES,
Lakehead Univ., Thunder Bay (Ontario).
A. J. Bruley.
Environment Canada, Environment Protection Service Water Pollution Control Directorate, Training Manual Environment Protection Services, 6-WP-74-3, Ottawa, Ontario, Canada, August, 1974, 140 p, 11 ref, 60 fig, 13 tab.

Descriptors: *Pulp and paper industry, *Waste treatment, *Training, *Water pollution sources, Pollution abatement, Technology, Education, Effluents, Bleaching wastes, Equipment, Water quality control.
Identifiers: Kraft mills, Manuals.

This manual is intended for the use of Environmental Protection Service personnel whose responsibilities include surveillance of effluents from pulp and paper mills. It provides a basic review of the pulp and paper technology with emphasis on sources of pollution within the industry. The main processes are described and any polluting effluents are noted. Waste reduction practices such as reuse of processed water and waste treatment are also delta with. A bibliography and a glossary of pulp and paper terminology are included. (Environment Canada)
W75-04871

ECONOMIC AND FINANCIAL ASPECTS OF WASTEWATER TREATMENT IN THE ST. FRANCOIS RIVER BASIN, QUEBEC - A PRELIMINARY ANALYSIS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
D. M. Tate.
Water Planning and Management Branch, Social Science Series No 4, 1974, 30 p, 1 fig, 62 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Pulp wastes, *Costs, Pollution abatement, Water pollution sources, Treatment facilities, Water quality control, Domestic wastes, Planning, *Canada.
Identifiers: *Economic aspects, *St. Francois River Basin(Canada).

Water pollution problems in the St. Francois River Basin of Quebec are examined and the existing pollution sources and treatment facilities are described. Pulp and paper mills are a main source of industrial wastes. Waste treatment facilities are judged completely inadequate. The costs of providing adequate waste treatment are estimated for both industrial and municipal effluents. Costs of financing such facilities are also estimated. Recommendations for treatment priorities are included. (Environment Canada)
W75-04872

PHOSPHORUS REMOVAL DEMONSTRATION STUDIED AT C.F.B. TRENTON,
Environmental Protection Service, Ottawa (Ontario).
W. E. Stepko, and E. E. Shannon.
Environment Canada, Environmental Protection Service, Water Pollution Control, Technical Development Report, EPS 4-WP-74-9, Ottawa, Ontario, September 1974, 35 p, 7 ref, 13 fig, 12 tables.

Descriptors: *Detergents, *Phosphorus, Activated sludge, *Nutrient removal, Nutrients, Waste water treatment, Monitoring, Water quality, Pollution abatement, Testing procedures, Effluents, Costs, *Canada.
Identifiers: Trenton(Canada), Ontario, *Alum treatment.

Full scale phosphorus removal studies, employing alum addition to an activated sludge treatment plant, were conducted at C.F.B. Trenton. Treatment plant performance with respect to BOD5 total phosphorus, and suspended solids removals was closely monitored under baseline (no chemical addition) conditions and at various alum addition levels. Secondary effects of the alum additions were also observed. The required alum dosage for phosphorus removal was 3.0 to 3.5 mg/l as Al and the most effective addition point was at the exit end of the aeration basins. Alum additions improved suspended solids removal efficiencies and maintained BOD5 and turbidity removal efficiencies at baseline levels. A residual phosphorus removal effect was observed during periods of zero alum additons (including baseline). An in-depth investigation of the effect was recommended to determine if phosphorus removal requirements can be met at reduced alum dosages. Because of inadequate digester capacity and poor digester supernatant quality, 70% of the phosphorus removed from the plant in the raw sludge eventually recycled back to the primary clarifier. To alleviate this problem it was recommended that a second digestion stage be added to the plant. (Environment Canada)
W75-04878

FULL SCALE PHOSPHORUS REMOVAL STUDIES AT C.F.B. PETAWAWA,
Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
E. E. Shannon, J. M. Salvo, and B. R. Burns.
Technology Development Report EPS 4-WP-74-3, 45 p, 11 tab, 16 fig, 11 ref, April, 1974, Environmental Protection Service, Environment Canada, Ottawa, Ontario, Canada.

Descriptors: *Phosphorus, *Monitoring, Investigations, Research and development, Facilities, Treatment facilities, *Waste water treatment, Testing, Analytical techniques, Methodology, *Nutrient removal, *Canada.
Identifiers: Petawawa(Ontario-Canada).

Full-scale phosphorus removal studies, employing alum addition to the primary wastewater treatment plant, were conducted at C.F.B. Petawawa. Plant efficiency with respect to BOD, total phosphorus and suspended solids removals was closely monitored. Secondary effects of the alum additions were also observed. Comparisons were made between jar test predictions and full-scale phosphorus removal. In order to assess potential effects of the alum sludge on anaerobic digestion, the digester performance was closely monitored during the phosphorus removal program. The optimum alum dosage for phosphorus removal was 12.5 mg/l as Al. With rectification of existing hydraulic problems, the plant should consistently produce an effluent of 1 mg/l total P or less. Alum additions improved BOD, suspended solids and turbidity removal efficiencies. Alum addition also incurred a two-fold increase in the volatile solids loading to the anaerobic digester resulting in an eventual digester failure. To alleviate future digester problems, stepwise alum additions were recommended in order to acclimate the digester to the increased loadings. (Environment Canada)
W75-04879

CHELANT TREATMENTS PROVIDE MAXIMUM RETURN TO THE PULP AND PAPER INDUSTRY,
Betz Lab., Inc., Trevose, Pa.
For primary bibliographic entry see Field 5F.
W75-04940

WATER TREATMENT WITH ACTIVATED CARBON MADE FROM SLUDGE AND WASTE PAPER,
Institute of Paper Chemistry, Appleton, Wis.
R. Maematsu.
Japan Pulp and Paper, Vol 12, No 3, p 53-58, Oct. 1974. 5 fig, 2 tab.

Descriptors: *Activated carbon, *Sludge, *Waste water treatment, Governments, Foreign countries, Effluents, Industrial wastes, Water purification, Color, Chemical oxygen demand, Pulp wastes, Pollution abatement, Water pollution sources, Pulp and paper industry, Sludge disposal, Waste disposal.
Identifiers: *Waste paper, *Japan.

Government pressures on Japanese industries to reduce the color and BOD of effleunts have generated studies in activated carbon treatment, and in developing sources of this material. Some actions directed at producing activated carbon from certain industrial waste sludge streams (such as pulp and paper mill sludge) and from waste papers not suitable for recycling as secondary fiber are discussed. (Hansen-IPC)
W75-04941

EFFLUENT TOXICITY REMOVAL ON THE WEST COAST,
B.C. Research Ltd., Vancouver.
C. C. Walden, and T. E. Howard.
Pulp and Paper Canada, Vol 75, No 11, p 88-92 (T370-374), Nov 1974. 6 tab, 20 ref.

Descriptors: *Biological treatment, *Pulp wastes, *Sulfite liquors, *Waste water treatment, *Toxicity, Performance, Activated sludge, Aerated lagoons, Ammonia, Surveys, Water pollution sources, Industrial wastes, Bioassay, Biochemical oxygen demand, Hydrogen ion concentration, Effluents, Waste treatment, Water pollution control, Water quality, Canada, United States, Pulp and paper industry.
Identifiers: Zinc hydrosulfite(Dithionite), Kraft mills, Sulfite mills, Black liquors.

The performance of 14 pulp and paper mills in the provinces of British Columbia and Alberta and in the states of Washington, Oregon, and California in detoxifying effluents was surveyed. The frequency of successful detoxification was assessed at 80% for aerated stabilization basins and 70% for activated sludge systems. The poorer performance of the latter was attrubited to low operating sludge levels in the biobasins. For a number of mills, available bioassay data could not be interrelated with mill operating experience. In certain instances, the lack of biotreatability was attributed to black liquor spills, pH variations, woodroom effluent, and to the presence of waste zinc hydrosulfite. The potential toxicity of ammonia entering biotreatment systems, from ammonia-base sulfite operations, is discussed. (Hansen-IPC)
W75-04942

EXPECTATIONS FOR THE CLOSED WATER SYSTEM AND COST COMPARISON WITH EFFLUENT PURIFICATION (DIE ERWARTUNGEN AND DEN GESCHLOSSENEN WASSERKREISLAUF IM KOSTENVERGLEICH ZUR ABWASSERREINIGUNG),
Krofta Apparatebau (Gesellschaft) (West Germany).
E. Hurst-Gaul.
Wochenblatt fur Papierfabrikation, Vol 102, No 16, p 591-593, August 31, 1974.

Descriptors: *Waste water treatment, *Water conservation, *Cost comparisons, *Benefits, *Biological treatment, *Water reuse, Waste treatment, Pulp and paper industry, Costs, Recirculated water, Industrial water, Biochemical oxygen demand, Slime, Energy, Corrosion, Water purification, Reclaimed water, Pulp wastes, Closed conduits.
Identifiers: *Closed systems, White water(Paper machine).

A closed water circulation system costs only a fraction of the cost of biological purification of effluents, which shows every indication of rising still higher. The closed system requires careful planning to keep production undisturbed and prevent salting out or corrosion. The increase in BOD does not interfere with papermaking. Other advantages are control of slime and better raw material and energy utilization. Problems with special papers, which are still unsolved, are discussed. (Ward-IPC)
W75-04944

HANDBOOK OF ENVIRONMENTAL CONTROL. (1) AIR POLLUTION. (2) SOLID WASTE. (3) WATER SUPPLY AND TREATMENT. (4)

WASTEWATER: TREATMENT AND DISPOSAL,
Minnesota Univ., Minne. Div. of Environmental Health.
CRC Press (Division of the Chemical Rubber Company, Cleveland, Ohio, 1972-1974. Vol 1: 576 p. Vol 2: 580 p. Vol 3: 835 p. Vol 4: 905 p. Bond, R. G., Straub, C. P., and Prober, R., editors.

Descriptors: *Environmental control, *Air pollution, *Solid wastes, *Water supply, *Water treatment, *Waste water treatment, *Waste water disposal, Wastes, Monitoring, Disposal, Effluents, Pollutant identification, Atmosphere, Air pollution effects, Control systems, Control, Ultimate disposal, Water pollution sources, Management, Water quality, Biological properties, Analytical techniques, Municipal wastes, Sewage, Industrial wastes, Natural streams, Oxygen, Eutrophication.

These four volumes give compilations of data needed for the detection, monitoring, handling, and control of air- and water-borne contaminants, the treatment and disposal of solid wastes, and the processing and treatment of aqueous and atmospheric effluents. (Brown-IPC)
W75-04945

SYSTEM CLOSURE IN RHEMSPRINGE (KREISLAUFSCHLIESSUNG IN RHUMSPRINGE),
Harzer Papierfabrik Sievers G.m.b.H. and Co. KG, Rhumspringe (West Germany).
K. Hommel.
Wochenblatt fur Papierfabrikation, Vol 102, No 16, p 590-591, August 31, 1974.

Descriptors: *Pulp and paper industry, *Water reuse, *Reclaimed water, Industrial wastes, Effluents, Recirculated water, Slime, Odor, Corrosion, Hydrogen sulfide, Anaerobic digestion, Water treatment, Sulfates, Water pollution control, Water pollution sources, Pulp wastes, Closed conduits, Water conservation.
Identifiers: *Closed systems, White water(Paper machine), *West Germany(Rhumspringe).

In 1968 Harzer Papierfabrik Sievers GmbH joined the Rhumspringe community in a joint venture for biological clarifion of effluents. This was unsatisfactory, and since 1972 the mill has been operating with a closed system. Production has not suffered, and there have been no problems with salting out, slime, or odors. There have been corrosion problems caused by hydrogen sulfide, arising from anaerobic breakdown of sulfates. At present, the sulfate content of the plant water is being reduced with barium carbonate, but the problem is still under study. (Ward-IPC)
W75-04947

CARBON AND COLOR DISTRIBUTION IN VARIOUS SIZE FRACTIONS OF TREATED PULP MILL AND BOARD MILL WASTE EFFLUENTS,
Saskatchewan Univ., Dept. of Civil Engineering. Saskatoon.
For primary bibliographic entry see Field 5B.
W75-04948

INTRODUCTION OF THE ATTISHOLZ PROCESS INTO PAPER MILLS AND SOME RESULTING EXPERIENCES (EINSATZ DES VERFAHRENS ATTISHOLZ IN PAPIEROFABRIKEN UND DARAUS RESULTIERENDE ERFAHRUNGEN),
Cellulose Attisholz A.G., Luterbach (Switzerland).
K. Geiger.
Wochenblatt fur Papierfabrikation, Vol 102, No 16, p 593-594, August 31, 1974.

Descriptors: *Waste water treatment, *Treatment facilities, *Activated sludge, *Pulp wastes, Biological treatment, Industrial wastes, Waste treatment, Europe, Wisconsin, Operating costs, Costs, Effluents, Sludge, Foreign countries, United States, Pulp and paper industry, Water pollution sources, Water pollution control, North America.
Identifiers: *Attisholz process.

The Attisholz system for biological purification is a two-stage activated sludge process. It advantages, high effectiveness, low operating cost, and low yield of clarification sludge, are discussed in relation to the experiences of three mills now using the process: the Biberist and Utzenstorf mills in Europe and Wisconsin Tissue Mills in the United States. Whether a biological process would be of much help, since salting out would still present problems is discussed. (Ward-IPC)
W75-04951

ACTIVATED CARBON PROVES TO BE EFFECTIVE IN REMOVING TOXICITY,
Beak (T.W.) Consultants Ltd., Montreal (Quebec).
M. Wasserlauf.
Canadian Pulp and Paper Industry, Vol 27, No 11, p 33-37, Nov 1974. 8 fig, 2 tab.

Descriptors: *Pulp wastes, *Toxicity, *Activated carbon, *Waste water treatment, Pilot plants, *Canada, Foreign countries, Wastes, Industrial wastes, Waste treatment, Solids contact processes, Tertiary treatment, Water pollution sources, Biochemical oxygen demand, Chemical oxygen demand, Color, Hydrogen ion concentration, Suspended solids, Effluents, Industrial wastes, Water pollution treatment, Water purification, Bioassay, Water analysis.
Identifiers: Kraft mills.

The results are presented of a 2.5-month pilot plant study conducted at an eastern Canadian kraft mill on the feasibility of detoxifying pulp mill effluents with activated carbon. The mill produces bleached, semibleached, and unbleached kraft pulps from a combination of 90% softwood (mostly spruce and fir) and 10% hardwood. Mill effluents received primary treatment in a clarifier and secondary treatment in a two-stage aerated lagoon. The pilot plant is briefly described. Water quality tests were performed on influent and effluent from composite tanks and from the four activated carbon columns to determine BOD, COD, color, pH, and suspended solids. Bioassays were conducted to evaluate the toxicity removal. The results showed that activated carbon is effective in detoxifying kraft mill effluents. Despite solids concentrations as high as 200 mg/liter in the pilot-plant influent, there were not problems with plugging in the columns, and no need for prefiltering of solids. A contact time of 15 minutes was adequate for reducing toxicity to acceptable levels. The high concentration of kraft mill effluents precludes the use of carbon by itself for removal of either color or BOD. While high removals of both color and BOD were attained during the initial two to three days of operation with fresh carbon, the average removal attained was approximately 40% for 5-day BOD and 57% for color. On a per unit basis, activated carbon removed 0.0625 g BOD and 180 color units per gram of carbon used. (Witt-IPC)
W75-04953

KRAFT EFFLUENT COLOR REMOVAL BY DISPERSED AIR FLOTATION,
Saint Mary's Univ., Halifax (Nova Scotia).
E. R. Hayes, and V. G. Munroe.
Pulp and Paper Canada, Vol 75, No 11, p 61-64 (T398-401), Nov 1974. 7 fig, 2 tab, 24 ref.

Descriptors: *Color, *Pulp wastes, *Waste water treatment, *Flotation, Polyelectrolytes, Industrial wastes, Water pollution sources, Effluents, Biochemical oxygen demand, Chemical oxygen demand, Flocculation, Coagulation, Sedimentation, Aluminum, Sulfates, Water pollution treatment, Waste treatment, Water pollution control, Water purification, Costs, Pulp and paper industry.
Identifiers: Kraft mills, Alums.

An alum solution and a synthetic high molecular weight polyelectrolyte flocculant aid were added to kraft mill effluent. The sample was tested to determine float volume, floc size, and flotation time. Float was removed by aspiration, and the treated effluent was filtered. A dispersed air flotation system provided faster formation and separation of the float. A miniplant designed on the above principle was assembled and operated at Scott Maritimes Pulp Ltd. The color of the effleunt discharged from the pilot plant was comparable to results in the laboratory studies, in which 90% of the color was removed, and the BOD and COD were reduced 45% and 65%, respectively. Approximate costs for the operation are projected, and two methods of alum recovery are suggested. (Sykes-IPC)
W75-04954

'FLOAT WASH' – A CLOSING-UP SYSTEM FOR THE PULP AND PAPER INDUSTRY,
Fractionator, Stockholm (Sweden). Aktiebolaget.
M. Holmrich.
Paper, Vol 182, No 8, p 500-502, Oct 16, 1974. 4 fig.

Descriptors: *Water purification, *Industrial water, *Water conservation, *Pulp wastes, *Treatment facilities, Equipment, Screens, Water treatment, Separation techniques, *Waste water treatment, Reclaimed water, Sludge treatment, Water pollution control, Pollution abatement, Recycling, Waste treatment, Industrial wastes.
Identifiers: *Float Wash Fractionator, Deinking, Fiber recovery.

The Float Wash Fractionator, developed by AB Fractionator, Stockholm, Sweden, involves fractionating against a liquid column. The water to be treated, formed to a full cone jet by a nozzle, is sprayed upwards towards a screen. The fines fraction, which is the passed fraction, forms a liquid column on the upper side of the screen. The coarse fraction, containing pure fibers, falls from the screen into the lower tank. In some applications, the fines fraction is used as fourdrinier wire shower water and the coarse fraction returns to production. In a deinking system the fines fraction is passed to a flotation system and the coarse fraction goes to a washing filter. Other applications include: separation of fibers from sludge, microscreening of water, preparation of precoat for filters, fractionating of pulp, or in combination with existing flotation systems. (Sykes-IPC)
W75-04955

WATER CONSERVATION AND FIBER ECONOMY,
Thames Board Mills Ltd., Purfleet (England).
For primary bibliographic entry see Field 3E.
W75-04956

HOW TO CLARIFY KRAFT EFFLUENT WITH SEAWATER AND LIME,
Nova Scotia Research Foundation, Dartmouth.
B. Rapson, D. P. Sullivan, and J. A. Brothers.
Pulp and Paper Canada, Vol 76, No 1, p 88-91 (T21-23), Jan 1975. 9 fig, 2 tab, 4 ref.

Descriptors: *Waste water treatment, *Pulp wastes, *Color, *Suspended solids, *Sea water, *Lime, Effluents, Aeration, Bicarbonates, Carbon dioxide, Magnesium, Oxides, Calcium, Flocculation, Water pollution sources, Industrial wastes, Operating costs, Costs, Waste treatment, Separation techniques, Pulp and paper industry.
Identifiers: Kraft mills.

A novel and efficient process is described for removing color and suspended solids from kraft mill effluents. In this process, developed at Nova

Scotia Research Foundation, a small amount (5-10%) of seawater is first added to the combined mill effluents, and the mixture is aerated to removed bicarbonates as carbon dioxide. This is followed by the addition of only slightly more than the stoichiometric amount of lime to produce a flocculant precipitate of MgO which, as it settles, removes color and suspended solids. Over 80% color removal has been achieved in the laboratory with lime additions as small as 250 mg CaO/liter. An unexpected finding was the relatively high floc settling rate, up to 4 ft/hr, obtained with small lime additions. This could lead to appreciably smaller clarifiers than those required in more conventional processes. Figures are presented showing a preliminary estimate of $5.00/ton of pulp for the direct operating costs of large-scale facilities based on this process. The process also offers the prospect of reduction of operating cost by recovering and selling MgO. A possible method of recovering MgO is described. (Hansen-IPC)
W75-04958

CALCULATION OF CONCENTRATION OF IMPURITIES IN THE RECYCLING SYSTEM OF PROCESS WATER IN KRAFT PULP MANUFACTURE (BERECHNUNG DER VERUNREINIGUNGSKONZENTRATION IM REZIRKULATIONS SYSTEM DER BETRIEBSWAESSER BEI DER SULFATZELLSTOFFHERSTELLUNG),
IRAPA, Prague (Czechoslovakia).
F. Minarik, and P. Sochan.
Zellstoff and und Papier, Vol 23, No 9, p 260-267, Sept 1974. 1 fig.

Descriptors: *Recirculated water, *Water quality, *Bleaching wastes, *Pulp wastes, Flow system, *Mathematical models, Model studies, Computers, Simulation analysis, *Recycling, Industrial water, Analytical techniques, *Water reuse, Waste water treatment.
Identifiers: *Kraft pulping, Chemical recovery, Black liquor.

The manufacture of kraft pulp is analyzed and a circuit diagram of the process is prepared, including recovery of chemicals, bleaching, and drying. A mathematical model is derived from this; calculation by the computer permits prediction of the efficacy of recycling, the quality of the return water, and the possibility of its repeated use without impairing pulp quality. (Ward-IPC)
W75-04959

WATER RECYCLING IN THE MANUFACTURE OF SIZED PAPERS (ISPOL'ZOVANIE OBOROTNYKH VOD V PROIZVODSTVE KLEENYKH VIDOV BUMAGI),
Belorusskii Tekhologicheskii Institut, Minsk (USSR).
V. L. Kolesnikov.
Bumazhnaya Promyshlennost', No 10, p 8-11, October, 1974. 2 fig, 1 tab.

Descriptors: *Water reuse, *Pulp and paper industry, *Water conservation, *Recirculated water, *Industrial water, *Reclaimed water, Effluents, Water pollution control, Water treatment, Waste water treatment, Demineralization, Water purification, Economics, Freshwater, Slime, Corrosion, Scaling, Suspended solids, Fibers(Plant), Water pollution sources, Acidic water, Inorganic compounds, Salts, Aluminum, Chemical precipitation, Coagulation.
Identifiers: White water(Paper machine), Sized papers, Alums, Rosin.

Most effluent recycling systems in the papermaking process take into account factors limiting the extent to which freshwater can be replaced by recycled water, such as slime formation, equipment corrosion, scale formation on heat exchangers, and wire and felt clogging. It is also widely recognized that repeated use of effluents requires the removal of fibers and other suspended particles. Insufficient attention has been given to the recycling of acidic water containing a aluminum salts. Diluation of papermaking stock with this water causes the formation of an undesirable coarse precipitate. Neutralization of the acidic water does not solve the problem, as aluminum compounds have a strong coagulating action even in neutral medium. Successful recycling in the manufacture of sized papers can be achieved only if inorganic compounds, primarily aluminum compounds, are removed from the white water prior to its use for stock diluation. A detailed description and diagram are given of a closed system developed for the manufacture of sized papers, in which freshwater is used only to make losses, and water consumption is only 1.6 cu m/ton of paper. The system, which includes stock preparation and papermaking operations, has three recycling circuits. A novel component is a unit for demineralization of white water and preparation of process water, in which the maximum permissible amount of untreated white water is mixed with purified white water and a certain amount of freshwater for compensation of losses. The system is economical and gives savings in rosin size of 5.3 kg/ton of product. (Stapinski-IPC)
W75-04960

REDUCTION OF FRESHWATER CONSUMPTION AT A BOARD MILL (OPYT L'VOVSKOI KARTONNOI FABRIKI PO SNIZHENNYU RASKHODA SVEZHEI VODY),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev (USSR).
V. P. Svitel'skii, A. D. Mil'shtein, V. A. Kovba, E. T. Mil'shtein, and T. D. Sokirko.
Bumazhnaya Promyshlennost', No 9, p 26-27, September, 1974. 1 tab.

Descriptors: Freshwater, *Pulp and paper industry, *Water consumption(Except consumptive use), *Water reuse, *Industrial water, Effluents, Water pollution control, Water pollution sources, Suspended solids, Microorganisms, Fibers(Plant), Recirculated water, Colloids, Water conservation, Waste water treatment.
Identifiers: White water(Paper machine).

The Lvov board mill manufactures solid fiber board from waste paper stock and lined board from a base layer of waste paper stock plus a liner of bleached chemical pulp. The freshwater consumption is 13 and 24 cu m/ton, respectively. This low consumption is due to the reuse of mechanically purified effluents for washing felts and cylinder molds, and as pump sealants. A large part of the felt wash water is discharged into the saveall of the solid-board machine. The pollution load of effluents increases with the advance of the web on the machine from the wet end to the presses. The processing of low-grade fibrous material under conditions of low freshwater consumption and reuse of insufficiently purified effluents resulted in the accumulation of highly dispersed solids, solloidal particles, and microorganisms in the system. This in turn caused excessive clogging of felts and shortening of their service life, deterioration of the pulp quality, poor dewatering, and web breaks. It was recommended that the felt wash water be separated from white water, that white water containing good quality fibers be used for stock dilution, and that all effluents that cannot be reused without purification be discharged. The introduction of these measures increased the recovery of fibers and halved the volume of effluents and their suspended solids content. (Stapinski-IPC)
W75-04961

DISINFECTION OF WHITE WATER WITH OZONE (OBREZZARAZHIVANIE OBOROTNOI VODY OZONOM),
Tsentralnyi Nauchno-Issledovatelskii Institut Bumagi, Moscow (USSR).
P. N. Fisher, E. A. Morkovina, Z. G. Oleneva, V. V. Sergeeva, and L. G. Loginova.
Bumazhnaya Promyshlennost', No 10, p 11, Oct, 1974. 1 tab.

Descriptors: *Ozone, *Disinfection, *Pulp wastes, *Waste water treatment, Microorganisms, Bacteria, Water purification, Water quality control, Water pollution sources, Water pollution control, Pulp and paper industry, Temperature, Industrial wastes, Waste treatment, Fibers(Plant), Aquatic bacteria, Aquatic microorganisms.
Identifiers: *White water(Paper machine).

White water from two paper mills (at Kondopoga and Solikamsk) was treated with ozone at various doses, temperatures, and for varying times. At an ozone dose of 3.5-4 kg/100 cu m water and a contact time of 7-10 minutes, all microorganisms were killed with the exception of bacterial spores. These can be destroyed after germination by a subsequent ozonization. The recommended treatment temperature is 45 C. (Stapinski-IPC)
W75-04962

REMOVAL OF DYES FROM PAPER MILL EFFLUENTS THROUGH TREATMENT BY THE FLYGTOL PROCESS (FARBSTOFF-ENTFERNUNG AUS PAPIERFABRIKSABWAESSERN DURCH DIE BEHANDLUNG MIT DEM FLYGTOL VERFAHREN),
C. H. Mobius, and T. H. Gunther.
Wochenblatt fur Papierfabrikation, Vol 102, No 15, p 559-561, August 15, 1974. 1 fig, 1 tab, 6 ref.

Descriptors: *Pulp wastes, *Dyes, *Color, *Waste water treatment, Bentonite, Montmorillonite, Clays, Cation exchange, Ion exchange, Effluents, Industrial wastes, Separation techniques, Water pollution sources, Water pollution control, Waste treatment.
Identifiers: *Flygtol process.

Using three different sets of conditions, it was found that the Flygtol process almost completely removes basic dyes, but removes only a small fraction of most acid dyes. This is explained by the physical and chemical properties of the active agent, Flygtol A (effluent bentonite), which contains montmorillonite in its especially active sodium form. This material not only has a high specific surface, but also a high cation exchange capacity. (Ward-IPC)
W75-04963

THE CHEMICAL TREATMENT OF COOLING WATER,
Standard Oil Co. of California, San Francisco.
J. W. McCoy.
Chemical Publishing Company (New York), 1974. 237 p.

Descriptors: *Cooling water, *Pre-treatment(Water), *Industrial water, *Cooling towers, *Wastewater treatment, Design, Operations, Corrosion, Scaling, Fouling, Microbiology, Chemicals, Chemical engineering, Chemical degradation, Chemical reactions, Management, Operation and maintenance, Water reuse, Recirculated water, Control, Analysis.
Identifiers: Corrosion inhibitors, Scale inhibitors, Chemical treatment.

The design and operating principles and practices of open recirculating cooling water systems are discussed, with emphasis on causes, analysis, and control of corrosion, scaling, fouling, microbiological deposits. The proper application of corrosion and scale inhibitors and other water treatment chemicals is dealt with from the viewpoints of chemists, chemical engineers, and managers/administrators of water treatment programs. Citations to the pertinent literature are appended to each chapter. An index is included. (Brown-IPC)
W75-04964

STUDY OF EFFLUENT DISCHARGE (K VOPROSU ISSLEDOVANIYA REZHINOV VODOOTVENDENIYA),
For primary bibliographic entry see Field 5G.

W75-04965

PURIFICATION OF THE PULP INDUSTRY'S BLEACHERY EFFLUENTS WITH ALUMINA (REINIGUNG VON BLEICHEREIABIWESSERN DER ZELLSTOFFINDUSTRIE MIT ALUMINIUMOXID),
T. Ploetz.
Das Papier, Vol 28, No 10A, p V39-V43, Oct, 1974. 3 fig, 1 ref.

Descriptors: *Bleaching wastes, Water purification, *Aluminum, *Oxides, *Pulp wastes, *Adsorption, Water pollution sources, Industrial wastes, *Waste water treatment, Waste treatment, Pulp and paper industry, Treatment facilities, Water pollution control, Europe, Foreign countries, Water quality standards, Water quality control, Pilot plants, Biological treatment, Flocculation, Oxidation, Filtration, Electrochemistry, Radiation, Radioactivity, Ozone, Activated carbon, Calcium, Iron, Salts.

The requirements for water protection set up in 1967 by the International Commission for the Protection of Water at Lake Constance proved too stringent for the bleachery effluents of Feldmuehle AG. sulfite pulp mill at Baienfurt. Purification methods investigated were biological processes, both single- and multistage; flocculation with calcium, iron, and aluminum salts, alone and in combination; catalytic oxidation; ultrafiltration; electrochemical methods; radioactive irradiation; ozonization; and adsorption on activated charcoal. The development of a new method involving adsorption on alumina is reported. It has been operating in the pilot-plant stage for several months. (Ward-IPC)
W75-04966

INDUSTRIAL WATER PURIFICATION,
L. F. Martin.
Noyes Data Corporation (Park Ridge, New Jersey and London), 1974. 300 p.

Descriptors: *Industrial wastes, *Patents, Water purification, *Reviews, *Separation techniques, United States, Publications, *Waste water treatment, Flocculation, Filtration, Absorption, Electrolysis, Ultrasonics, Metals, Oil wastes, Sulfite liquors, Pulp and paper industry, Color, Water pollution sources, Pollutants, Waste treatment, Chemical precipitation, Wastes, Water pollution, Water pollution control, Water pollution treatment, Fertilizers, Paints, Photography, Pulp wastes.

Based on a review of the United States patent literature (about 165 patents), a discussion is presented of solid-liquid and oil-water separation processes and equipment (flocculation, filtration, absorbents, electrolysis, ultrasonic and other treatments) in general. Specific reference is made to the separation of metals, metal finishing, refinery operations, coal and ore processing, spent liquor and effluent treatments in the pulp and paper industry, including color removal, and miscellaneous chemical processes used in the fertilizer, paint, photographic, and other industries. (Brown-IPC)
W75-04968

INCINERATION OF SOLID WASTES,
For primary bibliographic entry see Field 5E.
W75-04969

CHEMICAL TREATMENT OF PULP MILL EFFLUENTS. USE OF ASH FROM COMBUSTION OF BISULFATE LIQUOR (TRAITEMENT CHIMIQUE D'EFFLUENTS D'USINESS DE PATE. UTILISATION DES CENDRES DE COMBUSTION DE LIQUEUR BISULFITIQUE),
Finnish Pulp and Paper Research Inst., Helsinki.
E. Meloni.
ATIP (Association Technique de l'Industrie Papetiere) Revue, Vol 28, No 7, p 323-328, 1974. 1 fig, 11 tab, 14 ref.

Descriptors: *Sulfite liquors, *Fly ash, *Effluents, *Pulp and paper industry, *Waste treatment, Chemical precipitation, Chemical oxygen demand, Color, Bleaching wastes, Industrial wastes, Water pollution sources, Biochemical oxygen demand, Suspended solids, Nutrients, *Waste water treatment, Water pollution treatment, Sludge, Sludge treatment, Hydrogen ion concentration, Dissolved solids, Foreign countries, Europe, Incineration, Lime.
Identifiers: Barking effluents, *Finland.

Following a brief review of methods of chemical treatment of pulp mill effluents in various countries, especially in Finland, studies are presented concerning the use of fly ash from combustion of calcium bisulfite spent pulping liquors in treating pulp mill effluents. Results were generally found to improve with increasing amounts of fly ash used; 1-5 g/liter can be considered as sufficient. The use of fly ash appears to be best suited to treating barking (woodroom) effluents. It is also useful in decreasing the COD and color of pulp washing and bleaching effluents, but does not significantly affect BOD or contents of suspended materials and nutrients. The fly ash is comparable or superior to lime for chemical effluent treatment. Sludge volumes produced are higher than in mechanical treatment, but sludge filtration is much easier in many cases. The main disadvantages of the treatment are the high pH and content of dissolved materials in the treated effluents. (Speckhard-IPC)
W75-04973

INVESTIGATIONS ON TREATMENT OF PAPER AND PULP EFFLUENTS BY THE RUTHNER RAPID CLARIFICATION SYSTEM (UNTERSUCHUNGEN ZUR AUFBEREITUNG VON PAPIER-UND ZELLSTOFFABWAESSERN MITTELS SCHNELLKLAERER SYSTEM RUTHNER),
W. Lutz.
Das Oesterreichische Papier, Vol 11, No 7, p 9-15, July 1974. 4 fig.

Descriptors: *Treatment facilities, *Pulp wastes, Water purification, Waste treatment, *Coagulation, *Flocculation, Silica, Inorganic compounds, Organic compounds, Cellulose, Cations, Anions, Ions, Chemical reactions, Chemicals, Separation techniques, Industrial wastes, Water pollution sources, Sulfite liquors, Water pollution treatment, Effluents, *Waste water treatment, Polyelectrolytes, Additives, Carbohydrates.
Identifiers: *Ruthner system, Starch, Alginates, Polyacrylamide, Polyamides, Polyamines, Polyvinyl alcohol, Polyethylene oxide.

Basic concepts underlying the separation of solids from waste liquors are defined, with a short discussion of the physical-chemical principles involved in the two commonly occurring mechanisms, coagulation and flocculation. Polymeric deflocculants are briefly classified as inorganic (silica), natural organic (starch, cellulose, and alginate products), and synthetic organic, which are subdivided into anionic (hydrolyzed polyacrylamide), cationic (polyamides and polyamines) and nonionic (polyvinyl alcohol and polyethylene oxide). The Ruthner system is described with a diagram. Typical results obtained in treating effluents from a fine paper mill, an integrated pulp and fine paper mill, a newsprint mill, and a bleached sulfite pulp mill are also given. (Ward-IPC)
W75-04974

FRACTIONATION OF SPENT SULFITE LIQUORS USING ULTRAFILTRATION CELLULOSE ACETATE MEMBRANES,
Institute of Paper Chemistry, Appleton, Wis.
I. K. Bansal, and A. J. Wiley.
Environmental Science and Technology, Vol 8, No 13, p 1085-1090, Dec 1974. 4 fig, 5 tab, 5 ref.

Descriptors: *Reverse osmosis, *Pulp wastes, *Waste treatment, *Waste water treatment, *Sulfite liquors, *Separation techniques, Industrial wastes, Desalination processes, Membrane processes, Osmosis, Liquid wastes, Permeability, Water purification, Permselective membranes, Water pollution treatment, Water pollution sources, Economics, Membranes, Pollution abatement, Carbohydrates, Lignins.
Identifiers: *Cellulose acetate, Flux rate, Solids rejection, Lignosulfonates.

Purification of softwood-derived calcium-base spent sulfite pulping liquors by ultrafiltration was conducted with standard commercially available cellulose acetate membrane modules from 3 different equipment suppliers provided modules with the cellulose acetate membrane inside the pressurized tubular supports, whereas the third had externally pressurized tubes within a pressure vessel and with the membrane cast on the outside of each tube. Calcium-base spent sulfite liquors containing 20-27% reducing sugars were converted to permeates with 40-66% reducing sugar. The degree of sugar purity increased with higher pressure in each type of membrane module tested. The cellulose acetate membrane modules were operated at inlet pressures of 300-600 psi (21.09-42.18 kg/sq cm) and elevated liquor temperatures of 50-60 C for a period of 500-1100 hr. Feed liquors were concentrated from 10-12% to 30-33% total solids, and the overall average flux rate ranged from 20-44 gal/day/sq ft (0.82-1.79 cu m/day/sq m) during the concentration run. The rejection of lignosulfonates varied from 80 to 95%, whereas the overall solids rejection averaged 50-80%. The cellulose acetate membranes were superior to the dynamic membranes in terms of higher flux rates and higher degree of sugar purity obtained. The loss in membrane flux rates and rejections was low for the 1100-hr duration of these trials. The capability for operation at elevated pressures and temperatures yields higher rates of permeation, thereby improving process economics. (Witt-IPC)
W75-04975

AT ABITIBI, IROQUOIS FALLS, $2.5-MILLION PRIMARY TREATMENT SYSTEM NEARS COMPLETION.
Canadian Pulp and Paper Industry, Vol 27, No 11, p 38-39, Nov 1974. 3 fig.

Descriptors: *Pulp wastes, *Waste water treatment, *Treatment facilities, *Sewage treatment, *Canada, Foreign countries, Pulp and paper industry, Sludge disposal, Sewers, Sulfite liquors, Waste treatment, Industrial wastes, Water pollution sources, Water pollution control, Biochemical oxygen demand, Suspended solids, Water quality standards, North America.
Identifiers: Clarifiers, *Iroquois Falls(Ontario-Canada).

Abitibi Paper Co. operates a 1,000 ton/day newsprint mill at Iroquois Falls, Ontario. The primary effluent treatment system, begun in the spring of 1973, is nearing completion. It consists of two 100-foot diameter Eimco clarifiers plus facilities to handle, thicken, and dispose of the sludge. In addition to the new treatment facilities, the mill's sewer systems have been modified and extended to separate lean waste water (containing less than 50 ppm suspended solids) from the process sewer system. The treatment system will come on-line as the various components are tested out and become operational. So far, preliminary tests with effluent from the sulfite and paper mills indicate an 87% solids removal at a flow rate of 10,000 gal/min through both clarifiers. This brings the test effluents in line with the required 50 ppm discharge regulations. Abitibi is presently studying possible methods of secondary treatment to reduce BOD loading. (Witt-IPC)
W75-04976

SURVEY OF NEEDS FOR MUNICIPAL WASTE TREATMENT FACILITIES.
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 084, $3.75 in paper copy, $2.25 in microfiche. February, 1972. 39 p, 1 fig, 14 tab.

Descriptors: *Waste water treatment, Municipal wastes, *Treatment facilities, *Sewage treatment, Costs, Water quality control, Water pollution treatment, *Surveys.
Identifiers: *Municipal waste treatment.

A survey was conducted to obtain current estimates of the scope and cost of construction of municipal waste treatment facilities that are needed to meet existing water quality standards implementation schedules or other standards or enforcement requirements. The procedures and findings are explained. (Orr-FIRL)
W75-04978

DESIGN OF A MULTILAYER FILTER FOR USE IN THE WATER TREATMENT INDUSTRIES,
Imperial Coll. of Science and Technology, (England). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5F.
W75-04979

COLUMNS REPRESENTING MOUND-TYPE DISPOSAL SYSTEMS FOR SEPTIC TANK EFFLUENT: II. NUTRIENT TRANSFORMATIONS AND BACTERIAL POPULATIONS,
Wisconsin Univ., Madison. Dept. of Soil Science.
E. R. Magdoff, D. R. Keeney, J. Bouma, and W. A. Ziebell.
Journal of Environmental Quality, Vol 3, No 3, p 228-234, July-September, 1974. 6 fig, 4 tab, 15 ref.

Descriptors: *Septic tanks, Effluents, *Liquid wastes, Potable waters, Eutrophication, Public health, Nitrogen, Phosphorus, Chemical oxygen demand, Soil, Laboratory experiments, Bacteria, *Waste water treatment, *Waste disposal, Water reuse.
Identifiers: *Mound-type disposal systems.

The purification of liquid wastes is associated with health problems relating to the occurrence of pathogenic bacteria and viruses or a high nitrate concentration in potable waters, and eutrophication of ground and surface waters due to nutrients from the effluents. Carbon, nitrogen, and phosphorus transformations and bacterial populations were studied in columns representing a mound disposal system. Total nitrogen, total phosphorus, and the chemical oxygen demand (COD) of the influent (septic tank effluent) averaged 41, 21, and 257 mg/liter, respectively. It was concluded that soil materials, arranged as 60 cm of fill over 30 cm of silt loam to simulate a mound, considerably improved the quality of percolating septic tank effluent. Techniques for application to remove COD, nitrogen, and phosphorus are currently being developed both in field and laboratory experiments. (See also W74-02147) (Prague-FIRL)
W75-04981

RETURN SLUDGE FLOW CONTROL,
Environmental Protection Agency, Washington, D.C. Office of Enforcement and General Counsel.
A. W. West.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-231 085, $3.25 in paper copy, $2.25 in microfiche. September, 1973. 14 p, 4 fig, 1 tab.

Descriptors: Sludge, *Sludge treatment, *Flow control, Flow rates, Environmental sanitation, *Waste water treatment, Biological treatment, *Sewage treatment, Operation and maintenance, Management, Control.

The clarifier sludge flow, which includes both return sludge and excess waste sludge flows, should be adjusted to meet measurable process requirements. The results of a one-hour mixed liquor settlometer test, 15-minute mixed liquor and return sludge centrifuge test, and final clarifier sludge rate that is necessary to keep process equilibrium. The advantage of this control formula is that it responds to almost all loading, process balance and sludge quality characteristics to determine the optimum clarifier sludge flow rate. (Orr-FIRL)
W75-04982

STATUS OF ADVANCED WASTE TREATMENT,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
I. J. Kugelman.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-213 819, $4.75 in paper copy, $2.25 in microfiche. May, 1972. 79 p, 24 fig, 34 tab, 59 ref.

Descriptors: *Waste treatment, *Waste water treatment, Phosphorus, Nitrogen, Activated sludge, *Tertiary treatment, Filtration, Biological treatment.
Identifiers: Chemical treatment, Physical treatment, Waste treatment advances, Treatment methods.

A review of waste treatment is presented with emphasis on those developments ready for full-scale engineering application. Topics covered include waste water characteristics, conventional treatment technology, microstrainers, deep-bed filtration, chemical treatment, phosphorus removal, phosphorus removal in conventional treatment, phosphorus removal by chemical precipitation, nitrogen control, biological denitrification, breakpoint chlorination, selective ion exchange, organic carbon removal, activated carbon adsorption, physical-chemical treatment, ozone oxidation, pure oxygen activated sludge, dissolved inorganics removal, ion exchange, electrodialysis, reverse osmosis, and tertiary treatment. Biological-physical treatment employs a filter to upgrade the performance of conventional treatment. Biological-chemical treatment uses chemical coagulants at differing points for phosphorus removal and improved solids removal. Physical-chemical treatment combines chemical clarification and activated carbon to achieve waste water purity. Biological-chemical-physical treatment combines many processes to achieve a high degree of purity for a large variety of pollutants. (Orr-FIRL)
W75-04983

PHYSICAL-CHEMICAL PROCESSES,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
I. J. Kugelman, and J. M. Cohen.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-214 111, $4.25 in paper copy, $2.25 in microfiche. March, 1972. 52 p, 9 fig, 33 tab, 11 ref.

Descriptors: *Sewage treatment, *Chemcontrol, *Physical control, *Waste water treatment, Water clarification, Filtration, Flocculation, Adsorption, Phosphorus, Suspended solids, Pilot plants, Treatment facilities.
Identifiers: Carbon adsorption, *Physical-Chemical treatment.

The various physical-chemical processes used in sewage treatment are discussed. Physical-chemical treatment of sewage is now an alternative to biological treatment, especially for those cases where a high level of phosphorus removal is needed. The clarification-adsorption process utilizes chemical clarification and filtration to achieve almost complete suspended and colloidal solids removal. Chemical clarification involves the addition of an appropriate chemical to the waste water and then flocculation and settling. The carbon adsorption step removes soluble organics from the waste water. Design and performance of some functioning physical-chemical pilot plants are described. (Orr-FIRL)
W75-04984

FEASIBILITY OF HYDRAULIC TRANSPORT AND TREATMENT OF GROUND HOUSEHOLD THROUGH SEWERS,
Foster-Miller Associates, Inc., Waltham, Mass.
A. R. Guzdar, and S. S. Rhee.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-229 256, $7.25 in paper copy, $2.25 in microfiche. April, 1974. 200 p, 67 fig, 9 tab, 38 ref, 2 append.

Descriptors: *Waste water treatment, *Hydraulic transportation, *Sewers, *Solid wastes, Sewage treatment, Sewage disposal, Cities, Domestic wastes, Municipal wastes, Sewage slurry, *Feasibility studies, Pipes.
Identifiers: *Ground household refuse, Solid waste management.

The feasibility of hydraulic transport of ground household refuse through the straight pipes of existing sewers is examined by studying the gravity flow of ground refuse slurry through inclined pipes. the feasibility of treating domestic sewage containing ground refuse was studied by conducting a laboratory analysis of the sewage-refuse slurry. It was concluded that the transport of ground refuse through existing sewer lines is feasible and that it is also feasible to treat ground refuse in sewage in at least 0.5 to 1 percent concentrations, with qualifications. (Orr-FIRL)
W75-04985

DOMESTIC WATER AND WASTE TREATMENT SUBSYSTEM, OPERATION AND MAINTENANCE MANUAL,
General Electric Co., Philadelphia, Pa. Space Div.
T. M Gresko, and R. W. Murray.
Available from the National Technical Information Service, Springfield, Va. 22161 as N74-16839. October, 1973. 28 p, 8 fig, 2 tab.

Descriptors: *Waste treatment, *Operation and maintenance, Domestic wastes, Domestic water, *Waste water treatment, *Treatment facilities.
Identifiers: *Operation and maintenance manual.

This manual for the operation and maintenance of a treatment substation is divided into three parts. The first part, Substation Operating Instructions, contains information n electrical connections, inlet/outlet connections, start-up, bypass controls, settings, operating conditions, and system mobilization. Maintenance Instruction explains the periodic maintenance on the incinerator dump, nozzle trap cleaning, and filters; a trouble shooting guide and teardown procedures for the evaporator/condenser, the catalytic oxidizer and the pumps are included. The third part of the manual is a list of parts and materials. (Orr-FIRL)
W75-04986

EFFECT OF CARBON TO NITROGEN RATIO ON ACTIVATED SLUDGE SUBSIDENCE AND DEWATERING CHARACTERISTICS,
Envirex, Inc., Milwaukee, Wis. Environmental Sciences Div.
A. Geinopolos.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-230 941, $5.75 in paper copy, $2.25 in microfiche. March, 1974. 126 p, 12 fig, 32 tab, 26 ref.

Descriptors: *Sludge disposal, *Pulp and paper industry, *Activated sludge, Carbon, Nitrogen, Industrial wastes, Biological treatment, Pulp wastes, *Dewatering, *Waste water treatment.

Identifiers: *Carbon to ammonia nitrogen ratio, Scott Paper Company.

The handling and disposal of waste sludge is one of the most important and most difficult problems in the design and operation of waste treatment facilities. Investigations were conducted to determine the effect of the ratio of organic carbon to ammonia nitrogen on activated sludge subsidence and dewatering characteristics. Changes in the carbon-nitrogen ratio were made on one of two activated sludge systems of a pulp and paper mill. When both the control and test sludge systems were operated under similar operating conditions, the solids produced from both systems had similar subsidence, thickening and filtration properties. When both sludge systems were nitrogen sufficient, the carbon-nitrogen ratio had an appreciable effect on the solids subsidence and compaction properties. The carbon-nitrogen ratio appears to be a good control measure in the activated sludge treatment of nitrogen deficient wastes. At the Scott Paper Company in Mobile, Alabama, the optimum carbon-nitrogen ratio seems to be equal to or less than 15. (Orr-FIRL)
W75-04987

EVALUATION OF NEW REVERSE OSMOSIS MEMBRANES FOR THE SEPARATION OF TOXIC COMPOUNDS FROM WASTEWATER,
Illinois Univ., Urbana. Environmental Engineering Program.
E. S. K. Chian, and H. H. P. Fang.
Available from the National Technical Information Service, Springfield Va. 22161 as AD-775 850, $4.25 in paper copy, $2.25 in microfiche. September 1973. 60 p, 12 fig, 10 tab, 15 ref, 5 append.

Descriptors: *Reverse osmosis, *Separation techniques, *Sewage treatment, *Membranes, *Waste water treatment, Desalination pocesses, Water quality control, Membrane processes, Organic compounds.
Identifiers: Cellulose acetate membrane, Aromatic polyamide membranes, Crosslinked-polyethylenimine ultrathin membrane.

New reverse osmosis membranes for the removal of toxic organic compounds from waste waters are evaluated. The reverse osmosis membranes were tested for separation with a solution of 14 model compounds, including all the major groups of organic compounds and with a sodium chloride solution to determine salt rejection and flux. Membranes made of cellulose acetate or its derivatives showed unsatisfactory organic compounds separation but were very high in salt rejection. Membranes made of aromatic polyamide showed good separation of the model compounds but relatively low fluxes. The membranes made of crosslinked-polyethylenimine were most satisfactory in terms of model compound separation and in terms of flux. This study confirms that solute separation is closely related to the chemical nature of the membrane materials rather than the size of the pore openings of the membrane. (Orr-FIRL)
W75-04988

COST OPTIMIZATION OF ACTIVATED SLUDGE SYSTEMS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
A. C. Middleton, and A. W. Lawrence.
Biotechnology and Bioengineering, Vol 16, No 6, p 807-826, June 1974. 6 fig, 2 tab, 17 ref.

Descriptors: *Waste water treatment, *Activated sludge, *Aerobic treatment, Biomass, *Costs, Separation techniques, Solids contact processes, Sewage treatment.

A rational approach to the least cost design of an integrated activated sludge water treatment system is described. Included are the processes of activated sludge reactor, final settling tanks, gravity thickening and aerobic sludge digestion; capital, maintenance and operation costs are also considered. The optimum acceptable design is taken as a combination of the parameters considered, which include biological reactor design, biological solids retention time, liquid-biomass separation, and trade-offs among the separate components involved in the machinery. (Carpenter-FIRL)
W75-04990

RECOVERY OF TRACE METALS FROM AQUEOUS SOLUTION - REVIEW ARTICLE,
Birmingham Univ. (England). Dept. of Chemical Engineering.
A. B. Clarke.
Chemical Engineer, Vol 25, No 1, p 19-23, 1974. 1 fig, 13 ref.

Descriptors: *Metals, *Waste water treatment, *Chemcontrol, *Aqueous solutions, Ion exchange, Foam fractionation, Separation techniques, Water pollution sources, Reviews, Trace elements, Metals.
Identifiers: Liquid-liquid extraction, Electrolysis, *Metals recovery.

Recent methods devised for the recovery of trace metals from aqueous solutions are reviewed. The ion exchange method is used for effecting separations at low concentrations. Liquid-liquid extraction using long chain anines is used when metal ions are not in the simple cationic form but in a stepwise series of mononuclear complexes and acting as anionic species. Foam fractionation, an adsorptive bubble technique, is used because of the versatility of the techniques and their potentiality for purposes ranging from chemical analysis to plant operation. A number of electrolysis methods have been developed for the treatment of wastes. The advantages and disadvantages of these methods are discussed. (Orr-FIRL)
W75-04991

DEGRADATION OF LIGNIN BY COMBINED CHEMICAL AND BIOLOGICAL TREATMENT,
Betz Labs., Inc., Trevose, Pa.
A. M. Stern, and L. L. Gasner.
Biotechnology and Bioengineering, Vol 16, No 6, p 789-805, June 1974. 7 fig, 3 tab, 14 ref.

Descriptors: *Ozone, *Lignins, *Color, Biomass, Costs, *Ozonation, Carbon, *Waste water treatment, Biodegradation, Degradation(Decomposition).
Identifiers: *Combined treatment(Chem-Bio).

The ozonation of lignin produce a series of decolorized products usable by microorganisms as a sole source of carbon. The color reduction is accompanied by a shift to lower weight species. At least 40 percent of the ozonated material can be transferred into microbial biomass and other products of commercial interest. Costs compare favorably with competitive decolorization processes. (Carpenter-FIRL)
W75-04992

BETHLEHEM TREATS 80 MILLION GALLONS OF WASTEWATER EACH DAY.
Industrial Wastes, Vol 22, No 3, p 36, May-June 1974.

Descriptors: *Aeration, Oxygenation, Sedimentology, *Waste water treatment, *Maryland, *Industrial wastes, Steel, Waste treatment, Dissolved oxygen.
Identifiers: *Sparrows Point(Md), Steel mill waste treatment, Aerators.

The Bethlehem Steel Corporation plant at Sparrows Point, Maryland has expanded its waste water treatment program with a facility in use since early 1971. Discharges treated include coarse and fine mill scale, oils, greases and wastes from pickling operations. After it is screened of floating debris, the waste water passes into a chamber where three 75 HP LIGHTNIN' aerators transfer enough oxygen to fulfill mixing and aerating requirements. The water then flows into a channel with settling basins, where suspended solids are removed by a floating dredge. The water, which is automatically monitored for pH and flow, is collected at a pumping station, where two additional aerators insure that the minimal dissolved oxygen content is achieved. (Carpenter-FIRL)
W75-04993

THE NEATH VALLEY SEWERAGE SCHEME.
Pipes and Pipelines International, Vol 18, No 3, p 25-26, June 1974. 1 fig.

Descriptors: *Pipes, *Pipelines, *Sewers, *Metal pipes, Joints(Connecions), Water conveyance, Sewerage, Hydraulic structures, Engineering structures, Great Britain.
Identifiers: *Neath Valley(Gt Brit), Iron pipes, Stantyte joints.

The development of 1200 mm diameter ductile iron pipe made available large diameter pipe with the strength of steel but possessing corrosion-resistant qualities better than those of gray steel. The Neath Valley Joint Sewerage System, Neath Valley, Great Britain, will use 2200 m of this pipe with a concrete lining. This pipe will receive the effluent from a pumping station equipped for grit removal and the screening of solids, and will convey the effluent to a submarine outfall. The pipes are being laid on a bed of crushed limestone aggregate and sand is used to surround the pipes. Polyethylene sleeves provide additional protection against corrosion. The pipes are connected by Stantyte joints, which are specially shaped rubber gaskets which fit in the sockets; the joints are completed by pushing the spigots into the sockets of mating pipes. (Orr-FIRL)
W75-05000

ACCUTE TOXICITY AND DETOXIFICATION OF KRAFT PULP MILL EFFLUENT,
International Pacific Salmon Fisheries Commission, New Westiminster (British Columbia).
For primary bibliographic entry see Field 5C.
W75-05014

PHYSICAL-CHEMICAL TREATMENT OF MUNICIPAL WASTES BY RECYCLED MAGNESIUM CARBONATE,
A. P. Black, A. T. DuBose, and R. P. Vogh.
Environmental Protection Agency, Technology Series report, EPA-660/2-74-055, June 1974. 113 p, 4 fig, 71 tab, 53 ref, append. EPA Grant 12130 HRA.

Descriptors: *Waste water treatment, *Coagulation, *Sludge treatment, *Nurtient removal, *Municipal wastes, Recycling, Magnesium carbonate, Magnesium hydroxide, Lime, Calcium carbonate, Carbon, Carbon dioxide.
Identifiers: *Magnesium carbonate-lime treatment, *Clinoptilolite.

The applicability to municipal wastes of the recently discovered magnesium carbonate-lime water treatment process has been investigated. A sixteen-month laboratory study was conducted and was followed by an eight-month pilot plant study. Four wastewaters with COD values varying from 200 to 1,500 mg/l were examined. Bench-scale coagulation studies designed to compare the effect of added $MgCO_3$ with treatment by lime only showed a 0%-30% greater reduction in effluent COD residuals. Color and turbidity reduction by the magnesium-plus-lime process averaged 50%-85% greater when compared to treatment by lime only. A series of 72-hour pilot plant runs was conducted with the magnesium precipitated increased after each three day period. Effluent characteristics improved as the amount of magnesium precipitated was increased. Influent and filter effluent samples were collected every four

hours and analyzed for COD, TOC, total phosphorus, alkalinity, hardness, calcium, and magnesium. Values for BOD were determined from composited samples. The percentage reduction in chemical (COD) and biological (BOD) oxygen-consuming substances ranged from a low of 70% for no magnesium ion precipitated to a high of 90% for 30 milligrams per liter of magnesium ion precipitated. Higher dosages have not yet been investigated. (EPA)
W75-05071

STUDIES OF LOW MOLECULAR WEIGHT LIGNIN SULFONATES,
Washington Univ., Seattle.
For primary bibliographic entry see Field 5A.
W75-05072

BIOLOGICAL TREATMENT OF CONCENTRATED SUGAR BEET WASTES,
Beet Sugar Development Foundation, Fort Collins, Colo.
J. H. Fischer.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.75. Environmental Protection Agency, Technology Series Report, EPA-660/2-74-028, June 1974. 100 p, 13 fig, 39 tab, 38 ref, 3 append. EPA Project 12060 FAK.

Descriptors: *Biological treatment, Colorado, Recycling, *Waste water treatment, Water reuse, Quality control, Reclaimed water, Pollution abatement, Treatment facilities, *Industrial wastes, *Recirculated water, Sugar beets, Suspended solids, Separation techniques, *Anaerobic digestion, Dissolved solids.
Identifiers: *Sugar beet waste treatment, *High solids flume water, Suspended solids separation.

A study of the variables influencing a closed loop recirculating flume water system for conveying sugarbeets for processing was conducted at Longmont, Colorado. Settleable solids were removed by screening, addition of milk of lime and settling; the concentration of dissolved solids increased daily during the processing season. The increasing concentration caused no problem provided the pH was 10 or greater and that the water temperature did not exceed 20C. A deep anaerobic pond received surplus system waters and the total system waters when operations ceased. Anaerobic digestion was aided by addition of nutrients and odors reduced surface aeration. Water eventually met discharge standards, and was used the second year to fill the system. (EPA)
W75-05078

AN INVESTIGATION OF ION REMOVAL FROM WATER AND WASTEWATER,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
R. J. Starkey, Jr., M. E. Kub, A. E. Binks, and K. K. Jain.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.95. Ecological Research Series Report, EPA-660/3-74-022, August 1973. 116 p, 38 fig, 19 tab, 14 ref, 5 append. EPA-68-01-0904.

Descriptors: *Capillary membrane dialysis, *Alumina adsorption, Macromolecules, Alum.
Identifiers: *Waste water treatment, *Coagulation, Nitrogen, Carbon, Phosphorus, Cations, Anions, Dissolved solids, Conductance, Hardness(Water), Polyelectrolyte, Hydrogen ion concentration, *Nutrient removal, Bioassay.

Three standardized techniques (capillary membrane dialysis, alumina adsorption, alum/polyelectrolyte coagulation) have been compared under laboratory conditions to determine their relative effectiveness in removing a broad spectrum of nutrients, cations, and anions from freshly collected samples of stream water and wastewater effluent (secondary and tertiary). Alumina adsorption was highly effective in removal of phosphorus, inorganic carbon, as well as most cations with concomitant reduction of specific conductance and hardness. High Kjeldahl and ammonia nitrogen removal efficiencies of alumina were only observed in samples of wastewater in which pre-treatment concentrations were relatively high. Dissolved solids content and pH of alumina treated samples were consistently observed to increase. Dialysis occupied an intermediate position in respect to cation removal, but produced results equivalent to alumina adsorption in respect to inorganic carbon. Failure to significantly reduce organic carbon concentrations was attributed to its association with macromolecules having a molecular weight greater than 5000 (the cutoff of the cellulose membrane under consideration). Superiority of dialysis in removal of sodium, potassium chloride, nitrate-nitrite, boron, and dissolved solids is reported. Coagulation was effective in removing phosphorus from all waters but was highly ineffective in respect to all other parameters tested. (EPA)
W75-05080

LIVESTOCK AND THE ENVIRONMENT, A BIBLIOGRAPHY WITH ABSTRACTS,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 10B.
W75-05084

RUM DISTILLERY SLOPS TREATMENT BY ANAEROBIC CONTACT PROCESS,
Bacardi Corp., San Juan, Puerto Rico.
T. G. Shea, E. Ramos, J. Rodriguez, and G. H. Dorion.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.75. Environmental Protection Agency, Technology Series Report, EPA-660/2-74-074, July 1974. 99 p, 16 fig, 15 tab, 30 ref, append. EPA Project 800935; Program Element 1BB037.
W75-05086

MEASUREMENT OF RESIDUAL CHLORINE LEVELS IN COOLING WATER--AMPEROMETRIC METHOD,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-05088

NEW MEMBRANES FOR REVERSE OSMOSIS TREATMENT OF METAL FINISHING EFFLUENTS,
Minnesota Pollution Control Agency, Minneapolis.
Lee T. Rozelle, C. V. Kopp, Jr., and K. E. Cobian.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.40. Environmental Protection Agency, Technology Series Report, EPA-660/2-73-033, December 1973. 66 p, 13 fig, 16 tab, 10 ref, append. EPA Project 12010 DRH.

Descriptors: *Reverse osmosis, Water pollution, *Waste water treatment, *Membranes, Laboratory tests, *Industrial wastes, Desalination.
Identifiers: *Metal finishing wastewaters, *Polymer membranes, Metal salts, Electroplating wastes.

An important new membrane has been developed for the reverse osmosis treatment of both highly alkaline and acidic (non-oxidizing) metal finishing rinse waters. This membrane designed NS-1, and originally developed for seawater desalination, consists of a microporous support film (polysulfone) coated with polyethylenimine which is cross-linked with tolylene 2,4-diisocyanate. Simulated alkaline copper and zinc cyanide plating rinses at pH's 11.8 and 12.9 were treated by NS-1 membranes during 500- and 340-hour tests without deterioration of reverse osmosis properties. Water fluxes above 10 gallons per square foot (of membrane) per day (gfd) were observed with cyanide rejections between 95 and 99 percent. The NS-1 membrane also treated simulated copper sulfate rinse waters effectively at pH 0.5 during 550-hour tests without deterioration of reverse osmosis properties (fluxes above 10 gfd with 99.8 percent rejection of copper). The NS-1 membrane is the only known membrane that can perform well using both acidic and alkaline feed solutions. Preliminary engineering considerations indicated the feasibility of applying the NS-1 membrane to reverse osmosis treatment and recycle of nickel and zinc cyanide electroplating rinse waters. (EPA)
W75-05089

THREE-STEP MEASUREMENT BY THE SAPROMAT TO EVALUATE THE BOD5, THE MINERAL IMBALANCE AND THE TOXICITY OF WATER SAMPLES,
Ghent Rijksuniversiteit (Belgium). Dept. of General and Industrial Microbiology.
For primary bibliographic entry see Field 5A.
W75-05162

TEMPERATURE INDUCED VARIATIONS OF KINETIC COEFFICIENTS FOR TEXTILE-DOMESTIC WASTE MIXTURES,
Auburn Univ., Ala. Dept. of Civil Engineering.
R. E. Topping.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 955, $4.75 in paper copy, $2.25 in microfiche. MS Thesis, December 1973. 70 p, 19 fig, 7 tab, 4 append. OWRR A-034-ALA(2).

Descriptors: *Domestic wastes, *Kinetics, *Temperature, Waste treatment, *Pulp wastes, Industrial wastes, *Waste water treatment, *Textiles, Chemical oxygen demand, Biochemical oxygen demand.
Identifiers: Organic carbon.

Temperature induced variations of kinetic coefficients for different textile-domestic waste mixtures were investigated. Kinetic coefficients were reported in terms of soluble COD, BOD, and TOC. At a given mixture ratio as temperature increased from 15 to 30C, maximum specific growth rate increased, saturation constant decreased, yield coefficient increased, and specific mortality constant remained constant. In order to predict the effect of temperature change on the kinetic coefficients, values of numerical constant for the van't Hoff-Arhenius relationship were determined for 10:90 and 25:75 textile-domestic waste mixtures. At a given temperature as the percentage of textile waste in the mixture increased from 10 percent to 25 percent, maximum specific growth rate, saturation constant, and specific mortality constant all increased in value. As the operating temperature increased, the strength of the effluent decreased and the value of minimum detention time decreased.
W75-05264

GROWTH KINETICS OF NITRIFYING MICROORGANISMS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
E. K. Mattern, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 954, $3.75 in paper copy, $2.25 in microfiche. Special Research Problem Report, June 1973. 31 p, 10 fig, 4 tab, 8 ref. OWRT A-058-GA(1). 14-31-0001-5010.

Descriptors: *Waste water treatment, *Nitrification, Ammonia, Nitrates, Nitrites, *Nitrogen fixing bacteria, Water pollution, Biochemical oxygen demand, Bacteria.

Identifiers: Carbonaceous bacteria, Nitrifying bacteria, Nitrosomonas bacteria, Nitrobacter bacteria.

Laboratory studies were used to determine the growth parameters of the organisms which control nitrification. The results showed that the yields of carbonaceous bacteria are about equal to those of nitrifying bacteria but that the maximum specific growth rate of the carbonaceous bacteria is about three times that of nitrifying bacteria. The growth of the carbonaceous bacteria is also much more sensitive to changes in nutrient concentration. The nitrosomonas bacteria, which convert ammonia to nitrate, control the nitrification process since nitrobacter bacteria, which convert nitrite to nitrate, have a higher maximum specific growth rate. (James-Geo Tech)
W75-05267

DETERMINATION OF THE EFFECT OF CARBONACEOUS SUBSTRATE CONCENTRATION ON THE RATE OF NITRIFICATION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
W. M. Saltenberger.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 956, $4.25 in paper copy, $2.25 in microfiche. Special Research Problem Report, May 1974. 57 p, 19 fig, 3 tab, 19 ref, 2 append. OWRT A-058-GA(2). 14-31-0001-5010.

Descriptors: *Nitrification , *Nitrogen fixing bacteria, *Waste water treatment, Ammonia, Nitrates, Nitrites, Biological treatment.
Identifiers: *Bio-disc reactors, *Bacteria growth kinetics.

Nitrification or the conversion of ammonia nitrogen to nitrites and nitrates is increasingly recognized as an important component of waste water treatments particularly when treated effluents are discharged into small streams. Effective treatment design requires full consideration of the kinetics of the nitrification process and the effects on that process of various substrate concentrations and various inhibitory materials. The process kinetics were examined in the laboratory with a rotating biological contactor. Results are presented on nitrification rates, the relationship of the rate to active surface area, area-capacity and saturation constants, and the effects of ammonia on the process. (James-Geo Tech)
W75-05268

NITROGEN REMOVAL OBTAINED THROUGH HETEROTROPHIC GROWTH IN TRICKLING FILTERS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
S. Suwan arpa.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 925, $4.25 in paper copy, $2.25 in microfiche. Special Research Problem Report, August 1974. 57 p, 11 fig, 8 tab, 20 ref, 3 append. OWRR A-058-GA(3). 14-31-0001-5010.

Descriptors: *Nitrification, *Nitrogen fixing bacteria, Bacteria, Biochemical oxygen demand, *Trickling filters, *Waste water treatment.
Identifiers: Bacteria growth kinetics.

Conventional biological treatment facilities are efficient in removing carbonaceous materials, but most remove only a small fraction of the biochemical oxygen demand exerted by nitrogen. This study investigated the use of plastic media trickling filters, and the growth kinetics of the heterotrophic bacteria on the filters, for more complete treatments. Mixed substrate environments were examined with the help of a mathematical model. Laboratory results are summarized on removal rates for glucose and ammonia-nitrogen under various conditions. Kinetic constants are tabulated. (James-Geo Tech)
W75-05269

QUICK-TIME INSTRUMENTAL MEASUREMENTS OF WASTE-WATER ORGANIC CHARACTERISTICS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-05304

WATER SUPPLY, TREATMENT, DISTRIBUTION, AND REUSE OPTIMIZATION IN ARID URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. R. Walker, G. V. Skogerboe, and R. C. Ward.
Water Resources Bulletin, Vol 10, No 6, p 1187-1197, December 1974. 7 fig, 18 ref. OWRT B-043-COLO(13).

Descriptors: Water management(Applied), *Water supply, *Water distribution(Applied), *Waste water treatment, Recycling, Evaluation, Institutional constraints, Alternative planning, Water quality, Regions, Arid lands, Agriculture, Interbasin transfers, Decision making, Costs, *Optimization, Biochemical oxygen demand, Total dissolved solids, Mathematical models, Systems analysis, *Water reuse, *Colorado.
Identifiers: *Urban water systems, Denver(Col), Agricultural transfer, South Platte River(Col), Cost minimization, Policies.

A management level model has been formulated in which a systems analysis format is employed to evaluate urban water management strategies. The model incorporates a multilevel optimization scheme to coordinate urban water supply, distribution, and wastewater management. The model is applied to the water management problems of the Denver, Colorado metropolitan area, which has used both agricultural transfers and transmountain diversions to supplement the natural stream resources of the South Platte River. Although plans are being made to increase the capacity of these sources, increasingly stringent standards on the area's effluents are enhancing the feasibility of reclaiming and recycling a portion of the wastewater. The urban model examines management characteristics and institutional constraints in the Denver area, considers alternative management strategies, and determines the least-cost combination of water supply sources. By formulating the model from a planner's vantage point, the most important results gained from the analysis are the costs of various institutional constraints which may restrict the decision maker's ability to implement optimal policies. The savings to individual municipal and industrial users derived from public acceptance of recycling is shown, and the ratios of present water supply costs to those expected in the future for a recycling alternative involving relaxed quality constraints on individual urban demands are given. (Bell-Cornell)
W75-05322

HIGH-RATE FILTRATION FOR TORONTO'S ISLAND WATERWORKS,
For primary bibliographic entry see Field 5F.
W75-05324

DOLLAR GAIN TO TOP COST CLIMB IN 1975 SEWERAGE CONSTRUCTION.
Engineering News Record, Vol 195, No 15, p 14-15, October 3, 1974. 1 fig, 1 tab.

Descriptors: *Construction costs, Municipal water, *Sewerage, Construction, Costs, Grants, *Treatment facilities, Waste water treatment, Sewage treatment.

Contracting plans were reported by 75 major sanitary districts in the United States, with about $5 billion in new work being bid for fiscal year 1975-1976. Despite inflation close to 20%, the Environmental Protection Agency anticipates dollar gains, related to sewerage construction cost indices. Many projects scheduled for contracts in the next year are hold-overs from previous years, where federal grants had been postponed. Construction costs have increased up to 30% for treatment plants and about 15% for interceptor plants. However, the financing needed to activate the contracts may be easier to obtain in fiscal 1975. State and municipal bond sales for sewerage construction have increased 66%, a rate more than double the increase of a year ago. Much of the 1975 sewerage construction is dependent upon federal aid, with EPA grants projected to total $3.5 billion, as opposed to 1974's $2 billion. (Prague-FIRL)
W75-05325

MEASURING SEWAGE FLOW USING WEIRS AND FLUMES,
Ontario Ministry of the Environment, Toronto. Project Operations Branch.
G. Mougenot.
Water and Sewage Works, Vol 121, No 7, p 78-81, July, 1974. 2 fig, 10 ref.

Descriptors: *Sewage disposal, *Waste water treatment, *Weirs, *Flumes, Hydraulics, Flow.
Identifiers: 'V' notch weirs, Rectangular weirs, Parshall flumes.

Two basic problems of flow measurement by means of weirs and flumes are the primary device and the method for the 'head' measurement. Although the primary and secondary devices are joined as an installation, they are usually separately manufactured, with the installation consisting of a check of the relationship of the datum point of the one device to that of the other. These devices have been popular in irrigation systems. However, when being used in sewage works, most weirs and flumes are not installed in hydraulic situations approximating those in irrigation for which rating tables were made. A 'V' notch weir is used where head loss is tolerable, and must not be used where the fluid flow contains entrained materials which could plug the notch. Settleable materials might degrade the performance of this weir if the materials collect on the upstream side. The fluid flow through the notch should clear the downstream side of the bulkhead, leaving air under the 'nappe'. The head/flow ratio at low heads is greater than at high heads. Installation costs are less than those for the Venturi flume. Parshall flume accuracy is dependent upon the accuracy of construction; strict adherence to the dimensions given is a necessity. (Leibowitz-FIRL)
W75-05326

LASL WASTE SYSTEM BACKS UP INTO STREET.
Nuclear News, Vol 17, No 13, p 106, October, 1974.

Descriptors: *Radioactive wastes, *Sewers, Waste water treatment, Pollutants, Environmental effects, Path of pollutants, Water pollution control, New Mexico.
Identifiers: *Plutonium, Los Alamos(NMex).

At Los Alamos Scientific Laboratory (LASL) in July and September, 1974, a sewer line carrying waste water with low-level concentrations of plutonium one and a half miles to a reprocessing plant backed up, ruptured, and spilled water into nearby streets. The activity of the waste was considered low-level, but might be high-level as an environmental pollutant. During the first incident, waste trickled into the ground near the point of rupture. The second incident sent hundreds of gallons of waste through a manhole, along a gutter, into a sewer intake, and finally into a dry canyon. Waste penetrated the sandy soil of a dry bed, one to two feet wide, to a depth of a few inches. Cleanup of the radioactive wastes entailed removing the con-

taminated soil to a burial area and asphalting the street. (Prague,FIRL)
W75-05327

THEY'RE FOREVER BLOWING BUBBLES.
Compressed Air, Vol 79, No 8, p 10-11, August, 1974.

Descriptors: *Equipment, Design criteria, *Waste water treatment, *Sewage treatment, *Bubbles, Liquid wastes, Aeration.
Identifiers: *Air diffusers.

One of the simplest and most effective air diffusers for sewage treatment is the so-called inverted reservoir type developed and manufactured by Sanitaire Water Pollution Control Corporation of Milwaukee, Wisconsin. In this mechanism air passes from a header into the diffuser with exit ports being two rows of holes, one on each side of the air reservoir. Below the diffuser's open base, a V-shaped deflector plate directs the flow of waste liquor up along its outer wall. As the air comes out, it is sheared into relatively small bubbles and then well distributed throughout the waste water in the basin. Determinations influencing the design of the Sanitaire diffuser are outlined. (Sandoski-FIRL)
W75-05328

TREAT WASTEWATER LIKE DOWNTOWN TRAFFIC,
R. J. Martin.
The American City, Vol 89, No 8, p 61-62, August, 1974.

Descriptors: *Automatic control, *Control systems, *Waste water treatment, Equipment, Sludge treatment, Costs, Performance, *New York, Water pollution control.
Identifiers: Sherburne(NY).

A 340,000 gpd waste water treatment plant in Sherburne, New York is a single-stage, high-rate trickling filter operation that has held costs to a minimum, obtained quality results, and reduced labor requirements by installing a process controller. All steps involved in handling sludge or supernatant are started and stopped by a Tenor preset controller system. The program interval is controlled by a timer that can be set from one hour to 60 hours. Any malfunction will either return all units to the 'at rest' mode or permit the program to continue, if it is safe to do so. The cost of the complete system is around $25,000. (Sandoski-FIRL)
W75-05329

VIRUS REMOVAL BY DIATOMACEOUS EARTH FILTRATION,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5F.
W75-05330

CARBONATION SYSTEM FOR RECOVERY OF SODIUM BASE PULPING LIQUOR,
Owens-Illinois, Inc., Cincinnati, Ohio. (assignee)
C. G. Anderson.
United States Patent 3,826,710. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1301, July 30, 1974. 1 fig.

Descriptors: *Patents, *Liquid wastes, Equipment, *Pulp wastes, Sodium compounds, Sulfite liquors, Sulphur compounds, Carbon dioxide, *Waste water treatment, *Industrial wastes, *Recycling, Water reuse.
Identifiers: Carbonation system.

An integrated closed carbonatin system for recovering sodium base sulfite pulping liquor includes: smelt solutions which contain from one third to two thirds mol percent sodium sulfide with the balance primarily sodium carbonate; self-sufficiency in carbon dioxide for displacement of the sulfide; temperatures during carbonation from 140 to 180 degrees F; an intermediate concentration of carbon dioxide for carbonation; and systems for cycling different gas streams to conserve and reuse carbon dioxide. The system also produces gases containing hydrogen sulfide suitable for direct combustion to sulphur dioxide and purges gases relatively free of hydrogen sulfide or sulphur dioxide. (Orr-FIRL)
W75-05331

RECOVERY OF RESIDUAL AMMONIA FROM WEAK AQUEOUS SOLUTIONS THEREOF,
I. Mavrovic.
United States Patent 3,826,815. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1320, July 30, 1974. 1 fig.

Descriptors: *Patents, Ammonia, Equipment, Aqueous solution, *Waste water treatment, *Liquid wastes, Water treatment, Recycling.
Identifiers: *Ammonia recovery.

A method for recovering ammonia from a waste liquid effluent composed of a weak ammoniacal aqueous solution is described. The solution is stripped with steam and an inert gas in a fractionator at specific conditions. Substantially all of the ammonia is recovered in a gaseous product and a liquid product is recovered that is substantially free of ammonia. (Orr-FIRL)
W75-05332

WASTEWATER COLLECTION (LITERATURE REVIEW),
Nottingham (H.D.) and Associates, McLean, Va.
H. D. Tara Singh.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1191-1195, June, 1974. 43 ref.

Descriptors: *Sewers, *Design, *Construction, *Operation and maintenance, Flows, Pipes, Costs, Computer programs, Water Pollution Control Federation, *Reviews, *Bibliographies, *Waste water treatment.
Identifiers: *Waste water collection.

A literature review of waste water collection is presented. Topics include strategies of the Water Pollution Control Federation, sewer design and construction, sewer monitoring and maintenance, and economic considerations. Pressure sewers, computer programs for design and cost, a modified dynamic program of collection, and infiltration rates and materials of sewer construction are discussed. Techniques for measuring flows in sewers, smoke testing of sewers, and insertion techniques to use polyethylene pipe to repair defective sewers are presented. Various ways in which communities have saved money with their sewer systems are reported. (Orr-FIRL)
W75-05335

QUARTERLY PROGRESS REPORT, RESEARCH AND DEVELOPMENT ACTIVITIES, WASTE FIXATION PROGRAM, JULY THROUGH SEPTEMBER 1974,
Battelle-Pacific Northwest Labs., Richland, Wash. Nuclear Waste Technology Dept.
J. L. McElroy.
Available from NTIS, Springfield, Va. 22161 as Rept. No BNWL-1871, $5.45 in paper copy $2.25 in microfiche. Report BNWL-1871, p 62, November 1974. 22 fig, 12 tab.

Descriptors: *Waste treatment, Treatment facilities, *Radioactive waste disposal, *Research and development, *Metals, *Corrosion, *Evaporation, Heating, Metallurgy, Temperature, Viscosity.
Identifiers: *Calcination, Annealing, Glass.

Three melting concepts are being evaluated currently for use in converting waste calcine to glass. These are a resistance heated metallic melter, a joule heated (electric) ceramic melter, and in-can melting. The metallic melter is made of Inconel-690; however, tests are under way to locate a better material. One possibility is an Inconel-690 weld overlay, since corrosion experience with the Inconel-690 melter indicates moderate attack to the base metal but essentially no attack at the welds. Several metallic melter runs were completed to (1) test coupling of the melter to a wiper film evaporator to evaluate feeding slurry to the melter, (2) determine the maximum melt viscosity that could be drained from the freeze valve, and (3) produce five large glass castings for annealing studies. Detail of progress is given. (Houser-ORNL)
W75-05347

WASTE MANAGEMENT AND TRANSPORTATION TECHNOLOGY DEVELOPMENT, QUARTERLY REPORT, JULY 1974 THROUGH SEPTEMBER 1974.
Atlantic Richfield Hanford Co., Richland, Wash. Research Dept.
Available from NTIS, Springfield, Va. 22161 as Rept No ARH-ST-110-A, $5.45 in paper copy, and $2.25 in microfiche. Report ARH-ST-110 A, p 119, November 1974. 18 fig, 17 tab, 8 ref.

Descriptors: *Radioactive waste disposal, *Radioactive wastes, *Management, *Transportation, Technology, Research and Development, Water pollution treatment, Waste storage, *Waste treatment, Hazards, Safety, Radioactivity, *Washington.
Identifiers: Decommissioning, Decontamination(Solids), Immobilization, Hanford Site(Wash).

This is the first in a series of quarterly progress reports on activities in support of long-term management of Hanford high-level waste. A variety of specific topics are discussed in some technical depth. These topics can be grouped in the areas of: salt cake retrieval, tank reliability, equipment decommissioning, and increased waste immobilization. (Houser-ORNL)
W75-05348

5E. Ultimate Disposal Of Wastes

ADDENDUM TO THE ENVIRONMENTAL ASSESSMENT, ANNEX B, LAS VEGAS WASH/BAY POLLUTION ABATEMENT PROJECT,
VTN Nevada, Las Vegas.
Clark County Board of Commissioners, Las Vegas, Nevada, July 1974. 127 p, 22 fig, 28 tab, 37 ref, 7 append.

Descriptors: *Environmental effects, *Water pollution control, *Assessments, *Alternate planning, *Environmental control, Waste water disposal, Waste water treatment, Groundwater recharge, Tertiary treatment, Ultimate disposal, Underground waste disposal, Nevada.
Identifiers: *Impact studies, *Lake Mead, *Las Vegas.

Municipal and industrial wastewaters from the Las Vegas Valley along with highly saline subsurface flows are discharged into Las Vegas Wash, thereby polluting Lake Mead and the Colorado River downstream. The principal effects of the pollution have been algal blooms in the Las Vegas Bay of Lake Mead, and increases to the salt load of the Colorado River. The 1971 Nevada Legislature designated the Las Vegas Valley Water District (LVVWD) as the agency responsible for developing a plan to abate the pollution caused by wastewater flows in Las Vegas Wash. The purpose of this Environmental Assessment Addendum is to reevaluate the nine previously considered alternatives along with a new alternative. Under the newly proposed alternative, wastewater would be collected at a central point and given advanced wastewater treatment sufficient to meet

water quality standards. Effluent from this facility would be available for use by: (1) Allen Power Project, (2) an in-valley irrigation program, (3) a water source for a pilot groundwater recharge program, (5) maintenance of a greenbelt in Las Vegas Wash, and (6) return flow credit from the Colorado River when returned to Lake Mead. Also presented are the relevant laws, regulations and policies that guided the formulation of the study and impace identification. (Poertner)
W75-04869

WATER TREATMENT WITH ACTIVATED CARBON MADE FROM SLUDGE AND WASTE PAPER,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W75-04941

NEW DEVELOPMENTS IN EFFLUENT LEGISLATION, ESPECIALLY LAWS GOVERNING EFFLUENT DISPOSAL (NEUERUNGEN AUF DEM ABWASSERRECHTS-SEKTOR -- INSBESONDERE ABWASSERABGABENGESETZ),
Industrie-Wasser-Umweltschutz e.V., Dueren (West Germany).
For primary bibliographic entry see Field 5G.
W75-04950

INCINERATION OF SOLID WASTES,
F. N. Rubel.
Noyes Data Corporation (Park Ridge, New Jersey and London), 1974. 246 p.

Descriptors: *Solid wastes, *Incineration, *Industrial wastes, Design, Operations, Corrosion, Costs, Air pollution, Sewage sludge, Oil wastes, Water pollution sources, *Waste treatment, Beaches, Oil spills, Paints, Plastics, Rubber, Textiles, Disposal, Sludge disposal, Wastes, Ultimate disposal, Air pollution, Treatment facilities, Equipment.
Identifiers: Melt-Zit incinerator.

This compilation of federally sponsored studies reviews and discusses the design, operation, corrosion, costs, air emission control, and special applications of refuse incinerators, including the combustion of sewage sludges, oil refinery wastes, and carbonaceous industrial wastes (from paint, plastic, rubber, and textile production), the restoration of oil-contaminated beaches, and the Melt-Zit high-temperature incinerator. (Brown-IPC)
W75-04969

STATUS OF ADVANCED WASTE TREATMENT,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W75-04983

EFFECT OF CARBON TO NITROGEN RATIO ON ACTIVATED SLUDGE SUBSIDENCE AND DEWATERING CHARACTERISTICS,
Envirex, Inc., Milwaukee, Wis. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W75-04987

BETHLEHEM TREATS 80 MILLION GALLONS OF WASTEWATER EACH DAY.
For primary bibliographic entry see Field 5D.
W75-04993

MANAGEMENT OF WASTE FLUIDS IN SALAQUIFERS,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05191

QUARTERLY PROGRESS REPORT, RESEARCH AND DEVELOPMENT ACTIVITIES, WASTE FIXATION PROGRAM, JULY THROUGH SEPTEMBER 1974,
Battelle-Pacific Northwest Labs., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W75-05347

WASTE MANAGEMENT AND TRANSPORTATION TECHNOLOGY DEVELOPMENT, QUARTERLY REPORT, JULY 1974 THROUGH SEPTEMBER 1974.
Atlantic Richfield Hanford Co., Richland, Wash. Research Dept.
For primary bibliographic entry see Field 5D.
W75-05348

5F. Water Treatment and Quality Alteration

CHELANT TREATMENTS PROVIDE MAXIMUM RETURN TO THE PULP AND PAPER INDUSTRY,
Betz Lab., Inc., Trevose, Pa.
J. R. Metcalf, and B. C. Moore.
In: TAPPI 1974 Engineering Conference, Seattle, Washington, October 21-24, 1974, Preprinted Proceedings (TAPPI, Atlanta, Georgia), p 145-151. 4 fig, 11 ref.

Descriptors: *Boiler feed water, *Industrial water, *Chelation, *Pulp and paper industry, *Operation and maintenance, *Water treatment, Chemical reactions, Chemicals, Scaling, Corrosion, Fouling, Chemical precipitation, Boilers, Ionization, Metals, Solubility, Costs, Economics, Water pollution sources, Pre-treatment(Water), Water quality control, Quality control, Water purification.

The technical principles behind the use of chelants for the treatment of boiler feedwater are reviewed. The chelant forms a soluble complex through absorption of the ionized metals within its chemical structure, thereby preventing these metals from precipitating out on the evaporative boiler surfaces. Case histories are cited to illustrate the merits of chelant programs to paper mill boiler systems. (Witt-IPC)
W75-04940

HANDBOOK OF ENVIRONMENTAL CONTROL. (1) AIR POLLUTION. (2) SOLID WASTE. (3) WATER SUPPLY AND TREATMENT. (4) WASTEWATER: TREATMENT AND DISPOSAL,
Minnesota Univ., Minne. Div. of Environmental Health.
For primary bibliographic entry see Field 5D.
W75-04945

THE CHEMICAL TREATMENT OF COOLING WATER,
Standard Oil Co. of California, San Francisco.
For primary bibliographic entry see Field 5D.
W75-04964

DESIGN OF A MULTILAYER FILTER FOR USE IN THE WATER TREATMENT INDUSTRIES,
Imperial Coll. of Science and Technology, (England). Dept. of Public Health Engineering.
G. T. J. Fox, and S. M. Metcalf.
Filtration and Separation, Vol 11, No 4, p 383-386, July/August, 1974. 2 fig, 1 tab, 4 ref.

Descriptors: *Water treatment, *Filters, Filtration, *Design, *Waste water treatment.
Identifiers: Multilayer filters, Grain size, *Backwashing.

The inherent size grading resulting from backwashing a bed of material of the same density but slightly differing sizes is a major problem in the improvement of water filters of the 'packed bed' variety. It is not feasible to obtain large quantities of single sized grains, and a size gradation of small-to-large in the direction of filtration is found in a sand bed after backwashing. The effect of this on the operating efficiency of such a water filter is discussed, and the way in which these problems can be overcome by the use of a multiplicity of layers composed of materials of differing sizes and densities is outlined. While a filter with a gradation of large-to-small in the direction of filtration, produced by using more than one material, may be more efficient, it is also much more difficult to design. The best method of design is one which uses maximum removal by the center layer. Possible flow rates are also discussed. (Prague-FIRL)
W75-04979

COLUMNS REPRESENTING MOUND-TYPE DISPOSAL SYSTEMS FOR SEPTIC TANK EFFLUENT: II. NUTRIENT TRANSFORMATIONS AND BACTERIAL POPULATIONS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W75-04981

ARSENIC CONTAMINATION OF DRINKING WATER AND FOOD-STUFFS CAUSING ENDEMIC CHRONIC POISONING,
For primary bibliographic entry see Field 5C.
W75-05177

MANGANESE REMOVAL FROM POTABLE WATER,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
R. S. Ingols, and T. F. Craft.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 957, $3.75 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No. ERC-1874, November 1974. 27 p, 8 fig, 2 tab, 3 ref. OWRT B-071-GA(1). 14-31-0001-3871.

Descriptors: *Manganese, Impounded waters, Diffusion rates, *Water treatment, *Oxidation, Potable water, Organic matter, Water supply, Oxygen demand, Ions, Chemical precipitation.
Identifiers: Manganese dioxide precipitation, Manganese oxidation.

To understand the problems which occur in removing manganese from potable water, two approaches have been followed: (1) a continuing study of the factors which affect the concentration of manganese in impounded water and (2) the effect of soluble organic substances upon the removal processes. The studies have shown that: (1) The concentration of manganese in two potable water supplies is directly correlated with the concentration of organic matter in the sample, (2) the removal of manganese by oxidation can occur only after satisfying the oxidant demand of the organic matter or other interfering substances such as sulfide, (3) the vertical diffusion rate of the manganese is slightly influenced by the presence of an excess of hydrogen ions. Because a high concentration of the manganous ions was used for better accuracy at distant points, the pH of the concentrated manganous nitrate cannot be raised without precipitating manganous hydroxide. The diffusion rates of the manganous nitrate and potassium nitrate are similar enough to indicate that the soluble particle of manganese probably contains only one atom of manganese, (4) the rate of vertical diffusion does not explain the concentrations of manganese found in lake hypolimnetic waters: lateral diffusion from the sides of the lake bottom plus any mechanical agitation from natural phenomena or power generating operations are responsible for an observed high diffusion rate in lakes.
W75-05270

HIGH-RATE FILTRATION FOR TORONTO'S ISLAND WATERWORKS,
R. G. Tredgett.
Water and Pollution Control, Vol 112, No 8, p 37-39, 41, August, 1974. 2 tab.

Descriptors: *Water treatment, Water purification, *Water quality, Water supply, Chlorination, *Coagulation, *Filtration, Chemical precipitation, Costs, Lake Ontario, *Canada, Treatment facilities, Waste water treatment.
Identifiers: *Toronto(Canada).

Since 1917, Toronto's old Island Filtration plant has treated water by coagulation followed by direct filtration. Alum is added at pump suctions to raw water which is then pumped to the filters without flocculation and settling. The plant performs acceptably confirming the idea that good quality raw water can be filtered with minimum treatment. This fact was of significant consideration in the design of new facilities. Records of raw water quality kept by the plant were analyzed. Lake Ontario was shown to be generally a source of good quality raw water with isolated occurrences of high turbidity. Two pilot studies were performed early in 1971. The mechanical mixing required to produce a satisfactory floc for direct filtration and the direct filtration of coagulated water at rates not less than 4 g/sq ft/min were examined. The investigation resulted in the recommendation to build a plant employing rapid coagulation followed by direct filtration. Plans include immediate expansion to 60 mgd capacity and further extensions to replace the old plant when the demand increases. Chemical treatment will include alum, chlorine, sulphur dioxide, and fluoride which have been used previously. Improvements of chemical treatment include prechlorination, addition of ammonia hydroxide and polyelectrolyte filter aids. The estimated cost for construction of the first phase of the extensions is $9.0 million. (Orr-FIRL)
W75-05324

VIRUS REMOVAL BY DIATOMACEOUS EARTH FILTRATION,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
M. Chaudhuri, P. Amirhor, and R. S. Engelbrecht.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE4, p 937-953, August, 1974. 9 fig, 1 tab, 34 ref.

Descriptors: *Diatomaceous earth, *Viruses, *Filters, *Filtration, Potable water, *Water treatment, Evaluation, Municipal water, Waste water treatment.
Identifiers: Cationic polyelectrolyte, Flux calcined.

Diatomaceous earth filters have been increasingly employed by municipalities for water filtration, and their effectiveness in removing viruses is evaluated. Previous research in this area is reviewed. Methods and materials used in the experimental study of the effectiveness of DE Filter media (flux-calcined) in virus removal, the ability of polyelectrolyte coated DE filter media to remove viruses, and the influence of certain operational parameters on virus removal by DE filtration were discussed and results analyzed. It is concluded that DE filter media coated with water soluble cationic polyelectrolyte can efficiently remove virus particles. (Nelson-FIRL)
W75-05330

5G. Water Quality Control

A PRACTICAL APPROACH TO WATER QUALITY MANAGEMENT PLANNING,
Oklahoma Univ., Norman.
J. S. Peavy.
Available from Xerox University Microfilms, Ann Arbor, Mich. 48106, Order No. 74-21, 986. Ph. D. Thesis, 1974, 276 p.

Descriptors: *Water quality control, *Planning, *Water pollution control, *Model studies, Effluents, Standards, Monitoring, Waste water disposal, *Oklahoma.

An approach to water quality management planning is presented which provides for the protection of water quality without placing undue stress on state agencies planning and monitoring resources. The approach is designed to meet the requirement of federal and state statutes on water pollution control. A model plan was prepared for a river basin in Oklahoma using data available through the state pollution control agencies and local governments. The plan included: a description of the natural characteristics which would aid in understanding the problems relating to natural quantity and quality of the waters within the particular basin; an assessment of the current quality of the basin's surface waters and an analysis of the waste load presently imposed; and, the selection of two models which appeared to sufficiently represent waste assimilative characteristics and which required data that could be easily obtained. The models were calibrated by field studies to more closely approximate reactions in Oklahoma streams and then were used to estimate the maximum amounts of waste which each discharger can release into the receiving stream without violating the water quality standards. (Orr-FIRL)
W75-04857

SOUTHERN TIER EAST REGION, BROOME-TIOGA COUNTIES, NEW YORK COMPREHENSIVE DRAINAGE STUDY, REPORT SUMMARY,
For primary bibliographic entry see Field 4A.
W75-04858

PLAN OF STUDY, YAKIMA RIVER BASIN, TASK III REPORT FOR THE YAKIMA BASIN WATER QUALITY MANAGEMENT PLAN,
CH2M/Hill, Bellevue, Wash.
For primary bibliographic entry see Field 6G.
W75-04865

FRAMEWORK FOR THE PLAN OF STUDY, YAKIMA RIVER BASIN, TASK I REPORT FOR THE YAKIMA BASIN WATER QUALITY MANAGEMENT PLAN,
CH2M/Hill, Bellevue, Wash.
For primary bibliographic entry see Field 6G.
W75-04866

ANALYTICAL METHODS MANUAL - MANUEL DES METHODES ANALYTIQUES,
Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 5A.
W75-04870

ENVIRONMENTAL CONTAMINANTS INVENTORY STUDY NO 1: STATISTICS ON THE USE OF PEST CONTROL PRODUCTS IN CANADA,
Canada Centre for Inland Waters, Burlington (Ontario).
J. N. Thomson.
Canada Centre for Inland Waters, Report No 35, Burlington, Ontario, Canada, 1973, 54 p, 2 fig, 22 tab, 2 append.

Descriptors: *Pesticides, *Distribution, *Statistics, Surveys, *Data collections, Insecticides, Herbicides, Fungicides, Rodenticides, Seed treatment, Canada, Pest control.

Statistics on the use and sales of pest control products in Canada are reviewed. The various data are described and critically evaluated in terms of their potential usefulness to researchers. Provincial and federal sources of data are appraised and an overview of the pest control market and its changes is provided from the year 1947 through to 1971. Appendices contain tables of the more significant data. The first appendix tabulates national sales figures for the study period, while the second deals with provincial figures for various pesticides. (Environment Canada)
W75-04880

IMPACT OF DETERGENT PHOSPHATE REDUCTIONS ON WATER QUALITY,
State University Coll., Buffalo, N.Y. Great Lakes Lab.
For primary bibliographic entry see Field 5C.
W75-04895

STORMFLOW PRODUCTION FROM PERMEABLE UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 2A.
W75-04925

ENVIRONMENT U.S.A.: A GUIDE TO AGENCIES, PEOPLE, AND RESOURCES.
For primary bibliographic entry see Field 6G.
W75-04946

ENVIRONMENTAL PROTECTION IN THE FINNISH PULP AND PAPER INDUSTRY (UMWELTSCHUTZ IN DER FINNISCHEN ZELLSTOFF- UND PAPIERINDUSTRIE),
Finnish Pulp and Paper Research Inst., Helsinki.
W. Jensen.
Das Papier, Vol 28, No 10A, p V110-V119, Oct 1974.

Descriptors: *Water pollution control, *Pulp and paper industry, Water supply, Water utilization, Legislation, Water quality control, Pollution abatement, Costs, Financing, Air pollution, Research and development, Research facilities, Foreign research, Foreign countries, Europe, Pulp wastes, Water quality standards.
Identifiers: *Finland, Finnish Pulp and Paper Research Institute.

The Finnish water supply is described along with its utilization. The provisions of legislation governing this field and the organization of water protection are discussed. The structure and production of the Finnish pulp and paper industry are considered, sketching the development and the current status of effluent loads. A survey is given of measures adopted by the mills and of plans made by the National Board of Waters. There is a brief account of the total costs arising from water protection and their financing, and a discussion of air protection. Finally, there is a survey of research in these fields at the Finnish Pulp and Paper Research Institute, with a summary of work concluded and in progress. (Ward-IPC)
W75-04949

NEW DEVELOPMENTS IN EFFLUENT LEGISLATION, ESPECIALLY LAWS GOVERNING EFFLUENT DISPOSAL (NEUERUNGEN AUF DEM ABWASSERRECHTS-SEKTOR -- INSBESONDERE ABWASSERABGABENGESETZ),
Industrie-Wasser-Umweltschutz e.V., Dueren (West Germany).
K. H. Koster.
Wochenblatt fur Papierfabrikation, Vol 102, No 16, p 594, 596, August 31, 1974.

Descriptors: *Legislation, *Waste water disposal, Foreign countries, Europe, Law enforcement, Water quality control, Water quality standards, Regulation, Water policy, Water pollution, Water pollution control, Water quality, Legal aspects.
Identifiers: *West Germany.

On May 10, 1974, the Bundesrat turned down a proposed act regulating effluent disposal, which leaves the West German situation in this regard uncertain. The environmental statement by a special commission for 1974 held that the present bad conditions of German waters is largely due to incomplete enforcement of present laws. It is hoped that improvment in water quality can be attained without too much burden on the taxpayer. It is estimated that no new law could be put into effect before 1977. (Ward-IPC)
W75-04950

INDIGESTER BLACK LIQUOR OXIDATION FOR ODOR CONTROL IN KRAFT PULPING,
North Carolina State Univ., Raleigh. Dept. of Wood and Paper Science.
W. T. McKean, Jr., and J. S. Gratzl.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-228 692, $5.25 in paper copy, $2.25 in microfiche. EPA Report No 650/2-74-005, Jan 1974, 112 p. 10 tab, 28 fig, 37 ref.

Descriptors: *Odor, Control, *Pulp wastes, *Sulfur compounds, *Oxidation, *Hydrogen sulfide, *Air pollution, Air pollution effects, Oxygen, Costs, Operating costs, Pollutants, *Pollution abatement, Chemical reactions, Kinetics, Efficiencies, Inhibition, Yield.
Identifiers: *Black liquor, Kraft pulping, Methyl mercaptan(Methanethiol), Dimethyl disulfide, Pulp yield.

Laboratory studies were carried out to determine the major reaction paths, key inhibition reactions, and kinetics of methyl mercaptan and dimethyl disulfide during oxidation of black liquor. The studies help explain the low oxidation efficiencies with respect to hydrogen sulfide, methyl mercaptan, and dimethyl disulfide during black liquor oxidation at 60-90 C. and suggest that high temperature oxidation would be more efficient. Softwood and hardwood black liquors were oxidized at 80-170 C. Oxidation at 100-120 C resulted in efficient oxidation of all three malodorous compounds with no liquor reversion during subsequent storage and distillation. Oxygen consumption was about 125% of theoretical below 140 C, but increased to about 200% at 170 C. The application of this approach to batch and continuous digester systems is discussed. Preliminary work showed that injection of small amounts of oxygen into the liquor circulation line during the early stage of pulping increased pulp yield by 1-3%, depending on the final pulp kappa number. If this yield increase could be obtained in combination with in-digester black liquor oxidation, the net costs for odor control in kraft mills using batch digesters would be very attractive. (Witt-IPC)
W75-04952

WATER CONSERVATION AND FIBER ECONOMY,
Thames Board Mills Ltd., Purfleet (England).
For primary bibliographic entry see Field 3E.
W75-04956

THE FEDERAL WATER POLLUTION CONTROL ACT AND FORESTRY,
National Forest Products Association, Washington, D.C.
B. C. Grefrath.
Journal of Forestry, Vol 72, No 12, p 757-759, Dec, 1974. 10 ref.

Descriptors: *Federal Water Pollution Control Act, *Forestry, *Water quality, *Forest management, Legislation, Water quality control, Water pollution control, State governments, Regulation, Federal governments.

The Federal Water Pollution Control Act of 1972 places responsibility for water pollution control in forest management at the state level, but the Environmental Protection Agency exercises significant influence over state programs. The development of state forest practice acts is suggested as a method for regulating forest water quality. (Sykes-IPC)
W75-04957

STUDY OF EFFLUENT DISCHARGE (K VOPROSU ISSLEDOVANIYA REZHINOV VODOOTVENDENIYA),
A. I. Shishkin, and M. Ya. Krupnik.
Trudy Leningradskogo Tekhnologicheskogo Instituta Tsellyulozno-Bumazhnoi Promyshlennosti, No 31, p 53-64 plus 2 plates, 1973. 4 fig, 1 tab, 4 ref.

Descriptors: Natural streams, *Water quality, *Effluents, *Mathematical models, *Treatment facilities, Water pollution sources, Industrial wastes, Pulp wastes, Water pollution, Pollutants, Waste water treatment, Costs, Water purification, Mathematical studies, Analog models, Water quality control, Biochemical oxygen demand, Water pollution control, Water pollution effects, Equations, Capital costs, Effluents, Self-purification, Waste assimilative capacity.
Identifiers: *Nara River(USSR).

The construction of effluent treatment plants constitutes up to 5% of the total capital investments in the pulp and paper industry, but even with the most modern plants the degree of purification achieved usually does not exceed 85%. According to literature data, the relative cost of purification increases with decreasing pollution load. Thus, if the cost of BOD reduction from 200 to 20 mg/liter is taken as 1, its reduction from 20 to 2 mg/liter will cost 10. For optimum solution of the problems of purification and discharge of effluents, the costs of construction and operation of treatment plants must be taken into consideration, as well as deterioration of the water quality in waterways where insufficiently purified effluents are discharged. Assuming that proper procedures are used, natural waters could act as a second purification stage. This requires suitable methods for calculating the quality transformations of water receiving partially purified effluents. The process is adequately described by a semi-empirical equation of turbulent diffusion. Because there is no general solution of this equation, solutions for particular cases have been used in engineering practice. One such equation has been proposed earlier, based on the assumption of uniform distribution of pollutants across the stream depth and taking into account the inflow rates from the surface and the bottom. An approximate solution of this equation is given. Calculations made on the basis of this model are compared with experimental data on water quality transformations in the Nara River. The satisfactory agreement obtained confirm the correctness of this method. (Stapinski-IPC)
W75-04965

WORLD DIRECTORY OF ENVIRONMENTAL RESEARCH CENTERS.
For primary bibliographic entry see Field 10D.
W75-04971

CONCEPT DEVELOPMENT OF A FREE VORTEX OIL RECOVERY SYSTEM,
Scientific Associates, Inc., Santa Monica, Calif.
E. B. Nebeker, and S. E. Rodriguez.
Available from the National Technical Information Service, Springfield, Va, 22161 as AD-777 024, $4.25 in paper copy, $2.25 in microfiche. May, 1973. 180 p, 38 fig, 7 tab, 24 ref, 6 append.

Descriptors: Oil spills, *Pollution abatement, Research and development, Model studies, *Water pollution control, Pollutants, Technology, Equipment, *Oil pollution.
Identifiers: *Free Vortex, *Oil spill recovery, Oil spill clean-up.

A free vortex system has been developed for use in recovering oil spilled under high sea conditions. Free vortex skimming is applicable under these conditions: oil films one inch thick or less, operation while stationary and in currents up to 0.75 knots, and severe Sea State 7 waves. The principle involves the production of two flows on and near the surface of the water; surface oil is brought inwards to the vortex and then concentrated as an oil packet, and a recovery pump intake can then remove the oil with little water. Efficiency of the model varied between 10 and 46 percent over the range of the thickness of the oil tested, 1/16 to one inch. A recovery rate of 110 gpm was achieved. Higher rates of recovery are possible if the pump size is changed. (Orr-FIRL)
W75-04977

A LOOK AT THE NATIONAL PERMIT PROGRAM,
J. Ziemba.
Industrial Wastes, Vol 22, No 3, p 44-45, May-June 1974.

Descriptors: *Water pollution control, *Legislation, Water discharge, *Permits, *Federal Water Pollution Control Act, Water permits, Water quality control, Legal aspects.
Identifiers: Water Pollution Control Act of 1972, *Zero discharge.

The Water Pollution Control Act of 1972 (P.L.92-500) is cited as a significant basis for future water pollution legislation, providing a workable framework for effective safeguards by means of which a situation of 'zero discharge' may be attained. A focal point of P.L.92-500, the National Pollutant Discharge Elimination System, would require a permit in order to discharge any type of pollutant. The permit program encourages citizen involvement through public hearings. The program is implemented by the state, with the EPA safeguarding proper enforcement. States without their own program leave permit procedures including application, review, public hearing, approval and the duration of the permit to the Federal agency. The permit program would provide specific guidelines for water pollution control under the Water Pollution Control Act. (Carpenter-FIRL)
W75-04995

WATER POLLUTION AS A CONSTRAINT TO THE DEVELOPMENT OF MARINE FARMING,
Nansei Regional Fisheries Research Lab., Maruishi (Japan).
For primary bibliographic entry see Field 5C.
W75-05013

INFLUENCE OF TRINITROTOLUENE ON MICROORGANISMS AND BIOCHEMICAL SELF-PURIFICATION PROCESSES IN WATER,
For primary bibliographic entry see Field 5C.
W75-05015

PRIMARY, PHYSICAL IMPACTS OF OFFSHORE PETROLEUM DEVELOPMENTS.
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5C.
W75-05032

THE ROLE OF MASS TRANSPORT IN OIL SLICK WEATHERING,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5B.
W75-05036

'HUMAN-ACCELERATED EUTROPHICATION OF FRESH-WATER LAKES,' PROCEEDINGS OF A CONFERENCE,
Brooklyn Botanic Garden, Ossining, N.Y. Teatown Lake Reservation.

For primary bibliographic entry see Field 5C.
W75-05037

LAKE FORMATION, SEDIMENTATION, CONTROL OF ALGAE, QUESTIONS,
Soil Conservation Service, New City, N.Y.
For primary bibliographic entry see Field 5C.
W75-05039

THE REGISTRATION STATUS OF SIMAZINE FOR SUBMERGED VASCULAR WEEDS AND ALGAE CONTROL IN PONDS,
Ciba-Geigy Corp., Greensboro, N.C.
J. Norton.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 12-16.

Descriptors: *Herbicides, *Aquatic weed control, *Algal control, *Safety, Ponds, Mode of action, Testing procedures, Rates of application, Chlorophyta, Cyanophyta, Application methods, Degradation(Decomposition), Sediments, Fish, Performance, Zooplankton, Food chains.
Identifiers: *Simazine, Princip 80W.

The safety of simazine, trademarked Princep 80W, for algal control and for submerged vascular weeds in lakes and ponds is discussed with a group of citizens concerned with lake preservation. Simazine has been extensively evaluated for a number of years and found to be safer than other materials currently registered. The objectives pursued in 1973 were determination of lowest effective simazine application rates for planktonic algal control; identification of algal species controlled with simazine; phytoplankton monitoring to provide additional information on recurring algal species established in lakes when a simazine concentration is reduced to nonphytotoxic levels; determination of rate of simazine removal from water by algae, photomicrographic documentation of cell wall changes as celluar food reserves are depleted; determination of algistatic algicidal rates of simazine on green and blue-green algae. Changes in nitrate, phosphate, total water hardness and dissolved oxygen levels were all closely monitored. Lake bottom samples were collected to determine the amount of simazine accumulations in sediments. Three criteria were stressed in the evaluation program: fish--possible stress from oxygen depletion; phytotoxicity of treated water on turf and woody ornamentals; monitoring zooplankton and other food chain organisms, which either increased or were not reduced in treated lakes. (See also W75-05037) (Jones-Wisconsin)
W75-05040

HISTORY OF AQUATIC HERBICIDES, BIOLOGICAL CONTROL, PRACTICAL ASPECTS OF THE USE OF CHEMICALS IN WATER WEED CONTROL,
Resource Management, Inc., Freehold, N.J.
R. Younger.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 17-18.

Descriptors: *Aquatic weed control, *Herbicides, Mode of action, *Biocontrol, Systemics, Sodium arsenite, 2,4-D, 2,4,5-T, Zoning, Diquat, Copper sulfate, History.
Identifiers: Contact herbicides.

Herbicide use was begun in 1924 based on Donald Domogolla's doctorate thesis entitled, 'The use of sodium arsenite to control aquatic weeds.' After World War II systemic herbicides, such as 2,4-D and 2,4,5-T, were introduced. These materials work under a premise that when sprayed on plants, they are translocated throughout the entire vascular system from the terminal bud to the last root hair. Sodium arsenite is a contact herbicide which differs from systemic herbicides in that it only operates down to the muck line of the lake bottom or the hydrosoil, where most of these materials are played out and become an integral part of the lake bottom. Contact herbicides are such chemicals as endosal, diquat, copper sulphate, and arsenite. These materials are applied to the water as a seasonal control method. Biological controls are becoming more and more prevalent, especially in the Southeast. Aquatic weed-control chemicals are only a stop-gap method to the problem in lieu of substitutes. This presentation was directed to a group of citizens concerned with lake quality and preservation. (See as W75-05037) (Jones-Wisconsin)
W75-05041

LAKE DREDGING OPTIONS AND MECHANICAL WATER WEED HARVESTERS,
Folsom Marine Service Corp., Plymouth, N.H.
R. Folsom.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 18-21.

Descriptors: *Lakes, *Dredging, *Mechanical equipment, Bottom sediments, Management, Eutrophication.
Identifiers: *Lake rehabilitation.

The method of lake rehabilitation--chemical treatment, aeration, or mechanical techniques--depends on the lake's intended use and local conditions. Conventional equipment, such as a bulldozer or a similar piece of equipment is used wherever possible because it is least expensive. In instances where specialized equipment must be used, the 'Terra Marine Scoop' is effective in removing sediment, root systems, stumps, rocks, trash, etc. It is a truck-mounted dredging unit and very portable. A modified form can reach 1200 feet and can generate a line-pull of up to 21,500 pounds. Its one restriction is that it does not pick up the dredged material which must be loaded onto trucks for hauling to a spill area. The 'Mud Cat' is another specialized piece of equipment; it is a small portable hydraulic dredge with maximum operation depth of 15 feet. A 'Mud-Cat-10' is also available and has a maximum operating depth of 10-1/2 feet. With proper planning, effective use of specialized equipment and continued good water management, natural water reserves can be saved and maintained for recreation use. This description was directed to a group of citizens concerned with lake preservation and rehabilitation. (See also W75-05037) (Jones-Wisconsin)
W75-05042

RESTORATION OF EUTROPHIC LAKES BY ARTIFICIAL HYPOLIMNETIC OXYGENATION,
Union Carbide Corp., Tarrytown, N.Y. Aquatic Environmental Sciences.
For primary bibliographic entry see Field 5C.
W75-05043

PUBLIC HEALTH REQUIREMENTS, SEWAGE DISPOSAL SYSTEMS, PERMITS REQUIRED FOR CHEMICAL TREATMENT OF AQUATIC VEGETATION, AUTHORIZED CHEMICALS, DREDGING PERMITS, SOURCES OF LAKE ENRICHMENT, BUILDING REGULATIONS,
Westchester County Dept. of Health, White Plains, N.Y. Div. of Environmental Health Services.
C. Weber.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 34-38.

Descriptors: *Public health, *Sewage disposal, *Chemcontrol, *Permits, Aquatic weed control, Dredging, Water pollution control, *New York, Septic tanks, Building codes.
Identifiers: Westchester(NY), Teatown Lake(NY).

Certain legal requirements must be observed in New York State before eutrophication control methods are undertaken. Part 327 of the rules and regulations promulgated by the State Department of Environmental Conservation provides that no person, including individuals, corporations, associations, organizations and so forth shall treat a lake or any body of water for purposes of control or elimination of aquatic vegetation by chemicals without first obtaining a permit. The regulation provides that the department can review and evaluate applications and issue permits but specifically states that the permit issuing official shall not make recommendations on the method, use, handling or efficiency of the chemical to be employed and the treatment method. Any permit that is issued will specify the type of chemical, the quantity, and the dates on which it can be applied. With respect to treatment involving dredging of lakes, the state has rules and regulations for the protection of streams which apply to such operations. Thes presentation was directed to a group of citizens concerned with lake preservation. (See also W75-05037) (Jones-Wisconsin)
W75-05044

LAND USE AND ZONING, SEPTIC EFFLUENTS AND THE RESPONSIBILITY FOR ADEQUATE CONTROL,
Yorktown School System, Yorktown Heights, N.Y.
R. Knabel.
In: 'Human-accelerated Eutrophication of Freshwater Lakes,' proceedings of a conference, December 1973, Teatown Lake Reservation, Brooklyn Botanic Garden, Ossining, New York, p 39-40.

Descriptors: *Land use, *Zoning, *Septic tanks, Sewage effluents, Control, *New York, Eutrophication, Regulation, Sewage disposal, Subsurface drainage, Groundwater, Water pollution sources.
Identifiers: Real estate.

Cultural eutrophication is really a function of land use and development around lakes. The problem becomes a question of zoning, a question of real estate interests and a question of regulation and control within the town or the area that the lake is located. Many of these areas are now being converted to year-round use, and almost all of them are still operating on their part time sewage disposal systems. The biggest problem with the lakes in the Westchester County, New York, area now is sewage effluent or septic effluent reaching the lakes, thus providing the nutrient material for plant growth, for turbidity, and all the other things that are associated with a eutrophic lake, most of which are very undesirable. Eutrophication is encouraged by the approach that is taken to land development or by not providing or requiring the necessary safeguards when these areas go through a conversion process. The relationship between subsurface disposal methods and the ground water table and the inevitability of septic nutrients getting into the water body and creating the eutrophic situation is ignored. This presentation was directed to a group of citizens concerned with lake quality and preservation. (See also W75-05037) (Jones-Wisconsin)
W75-05045

COMMENTS ON US EPA PROPOSED CRITERIA FOR WATER QUALITY,
Texas Univ. at Dallas, Richardson. Inst. for Environmental Sciences.
G. F. Lee, J. Hassett, J. Lopez, M. Piwoni, and R. Plumb.
Occasional Paper No 1, April 1974. 31 p, 21 ref.

Descriptors: *Water pollution control, *Federal Water Pollution Control Act, *Water quality standards, *Legislation, Chemicals, Organic compounds, Toxicity, Analytical techniques, Bioassay, Sampling, Toxins, Potable water, Metals, Sea water, Freshwater, Sewage effluents.

These comments point out types of problems that exist with many of the EPA proposed criteria. The tone of this critique is that many of the criteria should not be adopted as water quality standards since they would be too strict. All funds spent for water pollution control should be directed toward solving critical existing or potential problems. Discussed in particular are evaluation of chemical particulate species, problems with aquatic bioassay, bioassay of organic compounds, sampling and analytical problems, and the effluent mixing zone concept. Comments on specific proposed criteria include phosphorus, carbon adsorbable organics, chlorinated pesticides and chlorophenoxy herbicides in drinking water. The criteria for color, oils, phthalate esters, PCBs and pesticides in freshwater are evaluated. The limits of toxicants, including ammonia, cyanide, sulfides, dissolved gases, chlorine, copper, cadmium, lead, mercury, and zinc in freshwater and the toxic limits of fluoride, aluminum, arsenic, copper, chromium, cadmium, lead, manganese, mercury, nickel and zinc in marine waters are elucidated. (Jones-Wisconsin)
W75-05052

CONTROL OF AQUATIC WEEDS FROM WATER BODIES USING GRASS CARP,
Central Public Health Engineering Research Inst., Madras (India). Zonal Centre.
For primary bibliographic entry see Field 4A.
W75-05058

EXPERIMENTAL DREDGING TO CONVERT LAKE BOTTOM FROM ABIOTIC MUCK TO PRODUCTIVE SAND,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
R. L. Wilbur.
Water Resources Bulletin, Vol 10, No 2, p 372-383, 1974. 5 fig, 2 tab, 10 ref.

Descriptors: *Environmental control, *Dredging, *Benthos, *Lake beds, Productivity, Sands, Food chains, Fisheries, *Florida, Abiotic environment, Technology, Cost analysis, Mechanical equipment.
Identifiers: *Lake rehabilitation, Muck removal, Lake bottom redistribution, Trout Lake(Fla), Lake Charlton(Fla).

One major environmental factor contributing to gamefish reduction has been loss of productive lake bottom. Restoration of this link to gamefish food chain is a potential tool for revitalizing lake fisheries. Two eutrophic Florida lakes with extensive muck deposits were selected for implementing experimental bottom alterations, and two different techniques were selected which would reduce muck surface area and increase sand surface area. Preliminary results indicate benthos will be increased in areas converted to sand. Muck removal with a specially designed dredge was tested in Trout Lake. It removed 41,650 cu. yds. of muck and exposed 17 acres of sand bottom, but 10 of these acres developed thin muck layers which proved too soft to be picked up. Consequently, only 7 acres were satisfactorily converted. Bottom redistribution with a suction-type dredge was tested in Lake Carlton, converting 14 acres from muck to sand. Sand covered with muck was pumped from midlake areas to more peripheral areas where water depths were 11 to 13 feet and muck layer about 1.5 feet deep. The bottom was built up to an elevation above the previous muck elevation. Several methods for depositing the sand on the lake beds were tested. (Jones-Wisconsin)
W75-05060

ESTIMATING WATER QUALITY BENEFITS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
D. L. Jordening.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402, price $1.50. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-74-014, August 1974. 82 p, 11 tab, 131 ref, 2 append. EPA Project 21-AQJ-05. Contract 68-01-0744.

Descriptors: *Economic efficiency, *Water quality, Cost-benefit analysis, *Benefits, *Estimating, *Beneficial use, Evaluation, Assessment, *Research priorities.

A state of the arts summary concerning estimating water quality associated benefits is presented. This summary is viewed as a useful administrative tool to those that have been assigned the task of directing current and future research activity. Insofar as possible, this summary is presented by specific pollutants by beneficial use, devoting special attention to hypothesized and documented use-quality relationships. A discussion of the economic quantification of these relationships is also included. The beneficial uses considered include recreation, esthetics, property values and ecology with only limited attention devoted to water quality associated health and production impacts. Specific references and methodologies are discussed with the ultimate objective of providing a state of the arts assessment by beneficial use. This assessment was also useful in deriving conclusions concerning research priorities and possible results of future water quality related research. (EPA)
W75-05068

CARRYING CAPACITY IN REGIONAL ENVIRONMENTAL MANAGEMENT,
Utah State Univ., Logan.
For primary bibliographic entry see Field 6B.
W75-05069

CROP INSURANCE AND INFORMATION SERVICES TO CONTROL USE OF PESTICIDES,
Abt Associates, Inc., Cambridge, Mass.
J. A. Miranowski, U. F. W. Ernst, and F. H. Cummings.
For sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402, price $1.55. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-74-018, September 1974. 85 p, 4 fig, 8 tab, 24 ref, 2 append. EPA Program Element 1BA030. Contract 68-01-1888.

Descriptors: *Pesticides, *Information exchange, Insecticides, Cotton, Crop production, Management.
Identifiers: *Pest control, Implementation strategies, *Crop insurance.

This study analyzes the relative effectiveness and efficiency of pest information and crop insurance programs in encouraging farmers to use potentially harmful pesticides more sparingly by eliminating wasteful applications. Possibly excessive applications of pesticides can be attributed to poor timing of applications and to the risk-averse behavior of farmers. Focusing on insecticide use in cotton production as a major policy problem, the study employs a decision-theoretic framework to simulate the farmer's pesticide use decisions under alternative program options and subsidy levels. To the extent possible, empirical data are analyzed to complement the findings of the simulation analysis. The theoretical and empirical analyses in this study indicate that pest information programs are potentially more effective than crop insurance programs in reducing insecticide usage. These reductions from compliance with pest control recommendations provided by information programs are associated with economic gains by the farmer. Both the simulation experiments and available evaluations of the USDA Pest Management Program indicate that a maximum insecticide use reduction of 30 percent can be achieved through information programs. Subsidies to such programs appear an effective means to encourage adoption by farmers, at least in the initial phases. (EPA)
W75-05070

EVALUATION OF ADJUSTMENT ASSISTANCE PROGRAMS WITH APPLICATION FOR POLLUTION CONTROL,
Bowdoin Coll., Brunswick, Maine.
A. M. Freeman, III.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Ecological Research Series Report, EPA-600/5-74-029, September 1974 82 p, 4 fig, 1 tab, 45 ref, append. EPA Project R-801481.

Descriptors: *Resource allocation, *Pollution abatement, Water pollution control, Evaluation, Economics.
Identifiers: *Pollution control, *Adjustment assistance policies.

Adjustment assistance policies for pollution control are examined. The adjustment or economic resource reallocation problem which arises when pollution control requirements are imposed on a firm or industry is described. Micro and macro aspects of adjustment are examined. U.S. trade adjustment assistance policies are examined. The possible application of adjustment assistance concepts to the problem of pollution control is discussed. Factors to be considered in designing a program are described. The major elements of a model adjustment assistance program are presented. (EPA)
W75-05074

ANALYSIS OF COST SHARING PROGRAMS FOR POLLUTION ABATEMENT OF MUNICIPAL WASTEWATER,
National Bureau of Standards, Washington, D.C. Inst. for Applied Technology.
H. E. Marshall, and R. T. Ruegg.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Ecological Research Series, Report, EPA-600/5-74-031, November 1974. 137 p, 12 fig, 11 tab, 34 ref. EPA-IAG D4 H 374.

Descriptors: *Pollution abatement, *Cost sharing, *Federal project policy, Municipal wastes, *Treatment facilities, *Federal Water Pollution Control Act, Institutional constraints, Legal aspects, Legislation, Regulation.

This study evaluates existing cost-sharing programs for wastewater pollution abatement as described in the Federal Water Pollution Control Act Amendments of 1972, describes alternative cost-sharing programs that provide improvement in terms of national efficiency and equity criteria as defined herein, and suggests related areas for further research. Emphasis is on how Federal cost sharing biases communities in favor of certain kinds of techniques. The approach is to describe the current cost-sharing programs for both plant and nonplant techniques; to examine cost-sharing, legal, and other institutional biases against certain techniques; to analyze efficiency and equity effects of alternative cost-sharing programs; and to describe the incentive effects of cost sharing on nonfederal interests with respect to their choices among abatement techniques. Findings are that more efficient abatement will result if the same percentage cost share applies to all plant and nonplant techniques of abatement; the same percentage also applies to all categories of cost (e.g., capital, land, operation and maintenance) for a given technique; the same percentage applies to

large and small communities; institutional constraints on the selection of nonplant techniques are removed; and if the program provides for Federal cost sharing of every abatement technique that is technically viable. (EPA)
W75-05076

BIBLIOGRAPHY OF WATER POLLUTION CONTROL BENEFITS AND COSTS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
S. G. Unger, and D. L. Jordening.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Ecological Research Series Report, EPA-600/5-74-028, October 1974, 181 p. 1B1030/ROAP 20aab-02. EPA 68-01-6237.

Descriptors: Water quality, *Benefits, Costs, Economics, Environment, Pollution, *Water pollution control, *Bibliographies, *Cost-benefit analysis, Pollution abatement.

This computer-listed bibliography includes approximately 3,000 references to environmental quality management issues. The primary selection criteria for including the sources referenced was that the citation pertains to water pollution control benefits and costs. However, numerous listings include more general environmental issues within which water quality problems are embedded. Also, much of the economic cost-benefit analysis research has been conceptually developed and/or applied in resource-use areas other than water. Such concepts were often considered germane to water resources research even though water related applications were not found in the literature search. Therefore, this publication does include selected references outside the water resource research area, per se. The bibliography is arranged alphabetically, by author. Both literature sources and terms used in titles were often abbreviated to conserve space; such abbreviations were defined in the attached glossary. Literature sources included books, journal articles, trade publications, research reports, and unpublished reports pertaining to on-going research within both public and private agencies. (EPA)
W75-05077

EVALUATION OF DRAINAGE FOR SALINITY CONTROL IN GRAND VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
G. V. Skogerboe, W. R. Walker, Ray S. Bennett, J. E. Ayars, and J. H. Taylor.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.75. Environmental Protection Agency, Technology Series Report, EPA-660/2-74-084, August 1974. 100 p, 26 fig, 15 tab, 28 ref. Program Element 1BB039, EPA Grant S-800278.

Descriptors: *Colorado River, *Deep percolation, Drainage, Irrigation, Irrigation effects, *Irrigation efficiency, Irrigation water, *Return flow, Saline soils, Saline water, *Salinity, Water distribution(Applied), Water loss, Water pollution sources, Water quality.
Identifiers: *Grand Valley(Colo), Irrigation management, *Salinity control, Field drainage.

Irrigation return flows in the Grand Valley of Western Colorado contribute to the serious salinity problems in the Colorado River Basin by carrying large salt loads resulting from contact with local saline soils and aquifers. Since the valley is one of the more significant salt sources, it is a logical area for evaluation of the effectiveness of various salinity control measures. This study has emphasized two on-farm control alternatives, namely, irrigation scheduling and field drainage. This report considers the latter measure. Three farms were extensively studied during the 1972 and 1973 irrigation seasons to identify drainage needs and the effect field relief drainage would have on reducing salinity in the return flows. During the spring of 1973, a perforated plastic pipe drainage system was installed on one of the farms. Each farm was than incorporated into an irrigation scheduling program. The results indicate that while field drainage is effective in skimming water off the top of the water table where salinity concentration are typically 20% - 30% lower, the high costs emphasize the need to reduce seepage losses by lining canals and minimize deep percolation losses through improved on-farm water management in order to minimize the requirements for drainage facilities. (EPA)
W75-05090

DEVELOPMENT OF CLASSIFICATION SCALE FOR CHARACTERIZING BILGEWATERS USED IN EVALUATING OIL REMOVAL TECHNIQUES,
General American Transportation Corp., Niles, Ill. General American Research Div.
P. Budininkas, and G. A. Remus.
Avaalable from the National Technical Information Service, Springfield, Va 22161 as AD-778 929, $4.25 in paper copy, $2.25 in microfiche. Report No CG-D-75-74, January 1974. 59 p, 22 fig, 8 tab. DOT-CG-32,521-A.

Descriptors: *Emulsions, Oil, *Oily water, *Oil pollution, Laboratory equipment, Instrumentation, Laboratory tests, Measurement, Emulsifiers, Emulsions, *Separation techniques, Water pollution control, Pollution abatement.
Identifiers: *Bilgewater, Demulsification.

A method was developed for empirically classifying bilgewaters by observing the rate of oil separation from water-oil emulsions. A manually operated, compact demulsification measurement instrument for monitoring oil separation from emulsions containing oil concentrations in the 0.05 to 0.15% range, considered typical for bilgewaters, was developed and tested. The rate of demulsification is followed by reading the volume of oil separated from the test emulsion directly and visually in the instrument. The demulsification behavior of artificial bilgewater emulsions was determined by using the demulsification measurement instrument. The emulsions were prepared from oils considered representative of those in use on marine vessels, namely diesel fuel, hydraulic, and lubricating and detergent-lubricating oils, mixed with either deionized, fresh, or saline waters. These measurements resulted in a series of curves showing the amount of oil separated versus time, with a separate and distinctive curve for each of the emulsions tested. The series of experimentally observed demulsification curves for each of the water-oil emulsions tested established a classification scale showing relative oil separation behavoir. This classification scale, in conjunction with tests obtained with the demulsification measurement instrument, can be applied to: (1) characterizing actual bilgewaters according to their demulsification behavoir, and (2) preparing artificial bilgewaters with known properties and separation characteristics. (Sims-ISWS)
W75-05091

ARTIFICIAL SEA SLICKS: THEIR PRACTICAL APPLICATIONS AND ROLE IN FUNDAMENTAL RESEARCH,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-05092

A REVIEW OF THE LITERATURE CONCERNING THE STEEL INDUSTRY AND POLLUTION. PART 1. THE BACKGROUND TO POLLUTION,
British Steel Corp., Sheffield (England). Information Services.
D. G. Brinn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 290, $3.75 in paper copy, $2.25 in microfiche. Report No SM/BIB/832, June 1974. 24 p, 3 fig, 3 tab, 109 ref.

Descriptors: *Reviews, *Bibliographies, *Industrial wastes, Air pollution, Thermal pollution, Water pollution, Steel, Iron, Industries, Documentation, Information retrieval, Economics, Legislation, Legal aspects.
Identifiers: United Kingdom.

Pollution was defined and the increasing awareness of the problems of pollution was discussed. Developments in pollution legislation, with particular regard to the United Kingdom, were traced and some comparisons were made with the situation in other industrial countries. The effectiveness of the legislation and non-legislative reasons for controlling pollution were dealt with. Pollution levels in the United Kingdom, past, present, and future were outlined and brief reference was made to levels in other countries. Finally, some comments were made on the true economics of pollution control. (Sims-ISWS)
W75-05093

A METHOD FOR THE SEPARATION OF OIL FROM AN AQUEOUS OIL-DETERGENT SOLUTION PRIOR TO IR ANALYSIS,
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 5A.
W75-05098

OIL CONTAMINATED BEACH CLEANUP,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
J. J. Der, and E. Ghormley.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 329, $3.75 in paper copy, $2.25 in microfiche. Technical Note N-1337, April 1974. 39 p, 4 fig, 4 tab, 25 ref, 2 append.

Descriptors: *Oil spills, *Oil pollution, *Beaches, Mechanical equipment, Oil, Cleaning, Wastes, Environment, Reviews, Evaluation, *Pollution abatement, Water pollution control.
Identifiers: Beach cleanup.

A review of representative oil spill incidents supplemented by personal and telephone interviews with persons involved in beach cleanup operations as on-scene coordinators or as cleanup operators was made to evaluate cleanup methods suitable for future operations. The selection of procedure and equipment for beach cleanup was found to depend on the amount of oil, the characteristics of the oil as it hits the beach, and the type of beach contaminated. The most effective beach cleanup procedures and equipment were identified and tabulated in terms of selected beach classifications. Recommendations for future work to remove deficiencies of existing techniques were included. The tables in an appendix summarized major oil spills that occurred in the past in which significant effort was made to remove contamination from the shore area. The procedures used for beach cleanup were briefly described. (Sims-ISWS)
W75-05100

WEATHERING OF OIL AT SEA,
Esso Research and Engineering Co., Linden, N.J. Government Research Div.
For primary bibliographic entry see Field 5B.
W75-05106

GEOHYDROLOGIC RELATIONSHIPS IN WATER POLLUTION,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Program Operations.
J. R. Hyland.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 884,

$8.50 in paper copy, $2.25 in microfiche. EPA-430/1-74r006, July 1974. 93 p, 59 fig, 9 tab, 79 ref.

Descriptors: *Aquifers, *Hydrogeology, *Water pollution, Subsurface flow, Water supply, Surface-groundwater relationships, Geophysics, Discharge(Water), Recharge, Water wells, Aquifer characteristics, *Groundwater movement, Exploration, Water quality control.

A course manual was presented with outlines concerning groundwater quality control. Topics included: principles of geology, soils and groundwater hydrology, aquifer characteristics, technology of evaluating groundwater, geophysical applications, groundwater quality, pollution effects on groundwater, and groundwater recharge. (Visocky-ISWS)
W75-05128

BIBLIOGRAPHIES PERTINENT TO WILDLAND HYDROLOGY,
Utah State Univ., Logan. Dept. of Range Science.
For primary bibliographic entry see Field 10C.
W75-05153

WATER RESOURCES DEVELOPMENT, 1950-1965, AN INTERNATIONAL BIBLIOGRAPHY,
Center of Scientific and Technological Information, Tel Aviv (Israel). Library Services.
For primary bibliographic entry see Field 10B.
W75-05154

EFFECTS OF ECONOMIC DEVELOPMENT UPON WATER RESOURCES (AN INTERINDUSTRY APPROACH TO MODELING ECONOMIC-ENVIRONMENTAL SYSTEMS),
Maryland Univ., College Park. Bureau of Business and Economic Research.
For primary bibliographic entry see Field 6G.
W75-05174

PROBLEMS AND OPPORTUNITIES IN INTERDISCIPLINARY RESEARCH: THE MOLYBDENUM PROJECT,
Colorado Univ., Boulder. Dept. of Physics and Astrophysics.
W. R. Chappell.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 696-708, 1 tab, 1 fig, 17 ref. NSF(GI-34814X).

Descriptors: Projects, *Management, *Molybdenum, *Soil-water-plant relationships, *Project planning, Comprehensive planning, Governmental interrelations, Industrial wastes, Trace elements, Pollutant identification.

Some aspects of the development and evolution of the Molybdenum Project were discussed to illuminate some of the problems encountered in interdisciplinary research and in industry and regulatory agency interactions. The report included (1) background of the project; (2) analysis of interactins with external groups, such as governmental agencies and officials and private industry, and (3) short and long-range proposed impacts of the study. In the interaction analysis, the importance of credibility was stressed, and the biggest potential problem was identified as that of surprise. The best approach counseled to deal with the problem of surprise was that of maximum openness with all concerned parties. Uranium and copper mining and livestock management were suggested as areas of short range impact. The most important long-range impact was pictured as the development of techniques that can be generalized to treat other trace elements, as well as experience in university participation in interdisciplinary problem-oriented research. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05298

NATIONAL NEED - AN INDUSTRY VIEW OF RESEARCH,
AMAX Lead and Zinc, Inc., St. Louis, Mo.
M. N. Anderson.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 709-725, 2 tab, 3 fig, 12 ref.

Descriptors: *Lead, *Management, *Industrial wastes, *Investment, *Economic justification, Zinc, Capital, Economics, Econometrics, Mining, Mineral industry, *Missouri.

Lead and zinc industry efforts in reducing pollution in view of economic constraints are cited. The author gave a specific example of the lead industry - University of Missouri RANN effort and research on the interactions of lead and zinc and sulfur dioxide with the environment. A valuable result of this effort was stated as the working together of industry, the university, and government agencies to tune up the control mechanisms. Some pollution control expenditures by a lead mining and smelting company in the New Missouri Lead Belt were quoted. The author also presented his own philosophy of ecology. Capital intensive industries like mining and smelting need long periods of relatively stable operation to recover capital. Therefore, it is necessary to move intelligently in solving pollution problems, and legislative or regulatory dictates may not accelerate the rate of accomplishment. The use of fear motivations in environmental discussions and the interpretation of data from unfamiliar areas were cautioned against. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05299

AN APPROACH TO THE CONTROL OF TOXIC SUBSTANCES,
Environmental Protection Agency, Washington, D.C. Office of Toxic Substances.
G. E. Schweitzer.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 726-731.

Descriptors: *Toxins, *Regulation, *Legislation, *Administrative agencies, Standards, Environmental control, Economics, Industrial wastes, Government, Administration.

The concern of EPA with toxic substances is (1)identification and assessment of the risks associated with the manufacture, distribution, use and disposal of chemicals which could adversely affect health and environmental quality, and (2) practical steps to prevent or mitigate the problems posed by such chemicals. In these efforts, the government can draw on (1) consumer protection statutes, (2) media-oriented statutes, and (3) statutes dealing with a particular phase of the existence or use of a toxic substance. Balancing of the risks with the benefits related to the action is central to the consideration of regulatory options. The proposed Toxic Substances Control Act of 1973 was discussed. It would give EPA new authority for information acquisition and restrictive actions. The role of the researcher in the formulation of national policies aimed at controlling toxic substances was also discussed. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05300

THE EFFECT OF PARK USE ON SURFACE WATER QUALITY,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W75-05306

PREDICTION OF SUBSOIL ERODIBILITY USING CHEMICAL, MINERALOGICAL AND PHYSICAL PARAMETERS,
Purdue Research Foundation, Lafayette, Ind.
For primary bibliographic entry see Field 2J.
W75-05308

AN EXECUTIVE SUMMARY OF THREE EPA DEMONSTRATION PROGRAMS IN EROSION AND SEDIMENT CONTROL,
Hittman Associates, Inc., Columbia, Md.
M. A. Nawrocki, and G. M. Sitek.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $1.20. Environmental Protection Agency, Technology Series, Report EPA-660/2-74-073, June 1974. 50 p, 7 fig, 1 tab, 2 ref. Program Element 1B2042 EPA Contract 68-01-0743.

Descriptors: *Aquatic Environment, Construction, *Demonstration watersheds, *Erosion control, *Rainfall-Runoff relationship, *Sedimentation, *Urbanization, Watershed(Basins), *Dredging, *Sediment deposition, *Filtering systems, *Separation techniques, Biology, Channel morphology.
Identifiers: Guidelines, Presentations, *Suspended solids separation, Pond dredging, Grade control.

Highlights are presented of three recently completed programs in the area of sediment and erosion control. These programs were a 'Joint Construction Sediment Control Project, 'Project No 15030 FMZ; a 'Programmed Demonstration for Erosion and Sediment Control Specialists, 'Project No. S800854 (15030 FMZ); and a 'Demonstration of the Separation and Disposal of Concentrated Sediments,' Contract No 68-01-0743. (See W74-11923, W75-05-05311 and W75-05312). The first program demonstrated and developed guidelines for erosion and sediment control in urbanizing areas, the second produced a series of 15 presentations on sediment and erosion control, and the third program consisted of a field demonstration of a system for removing and processing sediments from pond bottoms. (EPA)
W75-05310

PROGRAMMED DEMONSTRATION FOR EROSION AND SEDIMENT CONTROL SPECIALISTS,
Hittman Associates, Inc., Columbia, Md. Environmental and Geosciences Dept.
T. R. Mills, M. A. Nawrocki, and G. R. Squire.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $2.15. Environmental Protection Agency, Technology Series Report EPA 660/2-74-071, p 148, February 1974. 3 fig, 3 tab, 2 ref, 8 append. EPA Program Element 1B2042, Project No S800854 (15030 FMZ).

Descriptors: *Erosion control, *Maryland, Education, Construction, *Sediment control.
Identifiers: Certification plans, *Construction related erosion, *Technical presentations.

A series of technical presentations and a certification plan for erosion and sediment control specialists are presented. Fifteen conventional presentations, complete with visual aids and student handouts, and six audiovisual programs consisting of film strips, taped narration, work books, and instructor's manuals are described. Samples of the presentation materials, designed to provide an effective program for qualifying construction personnel and other persons to pass the certification exam, are included in appendices. Presentations include such topics as: Goal, Objectives and Principles of Erosion and Sediment Control; Erosion and Sedimentation; Control of Sediment

Generated on Construction Sites; Control of Runoff During Construction; Vegetative Soil Stabilization; and Foreman-Inspector Responsibilities. Results of a demonstration to evaluate the conventional presentation approach versus the audiovisual approach are given. Also described is the development of a plan for the certification of on-site erosion and sediment control specialists. (See 74-11923, W75-05310 and W75-05312) (EPA)
W75-05311

DEMONSTRATION OF THE SEPARATION AND DISPOSAL OF CONCENTRATED SEDIMENTS,
Hittman Associates, Inc., Columbia, Md.
M. A. Nawrocki.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.45. Environmental Protection Agency Technology Series Report EPA-660/2-74-072, p 77, June 1974. 12 fig, 15 tab, 3 ref, 4 append. Program Element 1B2042, EPA Contract 68-01-0743.

Descriptors: *Dredging, *Sediment deposition, *Filtering systems, *Separation techniques, Impoundments, Water quality control, Desilting.
Identifiers: *Suspended solids separation, Pond dredging.

A demonstration was conducted of a system for removing and processing sediment from impoundment bodies. A MUD CAT dredge was used to remove the sediment from a pond. The dredged slurry was then pumped through a processing system consisting of a pair of elevated clarifier bins in series, a bank of hydrocyclones, a cartridge filter unit, and a Uni-Flow bag-type fabric filter consisting of 720 one-inch diameter hoses. The MUD CAT proved efficient in removing sediment from the pond bottom without imparting a substantial amount of turbidity to the pond water. The processing system was effective in removing suspended sediment from the dredged slurry. Its effluent averaged 445 mg/l with an average influent suspended solids of 170,300 mg/l. Experiments were also conducted on the use of five-inch diameter hoses on the Uni-Flow filter. These produced better results than the one-inch hoses in that they were not prone to blockage by sediment. (See W74-11923, W75-05310 and W75-05311) (EPA)
W75-05312

CONTROL OF ENVIRONMENTAL IMPACTS FROM ADVANCED ENERGY SOURCES,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 6G.
W75-05313

CALIFORNIA ENVIRONMENTAL QUALITY ACT: INNOVATION IN STATE AND LOCAL DECISIONMAKING,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 6G.
W75-05314

HOW TO INCORPORATE WATER QUALITY AND POLLUTION CONSIDERATIONS INTO THE MODEL OF THE WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05321

LASL WASTE SYSTEM BACKS UP INTO STREET.
For primary bibliographic entry see Field 5D.
W75-05327

TREAT WASTEWATER LIKE DOWNTOWN TRAFFIC,
For primary bibliographic entry see Field 5D.
W75-05329

WASTEWATER COLLECTION (LITERATURE REVIEW),
Nottingham (H.D.) and Associates, McLean, Va.
For primary bibliographic entry see Field 5D.
W75-05335

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

FACILITIES PLAN, ANNEX A, LAS VEGAS/BAY POLLUTION ABATEMENT PROJECT,
Nevada Environmental Consultants, Las Vegas.
Clark County Board of Commissioners, Las Vegas, Nevada, July 1974. 321 p, 31 fig, 71 tab, 37 ref.

Descriptors: *Water pollution control, *Pollution abatement, *Planning, *Urbanization, *Alternate planning, Groundwater mining, Land subsidence, Wastewater treatment, Nevada, Wastewater disposal.
Identifiers: *Las Vegas Wash/Bay, Lake Mead, Clark County(Nevada).

The Facilities Plan presents and evaluates alternative solutions to the problems associated with the discharge of domestic wastewater to Las Vegas Wash and Bay. A recommended project providing advanced wastewater treatment and beneficial reuse of reclaimed wastewater has been selected. Most geologists and engineers who have studied this Valley agree that the groundwater basin has been over-drafted for several years resulting in groundwater depletion and land subsidence. Efforts are being made by State and local agencies to reduce this over-drafting of the groundwater resource. Wastewater now available is a high quality secondary effluent. In 1973, over 80% (43,000 acre-feet) of the Valley's secondary wastewater was discharged to Las Vegas Wash where it mixed with highly saline groundwater discharges. Together these waters were discharged into Las Vegas Bay of Lake Mead. These discharges to the Colorado River system are a source of nutrients, dissolved and suspended solids, and bacteria. The nutrients, particularly phosphorus, have been identified as the principle cause of excessive summer algal growth experienced in Las Vegas Bay. (Poertner)
W75-04867

A LINEAR-PROGRAMMING SOLUTION TO SALMON MANAGEMENT,
Washington Univ., Seattle. Center for Quantitative Science; and Washington Univ., Seattle. Fisheries Research Inst.
For primary bibliographic entry see Field 8I.
W75-05021

OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
Academic Press, Inc., New York and London, 1974. p 273, 46 fig, 22 tab, 73 equ, 100 ref, 3 append. OWRT A-022-TEX(1).

Descriptors: Water resources, *Alternative planning, *Optimization, Methodology, *Model studies, *Multiple-purpose projects, *River basin development, *Economics, Water quantity, Capital, Investment, Budgeting, Scheduling, Dams, Simulation analysis, Water quality, Constraints, Reservoirs, Operating costs, Stochastic processes, Algorithms, Systems analysis.
Identifiers: Project expansion, Benefit maximization, Cost minimization, Sensitivity analysis, Branch and bound method, Out-of-kilter algorithm, Objective function.

A computationally and politically practical methodology for water resources planning is described. Its aim is the optimal expansion, over a fixed planning horizon, of a realistic water resources system that will meet increased demand, while maintaining water quality standards. After setting forth the criteria and scope of the problem, a physical-economic-water quantity river basin model is developed and an optimization strategy is formulated to maximize, over the set of alternative projects, the system benefits. The mixed integer programming optimization problem is decomposed into a capital budgeting problem and an operating policy problem. The optimization algorithm is applied to a project expansion, capital investment problem in a model river basin resembling the Maule River Basin in central Chile; return from the first feasible solution is within 3.3% of the final optimum. Next, a sensitivity analysis is made to discover the critical parameters and inputs in the model. Finally, the incorporation of water quality management into the water quantity model is described; use is made of the Streeter-Phelps equation and the objective function becomes one of cost minimization. A FORTRAN listing of the computer program to execute the optimization algorithm appears in Appendix A; a detailed solution of the example problem is provided in Appendix B. (See W75-05316 thru W75-05321) (Bell-Cornell)
W75-05315

INTRODUCTION,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
In: Optimal Expansion of A Water Resources System, p 1-37, (Chapter1), Academic Press, New York and London, 1974. 13 fig, 4 tab, 10 equ.

Descriptors: *Water resources development, *Comprehensive planning, *Optimization, *Multiple-purpose projects, Linear programming, Dynamic programming, River basins, Evaluation, Capital, Investment, Reservoir operation, Equations, Systems analysis.
Identifiers: Capacity expansion.

The development of water resources has progressed from single-purpose projects to multipurpose programs encompassing entire river basins. Presented is a discussion of the problems in planning for a comprehensive water resources system, how these problems are attacked, and what criteria are used to evaluate the expansion of an already existing system. The use of systems analysis, specifically optimization techniques, in solving water resource problems is considered in depth. The two principal methods of optimization are classified as: analytical methods, which make use of the classical techniques of differential calculus and the calculus of variations; and numerical methods, which generate solutions by means of iterative procedures. Three important numerical optimization tools--linear, nonlinear, and dynamic programming—are summarized in order to exemplify the significant role played by the model and objective function in the optimization of a water resources system. Considered specifically are the sequencing of capital investment in water resource projects and the choice of reservoir operating rules. Included is a discussion of quantitative, economic criteria for optimal water resource planning and a short review of previous work done in the area. (See also W75-05315) (Bell-Cornell)
W75-05316

FORMULATING THE PROBLEM OF THE OPTIMAL EXPANSION OF AN EXISTING WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
In: Optimal Expansion of A Water Resources System, p 38-65 (Chapter 2), Academic Press, New York and London, 1974. 7 fig, 2 tab, 18 equ.

Descriptors: Water resources, *Multiple-purpose projects, *River basin development, Economics, *Reservoir operation, *Optimum development plans, Mathematical models, Constraints, Costs, Benefits, Capital, Investment, Timing, Dams, Decision making, Reservoir storage, Recreation demand, Equations, Systems analysis.
Identifiers: *Project expansion, Objective function, Physical constraints, Benefit maximization, Revenue.

The problem of expanding an existing water resources system is formulated in mathematical terms by providing functions, equations and inequalities that represent appropriate criteria and the characteristics of the physical system. The locations of possible dam sites are assumed to be determined by the topography and runoff of a particular region. Dealt with is the question of when new elements should be added to an existing system and how large the new elements should be. Considered first are major assumptions and decisions that must be made in formulating the problem statement. Next, establishment of an objective function representing the criteria for a river basin and the formulation of a model of the basin, including identification of the different elements and the costs and benefits, are examined. An appropriate time scale (the Month) is selected for the water flows, and a time scale of a year is selected for the introduction of new projects. All variable and parameters are restricted to being deterministic in order to simplify the model and make it possible to apply the optimization techniques described in the following chapter. (See also W75-05315) (Bell-Cornell)
W75-05317

A PROCEDURE FOR SOLVING THE OPTIMAL EXPANSION PROBLEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
In:Optimal Expansion of a Water Resources System, p 66-105 (Chapter 3), Academic Press, New York and London, 1974. 15 fig, 7 tab, 21 equ.

Descriptors: Water resources, *River basin development, *Planning, *Optimization, *Algorithms, Capital, Budgeting, Methodology, Reservoir operation, Dams, Feasibility, Networks, Constraints, Water demand, Equations, Mathematical models, Systems analysis.
Identifiers: *Cost minimization, Project expansion, Branch and bound method, Out-of-kilter algorithm, Allocation, Water flow.

The problem of expanding an existing water resources system has been mathematically formulated in a way designed to facilitate solution and a corresponding river basin model incorporating physical and economic elements was developed. Methodology is described for solving the problem. Developed is an optimization strategy to maximize, over the set of alternative projects, the sum of the discounted present value of net earnings of the system, subject to the water demands and various institutional, physical, and budgetary limitations. The optimization problem is posed as a 0-1 mixed integer programming problem that is decomposed into the set of all feasible combinations--a capital budgeting (CB) problem --, and the economic return is determined for each combination--an operating policy(OP) problem. The CB problem is solved using Little's branch and bound algorithm; the OP problem is solved by Fulkerson's out-of-kilter algorithm which takes advantage of the problem network structure. These two problems are interconnected because the operating return in the CB problem is determined only by obtaining the optimal solution of the OP problem, and the total number of dams in the OP problem is the optimal solution of the CB problem. (See also W75-05315) (Bell-Cornell)
W75-05318

APPLICATION OF THE OPTIMIZATION ALGORITHM TO A WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
In: Optimal Expansion of a Water Resources System, p 106-129 (Chapter 4), Academic Press, New York and London, 1974. 4 fig, 6 tab.

Descriptors: Water resources, *River basin development, Economics, *Optimization, *Algorithms, *Reservoir operation, Dams, Capital, Investment, Planning, Constraints, Methodology, Networks, Water circulation, Mathematical models, Computers, Systems analysis.
Identifiers: Project expansion, *Benefit maximization, Decision tree, Branch and bound method, Out-of-kilter algorithm, Decomposition method, Water flow.

A methodology for expansion of an existing water resources system has been developed, including a physical-economic river basin model and a decomposition algorithm for maximizing system benefits, subject to water demands and various institutional, physical, and budgetary constraints. The optimization algorithm decomposes the original mixed integer programming problem to the set of all feasible combinations (capital budgeting problem) using Little's branch and bound algorithm, and the economic return is determined for each combination (an operating policy problem) utilizaing Fulkerson's out-of-kilter algorithm. The efficacy of the optimization algorithm is demonstrated by applying it to a project expansion, capital investment problem in a model river basin that resembles the Maule River Basin in central Chile. Objectives of proposed expansion are limited to two disparate facets of a water resources system: (1) withdrawal consumptive use (irrigation) and (2) withdrawal nonconsumptive use (generation of hydroelectric energy). Municipal, industrial, and recreational water uses are incorporated implicity in the river basin model by specifying respectively minimum flows in the relevant river reaches and seasonal water levels in the reservoirs. The model incorporates realistic economic and hydrological parameters. The efficacy of the solution procedure is demonstrated in the fact that the return from the first feasible solution is within 3.3% of the final optimum. (See also W75-05315) (Bell-Cornell)
W75-05319

THE SENSITIVITY OF PLANNING DECISIONS IN RIVER BASIN MANAGEMENT,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
In:Optimal Expansion of A Water Resources System, p 130-142 (Chapter 5), Academic Press, New York and London, 1974. 3 fig, 3 tab, 5 equ.

Descriptors: *River basins, *Planning, *Management, *Dams, *Scheduling, *Stochastic processes, Decision making, Interest rates, Construction, Projects, Reservoirs, Costs, Irrigation, Demand, Hydrology, Optimization, Simulation analysis, Regression analysis, Algorithms, Mathematical models, Systems analysis, Equations, Risks.
Identifiers: *Sensitivity analysis.

Water resources management occurs in a dynamic environment in which changes in inputs, costs, and objectives occur because of related technological, political, and social changes. A deterministic, physical-economic river basin model which employs a decomposition algorithm for maximizing benefits is examined using sensitivity analysis. Measured is the sensitivity of the model's objective function and outputs to small variations in four inputs and parameters: (1) system hydrology; (2) reservoir costs; (3) future irrigation demand; and (4) interest rate. A linear penalty function is used to punish noncompliance with irrigation demands. Single- and multiparameter sensitivity functions are defined, and the relationship between outputs and inputs of the water resources model is explained. Results show the dam construction schedule to be insensitive in 11 out of 16 trials. When both interest rate and reservoir costs were raised simultaneously, no solution was possible for scheduling the dam construction. Finally, three simulation strategies are considered in a discussion of stochastic analysis of water resources systems. Method 3, which combines optimization and regression analysis with simulation, is concluded to be the most reliable. (See also W75-05315) (Bell-Cornell)
W75-05320

HOW TO INCORPORATE WATER QUALITY AND POLLUTION CONSIDERATIONS INTO THE MODEL OF THE WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
D. T. O'Laoghaire, and D. M. Himmelblau.
In: Optimal Expansion of A Water Resources System, p 143-157 (Chapter 6), Academic Press, New York and London, 1974. 4 fig, 19 equ.

Descriptors: *Water quality, *Planning, *Management, *River basin development, *Waste water treatment, *Optimization, Simulation analysis, Constraints, Pollution abatement, Reach(Streams), Projects, Scheduling, Dissolved oxygen, Low-flow augmentation, Operating costs, Equations, Systems analysis, Mathematical models, Waste treatment.
Identifiers: Project expansion, *Cost minimization, Biological oxygen demand, Streeter-Phelps equation.

The interactive nature of a water resources system and the fact that water in typical rivers is used and reused numerous times in its transit downstream require a detailed examination of water quality in conjunction with water quantity. This chapter describes the incorporation of water quality management into a previously developed scheme for the optimal expansion of an existing water resources system, which includes a physical-economic river basin water quantity model and a decomposition algorithm for maximizing system benefits. It is assumed that quality problems arise in free-flowing fresh water river reaches, and a modern modification of the Streeter-Phelps equation is used to calculate the profiles of biological oxygen demand and dissolved oxygen in each reach of the system. Two strategies for controlling water quality are considered: low flow augmentation and direct waste treatment at the polluting source. The previously formulated optimization problem becomes: For a planning horizon and a set of alternative waste water treatment projects, select a period for introducing each project so as to minimize the system costs while meeting all the constraints (budgetary, technological, physical, and water quality standards). The comprehensive water management problem is decomposed, for solution, into two interdependent subproblems: the water quantity problem and the water quality problem. (See also W75-05315) (Bell-Cornell)
W75-05321

WATER SUPPLY, TREATMENT, DISTRIBUTION, AND REUSE OPTIMIZATION IN ARID URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-05322

6B. Evaluation Process

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT: INTERIM REPORT ON RESOURCE CAPABILITY,
Texas Univ. at Austin.
For primary bibliographic entry see Field 2L.
W75-04851

A PRACTICAL APPROACH TO WATER QUALITY MANAGEMENT PLANNING,
Oklahoma Univ., Norman.
For primary bibliographic entry see Field 5G.
W75-04857

CITY OF SPARKS, NEVADA, FEASIBILITY STUDY FOR SPANISH SPRINGS INTERCEPTOR,
Spink Corp., Reno, Nev.
For primary bibliographic entry see Field 5D.
W75-04863

ADDENDUM TO THE ENVIRONMENTAL ASSESSMENT, ANNEX B, LAS VEGAS WASH/BAY POLLUTION ABATEMENT PROJECT,
VTN Nevada, Las Vegas.
For primary bibliographic entry see Field 5E.
W75-04869

WATER QUALITY RELATIONSHIPS IN THE GREAT LAKES: ANALYSIS OF A SURVEY QUESTIONNAIRE,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 5C.
W75-04894

RECREATIONAL USES OF GREEN BAY: BAY/NON-BAY USERS COMPARED,
Wisconsin Univ., Green Bay. Leisure Sciences Collateral.
R. B. Ditton, and T. L. Goodale.
In: Proceedings 15th Conference on Great Lakes Research, April 5-7, 1972, Wisconsin Univ., Madison, International Association Great Lakes Research, p 729-736. 1 fig, 4 tab, 9 ref.

Descriptors: *Recreation, *Water quality, *Wisconsin, Attitudes, Fishing, Boating, Swimming, Water utilization, Social aspects, Economics, Lake Michigan, Surveys.
Identifiers: *Green Bay(Lake Michigan), Brown County(Wis), Door County(Wis), Kewaunee County(Wis), Marinette County(Wis), Oconto County(Wis).

Managing the water quality of Green Bay and tributary water requires knowledge of the extent of recreational usage if interaction conflicts between water uses are to be minimized, if not eliminated. Following the development of a reliable interview schedule, a survey of permanent and seasonal resident heads of households was conducted throughout the five-county study area adjacent to the bay, i.e., Brown, Door, Keqaunee, Marinette, and Oconto. The proportion of a representative sample of heads of households in the counties who use Green Bay for recreation are identified. While seven of ten household heads interviewed participated in fishing, boating, or swimming, only three of ten had used Green Bay during the preceding twelve months, indicating that the bay was not a focal point of waterbased recreation among residents of the study area. The data suggest that the use and location of use of Green Bay waters for fishing, boating, and swimming is related to participants' perception of the bay's water quality and characteristics. Bay users were more troubled by winds, water temperature, and cloudiness, were more deterred from further participation by 'dirty water,' and were inclined to allocate more money for water quality improvement. (Jones-Wisconsin)
W75-04913

ROOKERY BAY LAND USE STUDIES, THE RESOURCE BUFFER PLAN: A CONCEPTUAL LAND USE STUDY,
Miami Univ., Fla. Center for Urban Studies.
For primary bibliographic entry see Field 4A.
W75-04929

MULTIPLE USES OF UTAH IRRIGATION CANALS: CACHE COUNTRY AS A CASE STUDY,
Utah Cooperative Forest Recreation Research Unit, Logan.
For primary bibliographic entry see Field 4A.
W75-04939

ESTIMATING WATER QUALITY BENEFITS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W75-05068

CARRYING CAPACITY IN REGIONAL ENVIRONMENTAL MANAGEMENT,
Utah State Univ., Logan.
A. B. Bishop, H. H. Fullerton, A. B. Crawford, M. D. Chambers, and M. McKee.
For sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402, price $2.55. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-74-021, February 1974. 170 p, 22 fig, 7 tab, 134 ref. ROAP/TASK 21 AKL-22. EPA 802444.

Descriptors: *Carrying capacity, *Regional analysis, Input-output analysis, Simulation analysis, *Management, *Model studies, Environmental effects, Planning.
Identifiers: Externality models.

The concept of carrying capacity is examined in the context of regional environmental management. Historically, the notion of carrying capacity developed out of descriptions of the growth and dynamics of natural populations, and as such has been used as basis for range and forest management practices. Applied to human activities, however, the concept must be broadened to include the complex relations among resources infrastructure and productive activities, residuals, and societal preferences for quality of life within both the natural and human environments. Four dimensions of a human oriented carrying capacity--resource/production, environment/residuals, infrastructure/congestion, and production/societal relations--are described within normative and operational definitions of carrying capacity. Carrying capacity is then viewed from the standpoint of resources, regional structure, and regional models to see how it fits within the theoretical and analytical considerations related to these areas. A carrying capacity-based planning process is described where the forces for change in the region are analyzed in terms of impacts on identified carrying capacity indices and compared with desired levels to pinpoint areas in which capacities have been exceeded. Considerations in applying carrying capacity concepts in local/urban planning are discussed. (EPA)
W75-05069

EVALUATION OF ADJUSTMENT ASSISTANCE PROGRAMS WITH APPLICATION FOR POLLUTION CONTROL,
Bowdoin Coll., Brunswick, Maine.
For primary bibliographic entry see Field 5G.
W75-05074

BIBLIOGRAPHY OF WATER POLLUTION CONTROL BENEFITS AND COSTS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W75-05077

WEATHER MODIFICATION-RELATE UNCERTAINTIES IN ECOLOGICAL AND AGRICULTURAL SYSTEMS IN THE HIGH PLAINS: SCIENTIFIC APPRAISAL AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 3B.
W75-05118

MASS MEDIA HANDBOOK FOR WATER RESOURCES RESEARCH DIRECTORS,
Missouri Univ., Columbia. Coll. of Agriculture.
R. R. Kahle, and R. L. Lee.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 950, $3.25 in paper copy, $2.25 in microfiche. Completion Report SR166, December 1974, 14 p. OWRT X-127-MO(No. 3756)(3).

Descriptors: *Attitudes, *Information exchange, Social participation, *Water resources, *Communication, Surveys, Research, Planning, Decision-making, Evaluation, Photography, Methodology.
Identifiers: *Public relations, *Mass media, Information dissemination, Newspapers, Radio, Television.

Completion report results are expressed in pragmatic terms, information functions of Water Resource Research Centers and organizations are defined and tips to put them into practice are offered. The recommended approach is half informational/half public relations. Initially, the target public must be identified. A four step public relations process follows. Steps include (1) research - surveys, interviews, content analysis, questionnaires, semantic differential, Q-Methodology, etc.; (2) planning and decision-making; (3) communication; (4) evaluation and acceptance of the program. Characteristics of various media, including newspapers, radio, television, public speaking, and photography, are presented along with hints for their use. (See also W74-12192)
W75-05261

PROBLEMS AND OPPORTUNITIES IN INTERDISCIPLINARY RESEARCH: THE MOLYBDENUM PROJECT,
Colorado Univ., Boulder. Dept. of Physics and Astrophysics.
For primary bibliographic entry see Field 5G.
W75-05298

NATIONAL NEED - AN INDUSTRY VIEW OF RESEARCH,
AMAX Lead and Zinc, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 5G.
W75-05299

INFORMATION SYSTEMS IN ENVIRONMENTAL RESEARCH AND DECISION-MAKING,
Oak Ridge National Lab., Tenn.
G. U. Ulrikson, and E. D. Copenhaver.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Com-

mission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 732-745, 2 tab, 5 fig, 23 ref.

Descriptors: *Information retrieval, *Documentation, *Information exchange, *Decision making, Management, Data collections, Publications, Bibliographies, Environment.

The strategy and methodology of an information system in meeting user needs were discussed in terms of five major general types of environmental information needs. The first need cited was for bibliographic information. It was suggested that repackaging of information from large computer readable data bases produced by bibliographic services is extremely cost effective and expedient. The second information need was that of directories and inventories of current researchers and research projects. It was noted that both scientists and information processors are giving thought to the third need - factual information files - by considering development of a method for extracting and summarizing pertinent data from technical papers and reports without destroying the integrity of the data reported. The fourth need was for detailed unanalyzed numerical data that could be merged with other information for final assessment. Finally, it was noted that information systems can play a significant role in the evaluation of data and the subsequent preparation of reviews and state-of-the-art document. (See also W75-05277) (Pulliam-Vanderbilt)
W75-05301

THE EFFECT OF PARK USE ON SURFACE WATER QUALITY,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W75-05306

THE ECONOMIC AND ENVIRONMENTAL BENEFITS FROM IMPROVING ELECTRICAL RATE STRUCTURES,
Faucett (Jack) Associates, Inc., Chevy Chase, Md.
D. M. Sharefkin.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $2.55. Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-74-033, November 1974. 157 p, 3 fig, 46 tab, 8 ref. Program Element 1HA093 21AQL-03 EPA Contract 69-01-1850.

Descriptors: Electric Power, *Electric power rates, Economics, *Benefits, Evaluation, Environment, *Pricing.
Identifiers: *Cost savings, Load curve studies.

Quantitative estimates of the internal cost savings to be derived from changes in the pricing of electric power are devised and evaluated. The econometric literature on electricity demand is surveyed, and elasticity values are selected which are parameters for the overall benefit measures. A method for using reported utility data to estimate the cost of delivered power--at the system peak and off the system, and for each customer class--is devised. Data on five electric utilities used to make estimates of the potential benefits from improvements in the pricing of electric power, for each customer class in each system. The estimated potential benefits are sufficiently large to merit load curve studies by block for residential customers. Such studies are necessary preliminaries to a definitive assessment of the proposals for so called inversion. (EPA)
W75-05309

OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEM,
Universidad Simon Bolivar, Caracas (Venezuela). Departamento de Matematicas y Ciencia de la Computacion.
For primary bibliographic entry see Field 6A.
W75-05315

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ECONOMIC AND FINANCIAL ASPECTS OF WASTEWATER TREATMENT IN THE ST. FRANCOIS RIVER BASIN, QUEBEC - A PRELIMINARY ANALYSIS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 5D.
W75-04872

EXPECTATIONS FOR THE CLOSED WATER SYSTEM AND COST COMPARISON WITH EFFLUENT PURIFICATION (DIE ERWARTUNGEN AND DEN GESCHLOSSENEN WASSERKREISLAUF IM KOSTENVERGLEICH ZUR ABWASSERREINIGUNG),
Krofta Apparatebau (Gesellschaft) (West Germany).
For primary bibliographic entry see Field 5D.
W75-04944

ANALYSIS OF COST SHARING PROGRAMS FOR POLLUTION ABATEMENT OF MUNICIPAL WASTEWATER,
National Bureau of Standards, Washington, D.C. Inst. for Applied Technology.
For primary bibliographic entry see Field 5G.
W75-05076

THE ECONOMIC AND ENVIRONMENTAL BENEFITS FROM IMPROVING ELECTRICAL RATE STRUCTURES,
Faucett (Jack) Associates, Inc., Chevy Chase, Md.
For primary bibliographic entry see Field 6B.
W75-05309

DOLLAR GAIN TO TOP COST CLIMB IN 1975 SEWERAGE CONSTRUCTION.
For primary bibliographic entry see Field 5D.
W75-05325

6D. Water Demand

HYDROLOGIC ASPECTS OF A LOW FLOW WATER MANAGEMENT PROGRAM,
Washington State Dept. of Ecology, Olympia.
For primary bibliographic entry see Field 4A.
W75-04862

AN AGRICULTURAL IRRIGATION MODEL FOR A WATERSHED,
Washington State Univ., Pullman. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-05307

6E. Water Law and Institutions

HYDROLOGIC ASPECTS OF A LOW FLOW WATER MANAGEMENT PROGRAM,
Washington State Dept. of Ecology, Olympia.
For primary bibliographic entry see Field 4A.
W75-04862

IMPACT OF DETERGENT PHOSPHATE REDUCTIONS ON WATER QUALITY,
State University Coll., Buffalo, N.Y. Great Lakes Lab.
For primary bibliographic entry see Field 5C.
W75-04895

ENVIRONMENTAL PROTECTION IN THE FINNISH PULP AND PAPER INDUSTRY (UMWELTSCHUTZ IN DER FINNISCHEN ZELLSTOFF- UND PAPIERINDUSTRIE),
Finnish Pulp and Paper Research Inst., Helsinki.
For primary bibliographic entry see Field 5G.
W75-04949

NEW DEVELOPMENTS IN EFFLUENT LEGISLATION, ESPECIALLY LAWS GOVERNING EFFLUENT DISPOSAL (NEUERUNGEN AUF DEM ABWASSERRECHTS-SEKTOR -- INSBESONDERE ABWASSERABGABENGESETZ),
Industrie-Wasser-Umweltschutz e.V., Dueren (West Germany).
For primary bibliographic entry see Field 5G.
W75-04950

THE FEDERAL WATER POLLUTION CONTROL ACT AND FORESTRY,
National Forest Products Association, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04957

A LOOK AT THE NATIONAL PERMIT PROGRAM,
For primary bibliographic entry see Field 5G.
W75-04995

COMMENTS ON US EPA PROPOSED CRITERIA FOR WATER QUALITY,
Texas Univ. at Dallas, Richardson. Inst. for Environmental Sciences.
For primary bibliographic entry see Field 5G.
W75-05052

ANALYSIS OF COST SHARING PROGRAMS FOR POLLUTION ABATEMENT OF MUNICIPAL WASTEWATER,
National Bureau of Standards, Washington, D.C. Inst. for Applied Technology.
For primary bibliographic entry see Field 5G.
W75-05076

A REVIEW OF THE LITERATURE CONCERNING THE STEEL INDUSTRY AND POLLUTION. PART 1. THE BACKGROUND TO POLLUTION,
British Steel Corp., Sheffield (England). Information Services.
For primary bibliographic entry see Field 5G.
W75-05093

AN APPROACH TO THE CONTROL OF TOXIC SUBSTANCES,
Environmental Protection Agency, Washington, D.C. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W75-05300

CALIFORNIA ENVIRONMENTAL QUALITY ACT: INNOVATION IN STATE AND LOCAL DECISIONMAKING,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 6G.
W75-05314

6F. Nonstructural Alternatives

FLOOD PLAIN INFORMATION: KANSAS AND WAKARUSA RIVERS, LAWRENCE, KANSAS,
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04852

FLOOD PLAIN INFORMATION -- GREENS AND HALLS BAYOUS, HARRIS COUNTY, TEXAS,
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04853

FLOOD PLAIN INFORMATION: BRANDYWINE CREEK, NEW CASTLE COUNTY, DELAWARE,
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-04855

CROP INSURANCE AND INFORMATION SERVICES TO CONTROL USE OF PESTICIDES,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-05070

6G. Ecologic Impact Of Water Development

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT: INTERIM REPORT ON RESOURCE CAPABILITY,
Texas Univ. at Austin.
For primary bibliographic entry see Field 2L.
W75-04851

PLAN OF STUDY, YAKIMA RIVER BASIN, TASK III REPORT FOR THE YAKIMA BASIN WATER QUALITY MANAGEMENT PLAN,
CH2M/Hill, Bellevue, Wash.
Washington Department of Ecology, Olympia, October 1973. (Revised March 1974). 49 p, 1 fig, 4 tab.

Descriptors: *Water pollution control, Watershed management, *Water quality control, Planning, *Washington, Water Quality Act, Water pollution, Long-term planning, Ecology, Organic wastes, Municipal wastes, Farm wastes, Irrigation.
Identifiers: *Yakima River Basin.

The goal of the Water Quality Management Plan for the Yakima Basin is to maintain and enhance water quality of the lakes and streams in the basin while supplying an adequate supply of high-quality water domestic, municipal, industrial, recreation and irrigation purposes and to preserve, protect, and enhance the fish and wildlife resources. Various water uses in the Yakima River Basin include: irrigation, Salmonids propagation, boating and fishing, wildlife, municipal and industrial, esthetic enjoyment, water contact recreation, warm water fishing and power. The tasks included in the study plan involve: evaluation of the present water quality; development of basin physical, social and economic characteristics; municipal, industrial and domestic wastewater; irrigated agriculture; confined animals; fisheries and wildlife; recreation; forestry; urban runoff; mining, gas and oil wells, nuclear wastes, solid wastes and construction; effects of alternative management practices; monitoring surveillance, and preparation of the basin water quality management plan. (Poertner)
W75-04865

FRAMEWORK FOR THE PLAN OF STUDY, YAKIMA RIVER BASIN, TASK I REPORT FOR THE YAKIMA BASIN WATER QUALITY MANAGEMENT PLAN,
CH2M/Hill, Bellevue, Wash.
Washington Department of Ecology, Olympia, July 1973. 84 p, 2 fig, 1 tab, 190 ref.

Descriptors: *Planning, *Water quality control, Watershed management, *Washington, *Water pollution control, Irrigation, Farm wastes, Municipal wastes, Organic wastes, Water Quality Act, Legislation, Water pollution, Long-term planning, Ecology.
Identifiers: *Yakima River Basin.

A water quality management plan is being prepared for the Yakima River Basin to satisfy state and federal laws. The plan will be designed to control and abate water pollution and protect water quality for 30 years. The plan requires the completion of four tasks: Task 1, Framework for the Study; Task 2, Regionalization Study; Task 3, Plan of Study; and Task 4, the development of the Water Quality Management Plan. It appears that the following are the most serious water quality problems in the Yakima basin: high bacterial counts due to inadequately disinfected municipal wastes and runoff from improperly designed feedlots; high water temperatures due to agricultural return flows and natural causes; localized dissolved oxygen sags due to discharge of organic materials from wastes and return flows; low flows during certain times of the year below the major regulatory and diversion dams; turbidity caused by spring snowmelt runoff and irrigation practices; and aesthetically unpleasing conditions in the lower river due to low flows, high algal growth, and turbidity. (Poertner)
W75-04866

ENVIRONMENT U.S.A.: A GUIDE TO AGENCIES, PEOPLE, AND RESOURCES.

Descriptors: *Environment, *Human resources, *Organizations, Governments, Federal government, Local governments, Libraries, Education, Films, Conferences, Technical societies, Trade associations, Employment opportunities, Legislation, Labor unions, Bibliographies, Publications, Financing, Professional societies, Personnel, Labor, Management.
Identifiers: *Directories, Newspapers, Radio stations, Television stations, Consultants, Information sources.

This compilation lists environmental federal and state government agencies, private (citizens', trade, professional, and defunct) organizations, environmental consultants (classified by state), environmental officers of U.S. corporations (according to industry), environmental education programs, films, libraries, conferences, and information-disseminating newspapers, radio and television stations (classified by regions). Chapters are included on environmental employment, fundraising, law, and environmental concerns of labor unions. A subject-classified bibliography, a glossary of terms, an alphabetical index, and a classified index to federal agencies are appended. (Brown-IPC)
W75-04946

WORLD DIRECTORY OF ENVIRONMENTAL RESEARCH CENTERS.
For primary bibliographic entry see Field 10D.
W75-04971

AN ATTEMPT AT EVALUATING THE STABILITY OF AN AQUATIC ECOSYSTEM,
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 5C.
W75-05009

CARRYING CAPACITY IN REGIONAL ENVIRONMENTAL MANAGEMENT,
Utah State Univ., Logan.
For primary bibliographic entry see Field 6B.
W75-05069

ENGINEERING AND ECOLOGICAL EVALUATION OF ARTIFICIAL-ISLAND DESIGN, RINCON ISLAND, PUNTA GORDA, CALIFORNIA,
Blume (John A.) and Associates, Engineers, San Francisco, Calif.
For primary bibliographic entry see Field 8D.
W75-05117

WEATHER MODIFICATION-RELATE UNCERTAINTIES IN ECOLOGICAL AND AGRICULTURAL SYSTEMS IN THE HIGH PLAINS: SCIENTIFIC APPRAISAL AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Natural Resource Ecology Lab.
For primary bibliographic entry see Field 3B.
W75-05118

THE USE OF COLOR INFRARED AERIAL PHOTOGRAPHY IN DETERMINING SALT MARSH VEGETATION AND DELIMITING MAN-MADE STRUCTURES OF LYNNHAVEN BAY, VIRGINIA,
Old Dominion Univ., Norfolk, Va. Dept. of Biology.
For primary bibliographic entry see Field 2L.
W75-05126

EFFECTS OF ECONOMIC DEVELOPMENT UPON WATER RESOURCES (AN INTERINDUSTRY APPROACH TO MODELING ECONOMIC-ENVIRONMENTAL SYSTEMS),
Maryland Univ., College Park. Bureau of Business and Economic Research.
J. H. Cumberland, and B. N. Stram.
Available from the National Technical Information Service, Springfield Va. 22161 as PB-239 875, $5.25 in paper copy, $2.25 in microfiche.--Technical Report No 18, (1974). 105 p, 2 fig, 6 ref, 4 append. OWRT B-007-MD(1). 14-31-0001-3089.

Descriptors: *Model studies, Economics, *Pollutants, *Industrial wastes, Industries, *Environmental effects, *Management, Water resources development, *Economic impact, *Economic prediction.

A theoretical model is presented of interrelationships between economic and environmental models, together with basic data on 130 types of pollutants from 70 different industries. The purpose has been to provide data and analytic methods needed for improved environmental management. The first step was to devise a materials balance accounting structure in order to provide a coherent and complete format for emissions. This accounting structure was incorporated in a set of worksheets and instructions and distributed to relevant government agencies. The data collects with substantial internally developed data, have been used to create a simple, two-stage model of the emissions process. High priority in environmental research should now be assigned to the evaluation of damage functions associated with various levels of the emissions reported, and on the incremental costs of controlling these emissions. Integration of this additional kind of information with the data is necessary in order to provide the basis for improved environmental management.
W75-05174

INVESTIGATION OF ENRICHMENT OF MOLYBDENUM IN THE ENVIRONMENT THROUGH COMPARATIVE STUDY OF STREAM DRAINAGES, CENTRAL COLORADO,
Colorado Univ., Boulder. Dept. of Geological Science.
For primary bibliographic entry see Field 5B.
W75-05293

CONTROL OF ENVIRONMENTAL IMPACTS FROM ADVANCED ENERGY SOURCES,
Stanford Research Inst., Menlo Park, Calif.
E. E. Hughes, E. M. Dickson, and R. A. Schmidt.
Environmental Protection Agency, Technology Series, Report EPA-600/2-74-002, p 326, March 1974. 3 fig, 23 tab, 17 ref, 6 append. Program Element 1AB013, EPA Contract 68-01-0483.

Descriptors: *Environmental control, Energy technology, *Air pollution, *Geothermal energy, Oil shales, Solid wastes, Hydrogen.
Identifiers: *Coal gasification, *Environmental impact, *Solar energy, *Hydrogen energy sources, *Energy sources.

The technology and environmental effects associated with production of energy from new or advanced sources are reviewed. These include solar, geothermal, oil shale, solid wastes, underground coal gasification, and hydrogen energy sources. Projections to the year 2000 of levels of energy production from the first four of these sources are presented. Environmental impacts on air and water quality, and land use are derived per unit of energy. Levels of pollutant emissions and other environmental effects of the development of these advanced energy sources are projected. Impacts likely to require control measures are identified. Subjects for research and development directed toward control of environmental impacts are recommended. These recommendations are incorporated into a research and development plan. Approximate priority assignments derived from consideration of the timing of development and the importance and degree of definition of the identified environmental effects are given. (EPA)
W75-05313

CALIFORNIA ENVIRONMENTAL QUALITY ACT: INNOVATION IN STATE AND LOCAL DECISIONMAKING,
Center for California Public Affairs, Claremont.
T. C. Trzyna, and A. W. Jokela.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $2.00. Environmental Protection Agency Socioeconomic Studies Series EPA-600/5-74-023, October 1974. p 125, 18 ref, 2 append. EPA Program Element 1HA095, Contract 68-01-1818.

Descriptors: California, *Legislation, Legal aspects, *Decision making, *Administrative agencies, Organization, State government, Local governments, Environment.
Identifiers: *California environmental quality act, *Environmental impact.

The California Environmental Quality Act of 1970 requires State and local agencies to prepare an environmental impact report on public and private projects that may have a significant effect on the environment. The development and current status of California's environmental impact assessment program is described. CEQA's greatest impact has been on private projects permitted by cities and counties. In many localities, environmental impact reports clearly influence decisions on such permits. Still, some State and local agencies are not fully complying with CEQA, and the act's implementation is hampered by the lack of a State agency with authority and resources to enforce it. Based on California's experience, some general recommendations are made for other States considering adopting similar requirements. (See also W74-10527) (EPA)
W75-05314

7. RESOURCES DATA

7A. Network Design

HYDROLOGICAL DATA BANK - PRESENT STATUS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W75-04882

7B. Data Acquisition

INTERLABORATORY QUALITY CONTROL STUDY NO 6: SPECIFIC CONDUCTANCE, PH, COLOUR AND RESIDUE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2K.
W75-04887

A WATER BALANCE RECORDER FOR HYDROCLIMATIC AND AGROCLIMATIC MEASUREMENT OF PRECIPITATION AND EVAPORATION,
For primary bibliographic entry see Field 2D.
W75-04914

REMOTE SENSING POTENTIALS FOR RESOURCE MANAGEMENT,
Purdue Univ., Lafayette, Ind. Dept. of Forestry and Conservation.
For primary bibliographic entry see Field 5A.
W75-04922

AN AUTOMATIC UNDERWATER CAMERA SYSTEM,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W75-05048

A SUBMERSIBLE AUTOMATIC DISSOLVED OXYGEN-TEMPERATURE MONITORING SYSTEM,
Environmental Protection Agency, Fairview Park, Ohio. Ohio District Basin Office.
For primary bibliographic entry see Field 5A.
W75-05049

METHODS FOR STUDIES OF PLANKTON (IN SWEDISH),
L. Hernroth.
Fauna Flora, Vol 67, No 2, p 86-89, 1972, Illus.
Identifiers: Ecological studies, *Plankton, *Methodology, Network, *Zooplankton, *Sampling.

As a first step, a net of stations covering the research area have to be established. Horizontal tools covering a large area are used for collections of greater quantities of zooplankton. The disadvantage of horizontal sampling is that the method is not good for ecological studies. It is preferable to use vertical tools to take plankton samples because of their simplicity and the better picture they give of the fauna at the locality. Depending on the purpose of the survey, different mesh sizes are used. To decide where in the column of water the different organisms live a 'plankton collector' is used. A sample of plankton has little value if it is not complemented with hydrographic data.--Copyright 1974, Biological Abstracts, Inc.
W75-05061

REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT - LAFOURCHE PARISH, LOUISIANA,
Louisiana State Univ., Baton Rouge. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 4A.
W75-05095

A PROCEDURE FOR AUTOMATED LAND USE MAPPING USING REMOTELY SENSED MULTISPECTRAL SCANNER DATA,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05096

OPTIMIZING THE MEASUREMENT OF CONVECTIVE RAINFALL IN FLORIDA,
National Oceanic and Atmospheric Administration, Boulder, Colo. Weather Modification Program Office.
For primary bibliographic entry see Field 2B.
W75-05097

DEVELOPMENT OF A FIXED SITE SURFACE FILM OIL SAMPLER,
Curtis-Le Vantine and Associates, Tarzana, Calif.
For primary bibliographic entry see Field 5A.
W75-05099

DEVELOPMENT OF A TWO-CHANNEL LINEAR DISCRIMINANT FUNCTION FOR DETECTING AND IDENTIFYING SURFACE WATER USING ERTS-1 DATA.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05103

EVALUATION OF COMPUTER-AIDED PROCEDURE FOR DETECTING SURFACE WATER.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05104

USE OF REMOTE SENSING IN AGRICULTURE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
D. E. Pettry, N. L. Powell, and M. E. Newhouse.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-26876, $6.25 in paper copy, $2.25 in microfiche. Report No NASA CR-62098, January 1974. 139 p, 29 fig, 19 tab, 100 ref, 1 append. NASA Contract No NAS6-1863.

Descriptors: *Remote sensing, *Agriculture, *Aerial photography, On-site data collections, Bays, Measurement, Evaluation, Mapping, Estuaries, Monitoring, Chesapeake Bay, Plant diseases, Soils.
Identifiers: Cylindrocladium black rot disease.

A review of the literature dealing with remote sensing related to agriculture revealed that most of the related literature was no more than five years old. Comparatively little research involving agricultural remote sensing had been conducted in the humid eastern Coastal Plain section of the United States. Factors affecting multispectral photography and thermal infrared recordings related to the energy reflection of plants and soils were studied. Remote sensing techniques were refined for crop, tree species and soil identification. The detection of plant diseases and insect and pollution damage was also studied. From August 1969 through September 1973, 29 remote sensing flights were flown over the Virginia Truck and Ornamentals Research Station at Painter, Virginia

Ground truth data of the site were collected during each flight. Imagery data collected included black and white infrared, color infrared, and color photographs. Soils on the research station were evaluated and a detailed soil map was prepared. A forest type map was prepared for the wooded area surrounding the research station. An environmental monitoring station was set up to measure soil temperature, air temperature (wet and dry bulb), wind speed and direction, and solar radiation. The information from this monitoring station permited relationship between environmental factors and image quality of remote sensing overflights to be established. (Sims-ISWS)
W75-05107

KANSAS ENVIRONMENTAL AND RESOURCE STUDY: A GREAT PLAINS MODEL,
Kansas Univ./Center for Research, Inc., Lawrence.
H. L. Yarger, and J. R. McCauley.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-34743, $4.25 in paper copy, $2.25 in microfiche. Report No 2265-10, March 24, 1974. 49 p, 51 fig, 16 ref. NAS5-21822 Task 5.

Descriptors: *Remote sensing, Surface waters, *Turbidity, Water quality, *Reservoirs, Suspended solids, Dissolved solids, Chlorophyll, Monitoring, Satellites(Artificial), Aerial photography, *Kansas, *Great Plains, *Model studies, *Pollutant identification.
Identifiers: *ERTS-1, Multispectral scanner.

The major reservoirs in Kansas were studied to determine the feasibility of monitoring fresh water resources by satellite. Two reservoirs, Tuttle Creek and Perry, were the object of intensive study to determine the properties of reservoirs which control the spectral intensity of reflected sunlight as detected by the ERTS-1 sensors. Water samples were collected from these two lakes concurrent with satellite overpass and were analyzed to determine the amount of suspended solids, chlorophyll content, and concentrations of phosphate, nitrate, and potassium ions. In addition, water temperature and turbidity at each sample site were measured. ERTS images in four spectral bands (green, red, red-infrared, and infrared) were regularly received for each satellite overpass of Kansas reservoirs. ERTS MSS ratios derived from computer compatible tapes were very effective for quantitative detection of suspended solids up to at least 900 ppm. The relatively high inorganic suspended solids, characteristic of midcontinent reservoirs, dominated the reflected energy present in the four MSS bands. Dissolved solids concentrations up to 500 ppm and algal nutrients up to 20 ppm were not detectable. The MSS5/MSS4 ratio may be weakly correlated with total chlorophyll above approximately 8 micrograms per liter. (Sims-ISWS)
W75-05110

THREE-DIMENSIONAL SUBSURFACE DELINEATION VIA A NOVEL METHOD FOR DETERMINING THE SUBSURFACE ELECTRICAL PROFILE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2F.
W75-05116

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME II - DESIGN REPORT.
Aerojet Electrosystems Co., Azusa, Calif.
For primary bibliographic entry see Field 5A.
W75-05119

DEVELOPMENT OF A PROTOTYPE AIRBORNE OIL SURVEILLANCE SYSTEM - VOLUME III - SUBSYSTEM SPECIFICATIONS.
Aerojet Electrosystems Co., Azusa, Calif.
For primary bibliographic entry see Field 5A.
W75-05120

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME I,
Tennessee Univ., Knoxville.
B. A. Tschantz, J. D. Womak, J. M. Prochaska, H. R. DeSelm, and C. C. Amundsen.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 484, $7.25 in paper copy, $2.25 in microfiche. Report No. AFCRL-TR-73-0118(I), December 1972. 192 p, 62 fig, 10 tab, 128 ref. AFCRL Contract F19628-69-C-0016.

Descriptors: *Remote sensing, *Photography, *Water resources, *Civil engineering, *City planning, Ecology, Agriculture, Agricultural engineering, Agronomy, Forestry, Electrical engineering, Water quality, Thermal pollution, Land use, Land classification, Geomorphology, Plant groupings, Plant diseases, Soil moisture, Analytical techniques, Data processing.
Identifiers: *Thermal imagery, Multiband photography, Spectral signature, Botany, Agricultural biology.

The general purpose of the THEMIS Contract at the University of Tennessee was to use a broad interdisciplinary approach toward the application of remote sensing for studying environmental systems. Emphasis was on the use of photography and thermal imagery as tools for quickly retrieving relevant information from expansive and complex environs with aerial platforms such as aircraft, satellites, and towers. Volume 1 summarized the efforts in the disciplines of water resources, planning, botany and ecology, agriculture, and electrical engineering. Remote sensing application studies include thermal and water quality effects in streams and lakes, urban and regional land-use change detection, prediction of landscape (site and cover) parameters, identification of agricultural plant species, detection of plant disease, identification of agricultural soil series, evaluation of soil moisture conditions, and development of remote sensing data processing techniques. (See also W75-05124 and W75-05125) (Sims-ISWS)
W75-05123

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME II,
Tennessee Univ., Knoxville.
R. W. Peplies, and B. A. Tschantz.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 485, $5.25 in paper copy, $2.25 in microfiche. Report No. AFCRL-TR-73-0118(II), December 1972. 109 p, 29 fig, 7 tab, 31 ref, 1 append. AFCRL Contract F19628-69-C-0016.

Descriptors: *Remote sensing, *Photography, Land use, Economics, Population, Regional analysis, Data collections, Analytical techniques, Information retrieval.
Identifiers: *Geography, Thermal imagery, Multiband photography.

Volume II represents the subcontract efforts of the Geography Department at East Tennessee State University. Research was directed toward specific topics of terrain, economic, cultural, and population characteristics of landscapes which are detectable via remote sensing from low and high flying aircraft and also orbiting spacecraft. Remote sensing from different platform heights provides an advantage for geographic data acquisition purposes in terms of three basic modes: (1) spectral (ultraviolet through microwave bands, density level slicing, and multiband photography); (2) spatial (scale and resolution studies); and (3) temporal (short- and long-term duration studies). An appendix contains a bibliography of publications, papers, technical abstracts, theses, dissertations, and other presentations generated under the THEMIS project. (See also W75-05123 and W75-05125) (Sims-ISWS)
W75-05124

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEMS STUDIES, VOLUME III,
Tennessee Univ., Knoxville. Dept. of Geology.
G. M. Clark.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 486, $4.75 in paper copy, $2.25 in microfiche. Report No. AFCRL-TR-73-0118(III), June 1973. 83 p, 24 fig, 14 tab, 38 ref, 1 append. AFCRL Contract F19628-69-C-0016.

Descriptors: *Remote sensing, *Photography, *Landslides, Water resources, City planning, Ecology, Agronomy, Forestry, Electrical engineering, Water quality, Geomorphology, Plant groupings, Analytical techniques, Data processing, Floods.
Identifiers: *Geography, *Botany, Thermal imagery, Spectral signatures, Multiband photography.

Volume III summarized research results in geography, geology, and botany. Remote sensing applications in the detection of revegetating natural and human-related rapid slope mass movements of the class debris slides/debris flows include debris slide scar, debris flow tract, and debris fan and floodplain modification detection and mapping. Field research to establish ground conditions for remote sensing missions also shed light on movement mechanisms, post storm events, and sediment volumes involved in slide scar movements. An appendix contains a bibliography of publications, papers, technical abstracts, theses, and dissertations generated under the THEMIS project. (See also W75-05123 and W75-05124) (Sims-ISWS)
W75-05125

THE USE OF COLOR INFRARED AERIAL PHOTOGRAPHY IN DETERMINING SALT MARSH VEGETATION AND DELIMITING MAN-MADE STRUCTURES OF LYNNHAVEN BAY, VIRGINIA,
Old Dominion Univ., Norfolk, Va. Dept. of Biology.
For primary bibliographic entry see Field 2L.
W75-05126

TO DEVELOP A LAND USE-PEAK RUNOFF CLASSIFICATION SYSTEM FOR HIGHWAY ENGINEERING PURPOSES,
Maine Dept. of Transportation, Augusta. Bureau of Highways.
For primary bibliographic entry see Field 4A.
W75-05130

APPLICATION OF REMOTE SENSING TO HYDROLOGY.
IBM Federal Systems Div., Huntsville, Ala.
For primary bibliographic entry see Field 2A.
W75-05131

RESEARCH IN REMOTE SENSING OF AGRICULTURE, EARTH RESOURCES, AND MAN'S ENVIRONMENT,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
D. A. Landgrebe.
Available from the National Technical Information Service, Springfield, Va. 22161, as NASA CR 138885, $4.25 in paper copy, $2.25 in microfiche. Final Report, June 1974. 66 p, 23 fig, 3 tab, 1 append. NASA Grant NGL 15-005-112.

Descriptors: *Remote sensing, *Agriculture, *Satellites(Artificial), *Environment, Crops, Plant diseases, Geologic mapping, Mapping, Soils,

Forests, Data transmission, Water resources, Analysis, Bibliographies.

Satellite data and other remotely sensed data were applied to various problems in agriculture, earth resources, and environment. Techniques were developed for land use mapping, crop mapping, detection of corn blight, soil mapping, and geologic mapping. Useful applications of remote sensing were developed in the areas of forest and water resources. An appendix contains an annotated bibliography of the 160 reports that were previously provided to NASA. (Sims-ISWS)
W75-05132

UTILIZING ERTS IMAGERY TO DETECT PLANT DISEASES AND NUTRIENT DEFICIENCIES, SOIL TYPES AND SOIL MOISTURE LEVELS,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 3F.
W75-05133

DEVELOPMENT OF A COMPUTER-AIDED PROCEDURE FOR THE NATIONAL PROGRAM OF INSPECTION OF DAM.,
National Aeronautics and Space Administration, Houston, Tes. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05134

HYDROLOGICAL BASIS FOR FORECASTING AND CALCULATING RUNOFF BY SPACE IMAGES OF THE EARTH'S SURFACE,
Kanner (Leo), Associates, Redwood City, Calif.
For primary bibliographic entry see Field 4A.
W75-05135

SOIL-WATER PRESSURE DURING INTERMITTENT SIMULATED RAIN APPLICATION MEASURED WITH A NEW RAPID-RESPONSE TENSIOMETRIC TECHNIQUE,
Agricultural Research Service, Morris, Minn. North-Central Soil Conservation Research Center.
For primary bibliographic entry see Field 2G.
W75-05181

7C. Evaluation, Processing and Publication

FLOOD PLAIN INFORMATION: KANSAS AND WAKARUSA RIVERS, LAWRENCE, KANSAS,
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04852

FLOOD PLAIN INFORMATION -- GREENS AND HALLS BAYOUS, HARRIS COUNTY, TEXAS,
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04853

FLOOD PLAIN INFORMATION: BRANDYWINE CREEK, NEW CASTLE COUNTY, DELAWARE,
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W75-04855

FLOOD ESTIMATION FOR URBAN AND RURAL CATCHMENTS,
Snowy Mountains Engineering Corp., Cooma (Australia). Hydrology Branch.
For primary bibliographic entry see Field 4A.
W75-04856

STREAM PROGRAMMER'S MANUAL.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
January 1974, 366 p, 110 fig.

Descriptors: *Computer programs, *Streamflow, *Data storage and retrieval, Analytical techniques, Data processing, Publications.
Identifiers: *Programming manuals, Streamflow computations.

The purpose of the STREAM computer program is to automate the computation of streamflow records by compiling daily discharges and gauge heights from data on cards obtained with the d-mac Pencil Follower, i.e., x-y digitizer. Detailed instructions for digitizing water level recorder charts on a Pencil Follower to obtain punched cards containing x-y co-ordinates can be obtained from the Water Resources Branch manual 'Automated Streamflow Computations' by Mr. K.W. Stewart (January 15, 1974). With these cards and the card decks defining the stage-discharge relationship, gauge and shift corrections and updating corrections, the computer program STREAM can be used to obtain daily mean gauge heights and discharges along with the appropriate symbols. This manual provides a detailed description of the STREAM computer program. (Environment Canada)
W75-04874

HYDROLOGICAL DATA BANK - PRESENT STATUS,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Resources Branch, Report No 33, 1974, 7 ref, 10 fig, 1 table, 13 p.

Descriptors: *Data storage and retrieval, *Hydrologic data, Basic data collections, Statistical models, Runoff, Drainage.
Identifiers: *Hydrometeorological data, Hydrometric networks, Data banks, Information, Processing.

Recent hydrometric network planning studies by the Department of the Environment have resulted in an initial Hydrometeorologic-Physiographic Data Bank. Conjunctive analysis of these data by means of deterministic and statistical models can permit estimation of data at ungauged areas, thus enhancing the information content of the observed data. (Environment Canada)
W75-04882

RESEARCH PROJECTS IN GLACIOLOGY - 1974,
Department of the Environment, Ottawa, (Ontario). Inland Water Directorate.
For primary bibliographic entry see Field 2C.
W75-04884

EXTENSION OF HYDROLOGIC PROCESS MODELING TO TOTAL WATERSHED MODELING,
Agricultural Research Services, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 2A.
W75-04924

ON THE COLLECTION, THE ANALYSIS AND THE SYNTHESIS OF SPATIAL RAINFALL DATA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-04931

HANDBOOK OF ENVIRONMENTAL CONTROL. (1) AIR POLLUTION. (2) SOLID WASTE. (3) WATER SUPPLY AND TREATMENT. (4) WASTEWATER: TREATMENT AND DISPOSAL,
Minnesota Univ., Minne. Div. of Environmental Health.
For primary bibliographic entry see Field 5D.
W75-04945

SIMULATION OF HYPOTHETICAL OFFSHORE PETROLEUM DEVELOPMENTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 3E.
W75-05033

ANALYSIS OF OIL SPILL STATISTICS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5C.
W75-05034

OIL SPILL TRAJECTORY STUDIES FOR ATLANTIC COAST AND GULF OF ALASKA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 5B.
W75-05035

IMPLEMENTATION OF A COMPUTER-BASED INFORMATION SYSTEM FOR MASS SPECTRAL IDENTIFICATION,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5A.
W75-05085

A PROCEDURE FOR AUTOMATED LAND USE MAPPING USING REMOTELY SENSED MULTISPECTRAL SCANNER DATA,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
S. L. Whitley.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TR R-434, $3.25 in paper copy, $2.25 in microfiche. NASA Technical Report No R-434, January 1975. 44 p, 10 fig, 2 tab, 10 ref, 4 append.

Descriptors: *Remote sensing, *Land use, *Data processing, Computers, Satellites(Artificial), Aerial photography, Data collections, Analytical techniques, *Mapping.

A system of processing remotely sensed multispectral scanner data by computer programs to produce color-coded land use maps for large areas was described. The procedure was explained, the software and the hardware were described, and an analogous example of the procedure was presented. Detailed descriptions of the multispectral scanners currently in use were provided together with a summary of the background of current land use mapping techniques. The data analysis system used in the procedure and the pattern recognition software used were functionally described. Current efforts by the NASA Earth Resources Laboratory to evaluate operationally a less complex and less costly system also were discussed. (Sims-ISWS)
W75-05096

DEVELOPMENT OF A TWO-CHANNEL LINEAR DISCRIMINANT FUNCTION FOR DETECTING AND IDENTIFYING SURFACE WATER USING ERTS-1 DATA.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32793, $3.75 in paper copy, $2.25 in microfiche. Report No JSC-08450, August 1973. 30 p, 7 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), *Surface waters,

*Computer programs, Testing, Data processing, Analytical techniques.
Identifiers: *ERTS-1, Multispectral scanner.

The development of a method for detecting surface water by using ERTS-1 multispectral scanner digital data was described. The several computer programs for the processing multispectral data which were available were described, along with the manner in which these programs were used in this effort. The use of the LARSAA program to test and demonstrate the discriminant function was explained in detail. The discriminant function itself was later implemented in an operational program which performs only those specific operations necessary to test each data point for an indication of surface water in the scene. Several possible sources of difficulty in the use of the function were identified and suggestions were made for avoiding or correcting those difficulties. (Sims-ISWS)
W75-05103

EVALUATION OF COMPUTER-AIDED PROCEDURE FOR DETECTING SURFACE WATER.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32792, $4.25 in paper copy, $2.25 in microfiche. Report No JSC-08453, August 1973. 52 p, 7 fig, 1 tab, 4 ref, 4 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Surface waters, *Computer programs, Evaluation, Data processing, Performance, Analytical techniques.
Identifiers: *ERTS-1, Multispectral scanner.

Results are described of a detailed evaluation of a computer-aided procedure for processing ERTS-1 data to detect and locate surface water for the National Program for the Inspection of Dams (NPID). The procedure was evaluated by using data from a study area in the vicinity of the Lake Somerville area in Washington County, Texas. The result of the evaluation was that the use of the procedure failed to provide acceptable performance results. The success criteria established was that 90% of all areas of surface water of 10 acres or more had to be correctly identified and located with a frequency of false detection of 10% or less. The result from the procedure evaluation was that 100% of all areas of surface water of 10 acres or more were correctly detected, but the frequency of false detection was approximately 96.8%. Appendixes contain detailed descriptions of the computer programs and procedures, and a Fortran IV program listing. (Sims-ISWS)
W75-05104

DISTRIBUTION OF MEAN MONTHLY PRECIPITATION AND RAINFALL INTENSITIES,
Army Engineer Topographic Lab., Fort Belvoir Va. Geographic Sciences Lab.
For primary bibliographic entry see Field 2B.
W75-05105

USE OF REMOTE SENSING IN AGRICULTURE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 7B.
W75-05107

A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME I: SUMMARY REPORT.
IBM Federal Systems Div., Huntsville, Ala.
For primary bibliographic entry see Field 2A.
W75-05108

A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME II: SUPPORTING TECHNICAL DETAILS.
IBM Federal Systems Div., Huntsville, Ala.
For primary bibliographic entry see Field 2A.
W75-05109

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME I,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 7B.
W75-05123

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEM STUDIES, VOLUME II,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 7B.
W75-05124

REMOTE SENSOR UTILIZATION FOR ENVIRONMENTAL SYSTEMS STUDIES, VOLUME III,
Tennessee Univ., Knoxville. Dept. of Geology.
For primary bibliographic entry see Field 7B.
W75-05125

A PILOT PROJECT OF WEATHER MODIFICATION FOR THE SAN JUAN MOUNTAINS OF THE COLORADO RIVER BASIN,
Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 3B.
W75-05127

GEOECOLOGY INFORMATION SYSTEM, PART I. BIOGEOGRAPHIC MAPPING OF SPECIES RANGES: DOCUMENTATION OF INPUT AND DATA CHECKING PROCEDURE FOR COMPUTER STORAGE AND RETRIEVAL OF INFORMATION,
Oak Ridge National Lab., Tenn.
R. K. Schreiber, R. L. Stephenson, F. G. Goff, D. C. West, and G. Muse.
Available from the National Technical Information Service, Springfield, Va 22161 as EDFB IBP 74-5, $5.45 in paper copy, $2.25 in microfiche. Report No. EDFB-IBP 74-5, December 1974. 44 p, 6 fig, 13 ref, 4 append. AEC Contract W-7405-eng-26.

Descriptors: *Data storage and retrieval, *Computer programs, *Data processing, Data collections, Information retrieval, Mapping, Ecological distribution, Ecology, Geology, Biology.

Rationale was presented for the design and development of a regional scale data bank for biogeographical information. Counties were used as the basic cell for storage and retrieval of data. Application of the described procedure for manual digitization and coding of species range maps was made by using tree species found in Little's Atlas of United States Trees. The computer program for storage and retrieval of this spatial data was documented. An appendix contains a program listing of the PL1 language program. (Sims-ISWS)
W75-05129

APPLICATION OF REMOTE SENSING TO HYDROLOGY.
IBM Federal Systems Div., Huntsville, Ala.
For primary bibliographic entry see Field 2A.
W75-05131

RESEARCH IN REMOTE SENSING OF AGRICULTURE, EARTH RESOURCES, AND MAN'S ENVIRONMENT,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 7B.
W75-05132

DEVELOPMENT OF A COMPUTER-AIDED PROCEDURE FOR THE NATIONAL PROGRAM OF INSPECTION OF DAM.,
National Aeronautics and Space Administration, Houston, Tes. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va. 22161, as N74-32794, $3.75 in paper copy, $2.25 in microfiche. Report No JSC-08449, August 1973. 43 p, 8 fig, 8 tab, 1 append.

Descriptors: *Remote sensing, *Surface waters, Satellites(Artificial), *Computer programs, Data processing, Evaluation, On-site investigations, Analytical techniques, *Dams.
Identifiers: *ERTS-1, Multispectral scanner.

An effort was undertaken to determine the utility of ERTS-1 MSS data, together with automatic data processing techniques, to detect and locate surface water pursuant to legislation within the jurisdiction of the U.S. Corps of Engineers, and transfer the related technology to the Texas Water Rights Commission. For this purpose, a test site was selected, ERTS-1 MSS and ancillary data obtained, and existent classification programs applied. A linear discriminant function was developed. The results were evaluated for potential candidates for a transferable procedure. A computer-aided technique with a linear discriminant function was selected and recommended. Evaluation of the selected computer-aided procedure for the test site resulted in the detection of 100% of areas of surface water 10 acres or greater in areal extent and the geographic location of areas classified as water to a positional accuracy of 1000 feet or closer. (Sims-ISWS)
W75-05134

DISCHARGE OF SELECTED RIVERS OF CANADA.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
For primary bibliographic entry see Field 2E.
W75-05136

DISCHARGE OF SELECTED RIVERS OF CANADA, SUPPLEMENT 1.
International Hydrological Decade, Ottawa (Ontario). Canadian National Committee.
For primary bibliographic entry see Field 2E.
W75-05137

A STUDY OF RAINFALLS RECORDED AT THE CHERRAPUNJI OBSERVATORY,
Institute of Tropical Meteorology, Poona (India).
For primary bibliographic entry see Field 2B.
W75-05158

CONTINUOUS HYDROLOGICAL TIME-SERIES DISCRETIZATION,
Technical Univ. of Lisbon (Portugal). Instituto Superior Tecnico.
For primary bibliographic entry see Field 2A.
W75-05165

MICROWAVE MAPS OF THE POLAR ICE OF THE EARTH,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 2C.
W75-05170

A MODEL TO STUDY THE EFFECTS OF TIME-VARIABLE POLLUTANT LOADS ON STREAM QUALITY,
Saint Catharines (Ontario).
For primary bibliographic entry see Field 5B.
W75-05187

AGRICULTURAL LAND USE IN THE POUDRE VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-05260

FLOOD FLOW FREQUENCY TECHNIQUES,
Texas Univ. at Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 2E.
W75-05262

INVESTIGATION OF ALTERNATIVE PROCEDURES FOR ESTIMATING GROUND-WATER PARAMETERS,
Water Resources Engineers, Inc., Walnut Creek, Calif.
For primary bibliographic entry see Field 4B.
W75-05263

GTWS: GEORGIA TECH WATERSHED SIMULATION MODEL,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05271

AN AGRICULTURAL IRRIGATION MODEL FOR A WATERSHED,
Washington State Univ., Pullman. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-05307

8. ENGINEERING WORKS

8A. Structures

CITY OF TORONTO SEWER SYSTEM,
Toronto Dept. of Public Works (Ontario).
R. M. Bremner.
Progress Report No 1, Supplement A, March 30, 1973. 3 p, 4 fig, 3 tab.

Descriptors: *Hydraulic design, *Dynamic programming, *Sewerage, *Urban drainage, *Storm drains, *Combined sewers, Hydraulic engineering, Computer programs, Design flow, Hydraulic structures, Hydraulic systems, Systems analysis, Storage capacity, Pipelines, Canada, Sewers, Backwater, Cities, Water pollution control, Flood control.
Identifiers: *Toronto, Sewer surcharge, Combined sewer overflows.

Recommendations are made to the Toronto Committee on Public Works for modification of the original plans for a system-wide sewer improvement program in the City. A report (See W73-06460) by the Public Works Commissioner, dated March 18, 1970, included descriptions and scheduling of future work planned and work completed to that date. Since that date, computer programs have been developed for use in making hydrograph analyses of large sewer networks. One of these programs computes in detail the flow conditions in the sewer system at any time following the commencement of rainfalls of differing intensities. The effect of the storage volume capacity and the effect of various surcharges on the system are taken into account in a dynamic fashion in this analysis. Using this computer program, City engineers and engineering consultants in Munich, Germany have made revised hydraulic designs of the North Toronto Sewer System. The modifications of the original designs should result in a savings of $1,320,000 in construction costs. The work involves construction of new road storm sewers and modification of cross-connections of existing combined sewers. Tables and maps identifying the design modifications are included. (Poertner)
W75-04864

THE NEATH VALLEY SEWERAGE SCHEME.
For primary bibliographic entry see Field 5D.
W75-05000

WATER RESOURCES DEVELOPMENT, 1950-1965, AN INTERNATIONAL BIBLIOGRAPHY,
Center of Scientific and Technological Information, Tel Aviv (Israel). Library Services.
For primary bibliographic entry see Field 10B.
W75-05154

CHAO PHYA RIVER TRAINING WORKS,
Royal Irrigation Dept., Bangkok (Thailand).
J. Tejasen, and M. Remillieux.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 241-250. 3 fig.

Descriptors: *Navigable waters, *River training, *Channel improvement, *Dredging, *Model studies, Dams, Shoals, Locks, Channel erosion, Rivers, Streamflow, Dry seasons, Bed load, Groins(Structures), Canals, Bank protection, Regulated flow, Discharge(Water).
Identifiers: *Bottom paneling, Rock blasting, *Thailand(Chao Phya River).

Improvement of navigation on the Chao Phya River, Thailand, is presently obtained by rock blasting, mechanical dredging, bottom paneling, and discharge regulation. A scale model of a characteristic reach of the river was constructed to study methods of improving navigation conditions. The model represented the river over 5 km at 1/100 horizontal scale and 1/25 vertical scale with a movable bed. Three shoals were studied. Dredging and paneling were studied simultaneously with the model. The use of the bottom panel techniques in the actual river training works was described. It was concluded that for bottom panels it was necessary to be very attentive to the hydraulic limit conditions. If good conditions usually linked with the curve of the bank do not exist at the upstream part, they must be created by means of groins extending from the upstream bottom panels up to the bank. In some places these groins are connected with permeable bank protection groins. It is planned to extend navigation improvement to the sea so that an inland waterway of about 700 km will be available. (See also W75-05192) (Schicht-ISWS)
W75-05213

8B. Hydraulics

INTERIOR DRAINAGE STUDY, PUMPING PLANT B AREA, DALLAS FLOODWAY PROJECT,
URS Forrest and Cotton, Inc., Dallas, Tex.
Dallas, Texas, Department of Public Works, March 1971. 62 p, 30 fig, 29 tab.

Descriptors: *Storm runoff, *Drainage programs, *Flood control, *Detention reservoirs, *Urban runoff, Texas, Storm drains, Drainage engineering, Runoff, Sumps, Planning.
Identifiers: *Dallas(Texas).

The Corps of Engineers completed its investigations for interior drainage improvements in about 1953 and since that date, the topography of the Pumping Plant 'B' Area has been changed appreciably as developers have graded or filled low areas so that new construction would be above publicized flood levels. In view of the topographic changes, new aerial photographs were flown and topographic maps prepared to show 1970 conditions. Field surveys were made to determine the dimensions and controlling elevations of the drainage facilities affecting the flow of storm waters to the pumping stations and cross sections were run to check the sump storage areas. A field examination was also made of the existing pumping stations. The investigations showed that a high degree of development has taken place in all of the area contributing runoff to the existing pumping stations which results in a greater volume of water to be stored or discharged into the floodway. The increase in impervious areas brought about by development has also reduced the time of concentration of runoff into the sumps (stormwater detention areas) which further aggravates the flood problem. The investigations showed, in addition, that the sump storage capacity below design high water levels adopted by the Corps of Engineers had been decreased by about 43 percent by the filling of low areas for development. (Poertner)
W75-04859

INTERIOR DRAINAGE STUDY, WEST LEVEE, DALLAS FLOODWAY PROJECT,
URS Forrest and Cotton, Inc., Dallas, Tex.
Dallas, Texas Department of Public Works, September 1973. 78 p, 40 fig, 34 tab.

Descriptors: *Urban runoff, *Storm runoff, *Levees, *Detention reservoirs, *Flood control, *Drainage programs, Texas, Sumps, Urbanization, Storm drains, Drainage engineering, Runoff, Planning.
Identifiers: *Dallas(Texas).

The City of Dallas has adopted a 100-year frequency storm for design of drainage facilities throughout the City and it appears appropriate to consider the need for additional facilities for the West Levee Area on this basis. Runoff from the drainage area behind the floodway levee is stored in sump areas consisting of the old river channels, levee borrow ditches, and drainage ditches until it can be pumped into the floodway or discharged by gravity flow through the levee. The topography of the West Levee Area rises an average of about 1.2 feet per mile from Corinth Street upstream and because of this flatness, large areas of developed land can be flooded by a small increase in water levels once the sumps are filled. Consequently, in order to control the level of flooding and take full advantage of the storage capabilities of the sump areas, the West Levee area has been subdivided into three major areas designated as Pumping Plant 'C' Area, Pumping Plant 'D' Area, and the Eagle Ford Area. The investigation showed that new urban construction in the area protected by the West Levee has resulted in more rapid and greater runoff then originally anticipated and that flooding in some areas behind the levee would be experienced from the occurrence of the design storm. (Poertner)
W75-04860

CITY OF TORONTO SEWER SYSTEM,
Toronto Dept. of Public Works (Ontario).
For primary bibliographic entry see Field 8A.
W75-04864

ATTENUATION OF RANDOM DEEP WATER WAVES BY A POROUS WALLED BREAKWATER,
Washington Univ., Seattle. Dept. of Civil Engineering.
E. P. Richey, D. B. Morden, and B. J. Hartz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 690, $7.50 in paper copy, $2.25 in microfiche. Washington State Highway Department Research Program Report 13.1, August 1973. 236 p, 50 fig, 27 ref, 4 append. DOT Y-1307.

Descriptors: *Breakwaters, *Waves(Water), *Energy, *Bridges, *Winds, Hydraulic similitude,

Analytical techniques, Hydraulic models, Attenuation, Instrumentation, Statistical methods, Energy dissipation, Model studies.
Identifiers: *Porous walled breakwater, *Resonating chamber, Linear damped oscillator.

The porous walled resonating chamber, a type of breakwater, was investigated as a means of reducing reflected waves from structures subjected to random wind generated waves in deep water. Extending laboratory monochromatic studies to a full-scale apparatus appended to a floating bridge allows assessment of scale factors and the effects of random waves on the predicted performance of the device as a linear damped oscillator. The full-scale device was shown to be frequency selective at a frequency precisely corresponding to the predicted resonance of the system. The forces, measured on the porous wall, are lower than predicted and the device completely eliminates the problem of wave runup onto the bridge roadway. The porous wall resonating chamber can easily be appended to an existing structure or incorporated into a new structure. The consistency of results from the model and a full-scale prototype shows that the two systems are indeed hydraulically similar. (Singh-ISWS)
W75-05113

TO DEVELOP A LAND USE-PEAK RUNOFF CLASSIFICATION SYSTEM FOR HIGHWAY ENGINEERING PURPOSES,
Maine Dept. of Transportation, Augusta. Bureau of Highways.
For primary bibliographic entry see Field 4A.
W75-05130

PERMAFROST-RUNOFF: THE CONSULTING ENGINEER'S EXPERIENCE,
Bolter Parish Trimble Ltd., Edmonton (Alberta).
For primary bibliographic entry see Field 2C.
W75-05146

SOFAR CHANNEL AXIAL SOUND SPEED AND DEPTH IN THE ATLANTIC OCEAN,
Naval Undersea Center, San Diego, Calif.
J. Northrop, and J. G. Colborn.
Journal of Geophysical Research, Vol 79, No 36, p 5633-5641, December 20, 1974. 8 fig, 33 ref.

Descriptors: *Atlantic Ocean, *Depth, *Oceanography, *Currents(Water), Antarctic, Channels, Mapping.
Identifiers: *Sound speed, *Sofar channel, *Sound propagation, Strait of Gibraltar, Submarine topographic features, Mediterranean Ocean.

Axial sound speed and depth of the Sofar channel in the north and south Atlantic were estimated and the seasonal variations that affect Sofar propagation examined. The estimates were derived from applying averaging techniques to archived oceanographic data. The computed values appeared to agree within one part per thousand with the measured data from long-range propagation experiments. A more accurate sound speed mapping method was recommended, as was the incorporation of measured values of speed and depth in any Sofar computer program. (Bhowmik-ISWS)
W75-05156

MEAN LENGTH OF RUNS OF OCEAN WAVES,
Chicago Bridge and Iron Co., Planfield, Ill. Marine Research and Development.
S. K. Chakrabarti, R. H. Snider, and P. H. Feldhausen.
Journal of Geophysical Research, Vol 79, No 36, p 5665-5667, December 20, 1974. 4 fig, 7 ref.

Descriptors: *Waves(Water), *Ocean waves, *Atlantic Ocean, Mathematical models, Computer models, Simulation analysis, Wavelengths, Hydraulics, Numerical analysis.
Identifiers: *Wave run length, *Spectra, *Spectral model, Wave heights.

The mean length of runs of wave heights and the mean number of waves between the exceedance of a certain level by a group of waves and the next exceedance of the same level by the succeeding group of waves were investigated for data from the March 1968 North Atlantic storm. These quantities were compared with corresponding results obtained from the numerical simulation of waves in a computer for both wide and narrow band spectra. (Bhowmik-ISWS)
W75-05160

CONTINUOUS HYDROLOGICAL TIME-SERIES DISCRETIZATION,
Technical Univ. of Lisbon (Portugal). Instituto Superior Tecnico.
For primary bibliographic entry see Field 2A.
W75-05165

RAINFALL TEMPORAL PATTERNS FOR DESIGN FLOODS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2B.
W75-05166

RESEARCH INTO UNSTEADY FLUID FLOW DURING TRANSIENT PROCESSES IN A SHORT PIPE,
D. N. Popov.
Russian Engineering Journal, Vol 54, No 6, p 7-9, 1974. 4 fig, 4 ref. Translated from Vestnik Mashinostroeniya, No 6, p 7-9, 1974.

Descriptors: *Pipe flow, *Unsteady flow, *Transition flow, *Pressure, Turbulence, Mathematical models, Reynolds number, Hydraulics.
Identifiers: *Short pipe, *Incompressible fluids, *Hydraulic resistence, Surface friction.

The results of experimental research on unsteady flow in short pipes were presented and a method for calculating the transient processes was explained. During the transient motion of a fluid in a short pipe, a change in the flow structure was observed which affected the variation in the total pressure-drop and in the fluid discharge with respect to time. The effect of the transient nature of the fluid flow on the pressure-drop in a short pipe was allowed for by introducing a correction into the equation of motion for uniform quasi-static flow. During the transient process the effect of the unsteady flow in a short pipe was noticed principally in those portions with average velocity values where the difference in velocity values, when compared with the values determined by the usual methods of calculation, reached as much as 20%. (Bhowmilk-ISWS)
W75-05171

SEDIMENT TRANSPORTATION, VOLUME I.
International Association for Hydraulic Research, Delft (Netherlands).
For primary bibliographic entry see Field 2J.
W75-05192

TWO DIMENSIONAL JET DIFFUSION ON SLOPING FLOORS UNDER FINITE SUBMERGENCE,
Alberta Dept. of Environment, Edmonton. Water Resources Div.
V. M. Hari.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 1-12. 7 fig, 1 tab, 9 ref.

Descriptors: *Jets, *Diffusion, *Laboratory tests, *Mathematical studies, Steady flow, Flow characteristics, Turbulent flow, Continuity equation, Reservoirs, Boundary layers, Hydraulics, Fluid mechanics, Evaluation, Velocity, Spatial distributions, Underflow, Momentum transfer.
Identifiers: Equation of motion, Two dimensional flow, Submerged jets, Sloping floors, Turbulent wall jet.

Knowledge of the dispersion characteristics of buoyant jets and jets on sloping floors under finite submergence would help in understanding the reservoir sediment deposition process. A theoretical and experimental study of two dimensional jets diffusing on sloping floors under finite submergence was made. The turbulent wall jet model was used to derive simple power-law type mathematical expressions for the decay of jet velocity, growth of jet, and the bed shear stress distribution. These mathematical predictions werr correlated with the experimental observations. Observations were also made on the velocity distribution in the boundary layer and presented graphically. It was concluded that: (1) the theoretical analysis, inspite of some simplifying assumptions, predicts the scale variations reasonably well; (2) the turbulent wall jet model is quite useful for predicting some of the mean flow characteristics; (3) the boundary layer velocity distribution when correlated with ratio of (velocity at point y) / (maximum velocity in section) and the ratio of (depth y from bed) / (normal depth from bed to where velocity is half of the maximum velocity) was found to be good; and (4) further study in regard to turbulent characteristics would help in the analysis of sediment laden jet diffusion. (See also W75-05192) (Humphreys-ISWS)
W75-05193

ANALYSIS OF AGGRADATION UPSTREAM OF A DAM,
Roorkee Univ. (India). Dept. of Hydraulic Engineering.
R. J. Garde, and P. K. Swamee.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 13-22, 3 fig, 4 ref.

Descriptors: *Aggradation, *River beds, *Mathematical studies, *Alluvial channels, Deposition(Sediments), Profiles, Dams, Upstream, Sediment transport, Analytical techniques, Equations, Backwater, Continuity equation, Methodology, Fourier analysis, Flow resistance, Finite element analysis, Numerical analysis.
Identifiers: River mechanics.

The problem of predicting transient bed profiles upstream of a dam in an alluvial stream is important. The existing methods for numerical computation are time consuming and the stability of resulting solutions over a large number of cycles is not known. A new iterative method was described for predicting the deposition profile upstream of a dam. The iterative procedure converges rapidly. The profile obtained after using the iterative method at the end of each time interval was smoothened by use of a Fourier Sine Series. The use of this method permitted larger time and space intervals than those used in the method of characteristics. The method was also found to yield a stable solution over a large number of cycles. Example results were given in graphs. (See also W75-05192) (Humphreys-ISWS)
W75-05194

STUDY ON LOCALISED SCOUR AROUND A BRIDGE PIER AND ITS PREVENTION,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
H. Kikkawa, S. Fukuoka, and H. Sogawa.

In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 105-116. 7 fig, 1 tab, 7 ref.

Descriptors: *Scour, *Flow around objects, *Stream erosion, *Laboratory tests, Bridges, Piers, Erosion, Sands, Open channel flow, Alluvial channels, Froude number, Evaluation, Dimensional analysis, Theoretical analysis, Erosion control, Hydraulic structures, Hydraulics, Hydraulic models, Model studies.
Identifiers: River mechanics, Movable beds, Cylinders.

The mechanics of scouring around a pier was investigated experimentally in a laboratory flume with an erodible bed. Cylinders were used to model bridge piers. A method for preventing scouring was explored both experimentally and theoretically. When the Froude number of flow was larger than F = 0.25, maximum scour around a pier occured in the front portion of a cylinder and the ratio of maximum depth of scour, d, to flow depth, h, was described in terms of d/h = alpha times F to the 3/4 power. Alpha is a constant which depends on channel width, pier width and bed material. Observing that the downward flow caused by the vertical velocity gradient of the flow has a primary role on the scour, it was found that guards of concentric circular plants attached to a cylinder are useful for scour reduction around a pier. Theoretical basis for the availability of guards on scour reduction was provided by the two-dimensional potential flow theory. The guards with B/A approaching a value of 3.0, the ratio of spacing A to width B, contributed most effectively to scour reduction. The appropriateness of the value was verified theoretically by applying the concept of the strip roughness. The scour depth around a pier of various shapes and sizes in natural streams can be predicted by the results obtained, but the verification based on the model test of large scale and numerous data collected from natural streams is still desired. (See also W75-05192) (Humphreys-ISWS)
W75-05201

DEFORMED PIERS TO CONTROL THE DOWNSTREAM EROSION,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
H. Shi-Igai.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 117-126. 5 fig, 2 tab, 3 ref.

Descriptors: *Scour, *Flow around objects, *Erosion control, *Laboratory tests, Stream erosion, Piers, Shape, Downstream, Upstream, Hydraulic models, Model studies, Evaluation, Dimensional analysis, Hydraulic structures, Erosion, Alluvial channels, Hydraulics, Open channel flow.
Identifiers: River mechanics, Movable beds, Bulbhead piers.

In order to eliminate the scour around piers, the effect of a bulbhead was tested. The bulbhead attached to the upstream side of a pier generates a standing wave that minimizes the standing wave height caused by the pier. It was found that the standing wave was reduced and the scour at the back of the pier was drastically reduced, while the front scour received little effect. (See also W75-05192) (Humphreys-ISWS)
W75-05202

INCIPIENT MOTION OF BED MATERIAL,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
S. P. Chee, H. G. Payne, and T. Kung.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 127-136. 3 fig, 1 tab, 5 ref.

Descriptors: *Streambeds, *Jets, *Laboratory tests, *Model studied, Hydraulic models, Hydraulics, Evaluation, Velocity, Movement, Dimensional analysis, Flow, Stream erosion, Beds, Erosion control, Critical flow.
Identifiers: Bed material, Incipient motion, Cubical blocks, Critical velocity, Plunging jets.

Laboratory observations were made to study the incipient motion of bed materials exposed to streamflows which have velocity filaments sensibly parallel to the bed as well as to blocks located at the impact zone of falling water nappes from overflowing sharp-edged weirs. Dimensionless equations giving the critical velocity required to initiate movement of the bed material in horizontal flow and the conditions needed to cause the instability of blocks subjected to plunging water jets from weirs were presented. These non-dimensional equations will be useful to the hydraulic designer. (See also W75-05192) (Humphreys-ISWS)
W75-05203

SCOUR AT DOWNSTREAM END OF DAMS IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
C. M. Wu.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 137-142. 1 fig, 2 tab, 2 ref.

Descriptors: *Scour, *Dams, *Outlet works, Cavitation, Channel erosion, Running waters, Stream erosion, Hydraulics, Spillways, Tailwater, Fluid mechanics, Model studies, Hydraulic structures.
Identifiers: Scour hole, *Taiwan.

Prototype and model scour data at the downstream end of dams in Taiwan were analyzed and an empirical equation for predicting the limiting scour depth was proposed. Studies of available data showed that almost 80% of the total energy from the spill water is dissipated in the river bed where the scour hole is formed, irrespective of its type of structure. Hence, from a practical point of view, an empirical approximation based on the scour data can be developed for the limiting scour depth. (See also W75-05192) (Jess-ISWS)
W75-05204

SEDIMENTATION DAMAGE OF HYDRAULIC STRUCTURES IN TAIWAN,
Taiwan Water Resources Planning Commission, Taipei. Hydraulic Lab.
C. M. Wu.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 143-154. 7 fig, 2 ref.

Descriptors: *Dams, *Hydraulic structures, *Repairing, *Rehabilitation, *Sedimentation, Concrete structures, Reservoir silting, Erosion, Sluices, Spillways, Cavitation.
Identifiers: *Taiwan.

Sedimentation damage sustained by hydraulic structures in Taiwan is severe. Various kinds of damage discussed included: (1) land slide and river sedimentation to the normal operation of hydraulic structures, (2) abrasive erosion of concrete surfaces associated with hydraulic jumps in diversion tunnels and stilling basins resulting from the presence of solid matter in the turbulent flows, and (3) cavitational erosion of concrete in chute floors of high-head sluiceways. The techniques developed for corrective and preventive maintenance were discussed. (See also W75-05192) (Jess-ISWS)
W75-05205

MODELING OF LOCAL SCOUR AROUND SPUR DIKES IN STREAMS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
A. K. Tyagi.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 155-165. 4 fig, 2 tab, 14 ref, 2 append.

Descriptors: *Scour, *Hydraulic structures, *Model studies, *Laboratory tests, Dikes, River training, Alluvial channels, Sediments, Sands, Movement, Evaluation, Dimensional analysis, Depth, Flow, Streams, Rivers, Open channel flow, Hydraulic models, Froude number, Velocity.
Identifiers: River mechanics, Spur dikes.

A theoretical and experimental study was conducted on local scour around a spur dike. The depth of scour was related to various characteristics of the fluid, sediment, flow, alluvial stream, and spur dike. Dimensional analysis showed that the scour Froude number depends on the relative approach depth and the constriction ratio. Experimental data on maximum depth of scour was given for three sediments - the plastics, coke, and sand. Data were obtained over a wide range of sediment sizes and constriction ratios. Utilizing nondimensional parameters, data were analyzed for the maximum scour depth around a spur dike normal to the flow, for the case of no or little sediment movement. It was concluded that: (1) the maximum depth of scour is affected significantly by size and submerged specific gravity of the sediment; (2) the constriction ratio (Spur dike width/channel width), beta, is a relevant parameter that considers the geometry of the spur dike, and it is important in determining the scour depth; (3) the relative approach depth, which is a ratio of the apporach depth of flow and the sediment size, also influences the scour depth; and (4) with known values of mean flow velocity, flow depth, sediment size finer than 50%, beta, specific weight difference between sediment and water, the maximum scour depth can be determined. (See also W75-05192) (Humphreys-ISWS)
W75-05206

THE EFFECT OF SILLS ON RIVER BED,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
P. Volkart, J. Tschoop, and E. Bisaz.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 167-178. 11 fig.

Descriptors: *Scour, *Erosion control, *Model studies, *Laboratory tests, River beds, Alluvial channels, Depth, Shape, Erosion, Stream stabilization, Discharge(Water), Sediments, Size, Sediment transport, Riprap, Hydraulic structures, Barriers, Hydraulic models, Evaluation.
Identifiers: River mechanics, Transverse sills.

General statements were derived for the two dimensional steady stress case on the basis o model tests. They define the size of the scourin

basin between transverse sills in the natural river bed. They also indicate the great influence of sill spacing on scouring depth and stability of the scouring basin. A basis was laid for computing the dimensions of a riprap protecting the natural bed in relation to the discharge, the gradient, and the arrangement of sills. A possible application of the test result to natural conditions was tabulated. (See also W75-05192) (Humphreys-ISWS)
W75-05207

THEORY OF VISCOUS FLOW IN WIDE CURVED OPEN CHANNELS,
Technische Hogeschool, Delft (Netherlands). Lab. of Fluid Mechanics.
H. J. De Vriend.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 179-190. 11 fig, 4 ref.

Descriptors: *Viscous flow, *Open channel flow, *Mathematical studies, *Analytical techniques, Fluid mechanics, Mathematical models, Theoretical analysis, Equations, Continuity equation, Flow characteristics, Velocity, Distribution patterns, Profiles, Shallow water, Hydraulics, Channels, Flow.
Identifiers: Navier-Stokes equations, Curved channels, Rectangular channels.

The axisymmetrical viscous flow in a shallow curved open channel with a constant rectangular cross section and a fixed horizontal bed was investigated by using the method of matched asymptotic expansions in three separate regions of the cross section. This yields velocity-components that can be written as the product of two functions, one of which requires recomputation for every new channel geometry, while the other one does not. A simple interpolation between the three regions was possible, affecting only the former functions. The results of this approximation showed a good agreement with the numerical solution of the system of differential equations for the entire cross section, given by Ananyan (1965). However, the approximation developed requires much less computation. (See also W75-05192) (Humphreys-ISWS)
W75-05208

SECONDARY CURRENTS IN SUBSEQUENT MODEL BENDS,
Karlsruhe Univ., (West Germany). Theodor-Rehbock-Lab. for River Improvement.
E. Mosonyi, and W. Goetz.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 191-201. 7 fig, 10 ref.

Descriptors: *Flow characteristics, *Open channels, *Hydraulic models, *Laboratory tests, Flow, Distribution patterns, Dimensional analysis, Analytical techniques, Curves, Currents(Water), Flumes, Hydraulics, Open channel flow, Velocity.
Identifiers: *Secondary flow, Spiral flow.

Some characteristics of flow in model bends with rigid bottoms were studied and special regard was given to the intensity of secondary flow and its variation along the channel. The governing parameters of secondary motion for different reaches of the flow was determined by dimensional analysis. Hot-film anemometry was used to measure the magnitude and direction of the velocity vector. The intensity of the secondary flow was defined as the ratio of kinetic energy of the spiral velocity component to that of the main flow component. It was shown in the experiments that spiral flow can be described by the variation of its intensity. The two flumes erected for this research were described. The results of the measurements were illustrated by profiles of the velocity components for significant flow patterns in both flumes. The variation of spiral flow intensity under various conditions was presented. (See also W75-05192) (Humphreys-ISWS)
W75-05209

ECONOMIC REVETMENTS FOR PROTECTING THE BANKS OF MERIC AND ERGENE RIVERS FLOOD CANALS AGAINST WAVE EROSION,
State Hydraulic Works, Ankara (Turkey). Dept. of Research.
S. Bursali.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 203-212. 8 fig, 6 ref.

Descriptors: *Flood damage, *Flood protection, *Flood control, *Retaining walls, Floods, Levees, Waves(Water), Erosion, Canals, Riprap, Bank protection, Slopes, Scour, Shoreline cover, Vegetation, Cohesive soils.
Identifiers: *Turkey(Meric River-Ergene River).

Flood levees constructed along the Meric and Ergene Rivers to protect agricultural lands against flood damage were observed and studied analytically in order to find out the main cause of damage on the water side slopes. It was determined analytically that the tractive force on the slopes keeps its value of being smaller than the critical tractive force on the bottom. On the contrary, by studying wave effects, it was found that the dynamic action of waves is the main cause of slope erosion. Thus, the type of revetment and weight of natural or artificial stones resistant to the wave effects was determined. (See also W75-05192) (Visocky-ISWS)
W75-05210

STABILITY OF TIDAL RIVERS AND METHODS FOR DETERMINATION OF THE CORRECTIVE WORKS,
Calcutta Port Commissioners (India).
S. C. Roy.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 251-264. 6 fig, 1 tab, 9 ref.

Descriptors: *Rivers, Tidal waters, *Sedimentation, *Stream stabilization, Tidal effects, Tidal streams, Tides, River training, Channel erosion, Scour, Stream erosion, Model studies, Hydraulic models, Erosion, River regulation, History.
Identifiers: *Tidal river stability, Channel geometry, *India(River Hooghly), Spurs.

Methods for determining the stability of tidal river systems were discussed. The stability was identified when there is no erosion or accretion in the system. The methods for determining the stability were grouped in two broad categories: (1) analysis of historic data, and (2) analysis of hydraulic parameters from model data. When historic data of tides, channel geometry, and freshwater flow are available over long periods, the determination of the stability can be conveniently made. When, however, such data are not available, the state of stability can be assessed by analyzing the hydraulic parameters from model data. In a stable tidal system the training works require determination of the size of the spurs in relation to the expected improvement in the post-training period. From the basis of information obtained from prototype and hydraulic models, an empirical relationship was suggested for such determination. The importance of sequencing the training works in context to the changes that occur in the tidal system was pointed out. (See also W75-05192) (Sanderson-ISWS)
W75-05214

SETTLING CUM FLUSHING TANK ON TRISULI POWER CHANNEL,
Central Water and Power Research Station, Poona (India).
C. V. Gole, S. V. Chitale, and V. K. Kulkarni.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 265-275. 2 fig, 5 ref.

Descriptors: *Sediment control, *Model studies, *Settling basins, *Hydraulic structures, Separation techniques, Desilting, Suspended load, Bed load, Design, Canals, Open channels, Diversion structures, Bypasses.
Identifiers: *Sediment removal, Flushing tanks.

A settling tank with flushing arrangements for excluding sediment, except wash load, from a canal supplying water to a hydroelectric powerplant was designed. Final design was determined from model studies. Conclusions from the model studies were: (1) Coarse and medium sediment can be excluded from the canal to any desired extent by providing a settling cum flushing tank in a water conductor system situated in hilly regions where ample head from the tank to parent river would be available. (2) The design of the tank would be simpler and economical if all the canal supplies could be utilized for a limited period during flushing. (3) If diverting all canal discharge for flushing is not permissible, the settling tank will have to be subdivided into compartments. Flushing of one compartment can be done simultaneously with the other compartment working as the settling tank. (4) The compartment of the tank may be subdivided into flushing channels, and determining width and number by considering the discharge that could be spared and head available for the flushing. (5) If full supply is required all the time to the power canal downstream of the tank, it is necessary to design the upstream canal and the desilting tank for the extra discharge needed for flushing. (See also W75-05192) (Humphreys-ISWS)
W75-05215

INFLUENCE OF SUSPENDED SEDIMENT DISTRIBUTION ON SETTLING BASIN DESIGNS,
Mahaweli Development Board, Colombo (Sri Lanka).
U. T. B. Hippola.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 277-288. 2 fig, 9 ref.

Descriptors: *Sedimentation rates, *Settling basins, *Design, Suspended solids, Sediment distribution, Particle size, Model studies, Theoretical analysis, Statistical methods, Probability, Sediments, Silts, Laboratory tests.

Present methods of dimensioning settling basins in hydro-power and irrigation systems do not generally consider the actual vertical distribution of sediment. Diffusion and gravitational theories of sediment transport were applied in theoretical and experimental investigations to determine a design technique that reduced settling basin length approximately 30 to 40% when compared to other design methods. Based on these investigations, the following conclusions and recommendations for settling basin design were made: (1) Probability methods of settling basin design have a sound theoretical basis and can be used as standard methods for determining economical dimensions.

(2) Particles in motion in turbulent flow deflect from their mean trajectory in accordance with the Gauss law of normal distribution. (3) The assumption of constant vertical distribution of suspended sediment concentration seriously affects the computation of settling basin dimensions. Assuming trapezoidal or triangular vertical distribution or vertical distribution in accordance with the gravitational theory, a more general formula for settling basin design was obtained. (4) When adequate data on silt is not available it was suggested that a triangular vertical distribution be adopted and the curves presented for estimating basin dimensions be used. (See also W75-05192) (Humphreys-ISWS)
W75-05216

WATER INTAKE PROBLEMS IN TORRENTS,
Technical Univ., of Istanbul (Turkey). Dept. of Hydraulics and Water Power.
K. Cecen.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 289-300. 6 fig, 9 ref.

Descriptors: *Sediment control, *Hydraulic structures, *Intakes, Model studies, Laboratory tests, Intakes structures, Sediment transport, Running waters, Sediments, Sands, Gravels, Bed load, Bypasses, Diversion structures, Mountains, Streams, Rivers.
Identifiers: Frontal intakes.

For mountain streams on steep slopes that transport a large sediment load, it is not possible to state a general rule for the choice of an intake system. Model studies and prototype experiences were described. Lateral intakes must be located at the outer sides of natural or artificial bends. With the help of spurs, sills, submerging walls, gates, etc., it may be possible to divert as much as 50% of the water in streams with large sediment loads. In the frontal intake system, secondary currents and eddies are eliminated inside a sufficiently long gravel pass and a reasonably isotropic turbulence is achieved. Water was taken from the upper layers with no change of direction. By flushing the lower layer continuously as a kind of boundary layer suction, 90% or more of the water can be diverted free of sediment. Bottom intake was the best choice for streams on very large slopes carrying very coarse sediment. Frontal and bottom intakes were constructed together on a stream of slope 0.043 and it was found that the frontal system gave better results. (See also W75-05192) (Humphreys-ISWS)
W75-05217

THE VELOCITY DEFECT LAW AND THE SEDIMENT TRANSFER COEFFICIENT IN AN OPEN CHANNEL,
Africultural Research Service, Oxford, Miss. Sedimentation Lab.
N. L. Coleman.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 317-323. 3 fig, 7 ref.

Descriptors: *Sediment distribution, *Boundary layers, *Laboratory tests, Suspended solids, Evaluation, Sediments, Sands, *Open channel flow, Velocity, Hydraulics, Profiles, Distribution patterns.
Identifiers: *Velocity defect law, *Sediment transfer coefficient, Sediment concentrations.

The sediment transfer function and the velocity defect laws for boundary layer flow in a smooth rectangular channel were investigated for a constant flow with systematically increasing suspended sediment concentration. The sediment transfer function appeared to be the same for all values of average suspended sediment concentration. Universal forms of the velocity defect law, including the sediment transfer coefficient as a variable, were found for both the inner and outer parts of the boundary layer. (See also W75-05192) (Humphreys-ISWS)
W75-05218

TURBULENCE MEASUREMENTS OVER SAND BEDS,
California State Univ., Sacramento. Dept. of Civil Engineering.
A. L. Prashuhn.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 325-336. 8 fig, 1 tab, 11 ref.

Descriptors: *Turbulence, *Open channel flow, *Laboratory tests, Turbulent flow, Velocity, Profiles, Supercritical flow, Measurement, Evaluation, Beds, Sands, Open channels, Fluctuations, Instrumentation, Hydraulics.
Identifiers: River mechanics.

Results were presented of turbulence measurements in water flows over sand beds. A hot-film anemometer with a conical probe was used and the longitudinal turbulence determined. Restricted primarily to the flat bed regime, mean and fluctuating velocity profiles were given. The turbulence levels were compared with existing smooth and rough boundary turbulence data and analyzed with respect to the Reynolds number. Conclusions were: (1) Based on the comparisons with clear water data, including the turbulent and time-averaged velocity profiles, the observed logarithmic velocity distributions and von Karman k values, it appears that the anemometer gives reliable and repeatable values of both the mean and turbulent velocities in flows over sand beds. (2) The sand bed in the Froude number range of 1.1 to 1.5, generally considered smooth because of the low resistance coefficients associated with it, has turbulence profiles above it more nearly like a smooth boundary than a rough one. (3) The turbulence profile above the sand bed, unlike that above either a smooth or rough boundary, is distinguished by a thick, nearly constant, high turbulence region with a thickness of the same order as the heavy sediment concentration. (4) The relative turbulent intensities decrease with increasing Reynolds number at all depths. Near the surface this decrease is at the same rate as clear water flows over smooth boundaries. (See also W75-05192) (Humphreys-ISWS)
W75-05219

FLOW RESISTANCE IN SAND BED CHANNELS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
C. C. Villanueva, and J. A. Maza Alvarez.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 337-345. 2 fig, 1 tab, 11 ref.

Descriptors: *Flow resistance, *Open channel flow, *Alluvial channels, On-site data collections, Rivers, Evaluation, Streams, River beds, Sands, Hydraulics, Boundaries(Surfaces), Regime.
Identifiers: *River mechanics.

A dimensionless diagram and alternative formulas to determine the flow velocity in sand bed channels as a function of depth, slope and bed material characteristics, for any flow regime, were presented by Cruickshank (1968). The analysis was mainly based on laboratory tests, with few river data. For the study presented, a large quantity of river measurements was available with widely varying river characteristics. With this data, it was possible to verify the consistency of the first analysis and also to extend its applicability to a wider range of conditions. The criteria and method of practical use of results were given for any flow regime. Another advantage of the method is that it consists of simple formulas, which can be readily used in computer programs for river flow simulation and also to establish regime equations together with a sediment transport formula and a geometric relationship. The formulas presented are only valid for sand median sizes from 0.2 to 2.0 mm; further research is needed to include cases outside these limits. (See also W75-05192) (Humphreys-ISWS)
W75-05220

FLOW AND RESISTANCE CHARACTERISTICS OF SAND BED CHANNELS,
Colorado State Univ., Fort Collins. Engineering Research Center.
K. Mahmood, and D. B. Simons.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 347-358. 2 fig, 6 ref.

Descriptors: *Alluvial channels, *Flow resistance, *Boundary layers, *Flow characteristics, Open channel flow, Velocity, Profiles, Regime, Shape, Beds, Sands, Hydraulics, Roughness(Hydraulic), Sediment transport, Equations, Flow.
Identifiers: Two-layer model, Movable beds.

An empirical two-layer model of the velocity distribution in sand bed channels was developed. Integration of this distribution yielded a relation between the effective shear velocity in the inner layer and the average velocity of flow. This relation can be used to determine the vertical velocity profile if average velocity in the vertical is known. The resistance to flow in sand bed channels is related to the regime of the flow. A criterion was developed to predict this regime from known bed material, depth, and energy gradient. Resistance functions for sand bed channels were also developed. These functions can be used to predict the average velocity if the bed material, depth, and slope are known. (See also W75-05192) (Humphreys-ISWS)
W75-05221

STUDIES ON BED-LOAD TRANSPORT RATE IN OPEN CHANNEL FLOWS,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
K. Ashida, and M. Michiue.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 407-418. 9 fig, 15 ref.

Descriptors: *Alluvial channels, *Sediment transport, *Sediment discharge, *Open channel flow, Bed load, Flow resistance, River beds, Bottom sediments, Movement, Flow, Regime, Theoretical analysis, Equations, Cohesionless soils, Sands, Gradation, Sediments, Roughness(Hydraulic).
Identifiers: River mechanics.

The bed roughness in alluvial channels has a large effect on the bed load transport rate. Therefore, in order to estimate accurately the bed load discharge, the effect should be introduced into the bed load function. An analysis developed a procedure for estimating the effective shear stress for bed load transportation with Einstein's concept that the total shear stress is divided into two parts, resistance of surface friction and the form resistance. A formula was developed for the be

load transport rate by using the effective shear stress. Although the formula for the bed load transport rate was derived for the uniform sand grains, it was also indicated that the formula may be applicable for non-uniform sediment by using the critical shear velocity for each individual grain in the graded sediment. A method was presented for estimating the hydraulic resistance in alluvial channels on the basis of dimensional analysis and consideration of the flow regime. (See also W75-05192) (Humphreys-ISWS)
W75-05226

INVESTIGATION AND COMPUTATION OF SEDIMENT TRANSPORT WITH REGARD TO THEIR DENSITY,
Moskovskii Institut Inzhenerov Zheleznodorozhnogo Transporta (USSR).
G. V. Zheleznyakov, V. S. Altunin, and V. K. Debolski.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 525-536, 5 fig, 6 ref.

Descriptors: *Sediment transport, *Hydraulic models, *Laboratory tests, Sediment discharge, Bed load, Suspended load, Sediments, Density, Discharge(Water), Open channel flow, Velocity, Particle size, Beds, Shape, Dunes, Flow.
Identifiers: Movable beds, River mechanics.

Described were the results of laboratory investigations of transportation of bed-load and suspended sediments with sands of the different granulometric composition and easily movable synthetic materials. The experiments were conducted in a recirculation system with flow velocities and heights of dunes (sand waves) varying widely. The effect of sediment density on dune parameters was studied. Criterial relations between sediment discharges and flow parameters and particle characteristics for various forms of sediment transportation into a flattened-out form was determined. Scale factors determined for the distorted model of sediment transport considered sediment density and the relationship between sediment discharge and flow velocity. Experiments verified these model-scale factors for simulating river bed processes. (See also W75-05192) (Humphreys-ISWS)
W75-05234

SEDIMENT DIFFUSION OVER A WAVY, MOBILE BED,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
A. P. Apmann.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 561-572, 2 fig, 18 ref.

Descriptors: *Sediment transport, *Open channel flow, *Laboratory tests, *Streambeds, Diffusion, Movement, Turbulent flow, Turbulence, Eddies, Evaluation, Cohesionless soils, Suspended load, Settling velocity, Mixing, Equations, Shear, Flow, Entrainment, Beds, Velocity, Dunes, Streams, Shape, Sediments, Suspended solids, Flumes.
Identifiers: River mechanics, Vertical diffusion, Mobile beds.

It was hypothesized that the turbulence generated over wavy, mobile beds differs in its characteristics from the turbulence generated over plane beds and, therefore, that the characteristics of sediment diffusion in the two cases differs, leading to differences between experiments made under the two conditions. A comparison between such studies failed to substantiate that hypothesis and indicated the opposite. The fall velocity of the sediment was again shown to be an important variable in the diffusion process. Theoretical backing was given for this analysis, but the nature of the relationship between the fall velocity and the diffusivity has not been fully explored and sufficient data is not available to define the relationship. For the theories of sediment diffusion to be of maximum usefulness to those working on problems of river engineering, additional investigations are needed to explore the relations between fall velocity, depth, water velocity, and diffusion coefficient. Since differences appear between studies which are in themselves consistent, the suggested research must be sufficiently comprehensive to define the variables which create flume effects. (See also W75-05192) (Humphreys-ISWS)
W75-05237

A PROBABILISTIC METHOD FOR DETERMINING THE DISTRIBUTION OF SUSPENDED SOLIDS IN OPEN CHANNELS,
Queens Univ., Kingston (Ontario).
M. S. Yalin, and B. M. Krishnappan.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 603-614. 5 fig, 14 ref.

Descriptors: *Statistical models, *Suspended solids, *Channels, Sediment distribution, Probability, Markov processes, Movement, Flow, Evaluation, Equations, Statistical methods, Turbulent flow, Spatial distribution, Dispersion, Diffusion, Stochastic processes.
Identifiers: *River mechanics, Gaussian distribution.

The ordinates of the random path of a suspended particle drifted by the turbulent flow were considered as a Markovian sequence in time, each step being of the same infinitesimal duration. The normal (Gaussian) distribution was used only as the transitional function expressing the displacement of a particle during the infinitesimal time interval separating the steps. The probability density distributions corresponding to consecutive steps were generated with the aid of the Kolmogorov-Chapman equation. The final concentration distribution corresponding to a given stage of the flow was determined as an unlimited sum of these density distributions. The family of the concentration distribution curves determined was discussed in the light of experimental data. (See also W75-05192) (Humphreys-ISWS)
W75-05240

SPECTRAL PROPERTIES OF ALLUVIAL BED FORMS IN RIVERS AND FLUMES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. F. Cheong, and H. W. Shen.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 639-651, 6 fig, 1 tab, 9 ref. NSF Grant GK-11499.

Descriptors: *Alluvial channels, *Streambeds, *Frequency analysis, *Shape, Histograms, Rivers, Flumes, River beds, Statistical methods, Profiles, Data collections, Laboratory tests, Sand waves, Ripple marks, Sediments, Variability.
Identifiers: Spectral properties, Wave number, Spectral density.

The available spectral data on alluvial bedforms in laboratory flumes and in rivers were presented. With the possible exception of the data from the conveyance channel reported by Nordin and Algert, the high wave number range of each spectrum appears to follow a general straight line giving the '-3 power' spectral form. This seems to agree with Hino's similarity analysis. It was assumed that (1) the '-3 power' spectral form exists for the high wave number range and (2) there is similarity among the wave number spectra. For runs where the width of the channel exceeds three feet, a regression curve between the standard deviation of the bed elevation and the pertinent hydraulic variables was obtained. It was shown that if a ripple can be represented by a periodic function of a characteristic triangular form, the exponent of the line spectrum varies from -4 to -2 as the wave number increases. A preliminary investigation on the spectral properties of a bed composed of a series of statistically similar triangles arranged in tandem to simulate a ripple run was initiated. The spectrum, though multipeaked, showed a -4 power form over the high wave number range. This appears to agree with the experimental results on ripples by Taylor. (See also W75-05192) (Humphreys-ISWS)
W75-05242

EFFECT OF CHARACTERISTICS OF BED MATERIAL AND FLUID ON RIPPLE FORMATION,
Roorkee Univ. (India). Dept. of Civil Engineering.
P. P. Sahgal.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 653-665, 2 fig, 3 tab, 7 ref.

Descriptors: *Sediment transport, *Ripple marks, *Laboratory tests, Cohessionless soils, Bed load, Liquids, Water, Shear, Flow, Froude number, Movement, Viscosity, Sands, Granules, Sediments, Physical properties, Shape, Beds, Flumes, Open channels.
Identifiers: Water-glycerine mixtures, Kerosene oil-mobil oil mixtures, Movable beds, Grain seed, Oil seed.

Laboratory experiments were conducted in a recirculating 15 cm by 15 cm by 5 m long flume to study the mechanism of ripple formation on a granular bed. It was found that the Froude number, the shear stress, the particle size density of the bed material, and the fluid viscosity have a marked effect on the rippling phenomenon. Ripples formed only when the boundary was smooth or in transition from smooth to rough, that is, only when a laminar sublayer was present. Viscosity inhibits rippling for smaller grain size material and it promotes rippling for larger size material. The density of the particles seemed to have the same effect on rippling as the fluid viscosity; however, this conclusion was not verified. (See also W75-05192) (Humphreys-ISWS)
W75-05243

CONDITION FOR THE FORMATION OF ALTERNATE BARS IN STRAIGHT ALLUVIAL CHANNELS,
Waseda Univ., Tokyo (Japan). Dept. of Science and Engineering.
N. Sukegawa.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 679-689, 3 fig, 2 tab, 23 ref.

Descriptors: *Alluvial channels, *Channel morphology, *Laboratory tests, Sediment transport, Regime, Shape, Beds, Streambeds, River beds, Evaluation, Dimensional analysis, Sediments, Dunes, Hydraulic similitude, Hydraulics, Ripple marks.
Identifiers: *River mechanics, Antidunes, Alternate bars, Flat bed.

Experimental laboratory data were analyzed to determine the conditions under which alternate

bars form in alluvial channels. Two dimensionless parameters, A and B, were derived by dimensional analysis to establish the criterion for defining the region of alternate bar formation. Parameter A equals the square of (shear velocity)/(critical shear velocity). Parameter B equals the product of (shear velocity/critical shear velocity) and the square root of (channel surface width times channel slope/hydraulic radius). It was determined graphically that alternate bars formed when A is equal to or less than 5 times B raised to the 2/3 power. The bed form consisted of ripples, dunes, antidunes, or a flat bed for larger values of A. It was found from the criterion that alternate bars can be formed when the shear stress on the bed and the depth-width ratio of the channel flow is small, and that the critical value of this ratio for alternate bar formation depends on the properties of the fluid, flow, and bed material. (See also W75-05192) (Humphreys-ISWS)
W75-05245

STABLE CHANNELS IN ALLUVIUM,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
J. A. Maza Alvarez, and C. C. Villanueva.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technolology, Bangkok, Thailand, p 715-722, 8 ref.

Descriptors: *Channels, *Alluvial channels, *Open channels, *Stream stabilization, *Scour, Channel erosion, Open channel flow, Bank stability, Sediment control, Slope stability, Beds, Hydraulics, Alluvium, Erosion, Cohesionless soils, Canals, Flumes, Sediment transport, River training.
Identifiers: *Lacey's equations, *Stable channel design, River mechanics.

In order to describe the three degrees of freedom of a stream in alluvium, three independent equations are needed to determine its stable shape. It was shown that such equations may be: a resistance equation, a load transport equation, and a geometric relationship for the hydraulic section (e.g., a width to depth ratio). Starting with three such independent relationships for flow over a sand bottom, a set of three equations was established that define the geometry of a stream as a function of its discharge, sediment transport, and type of channel material. The obtained formulas agree very closely with observations in streams with dynamic equilibrium (regime streams). Their advantage over regime equations is that coefficients are functions of readily obtainable sediment characteristics. Their usefullness in design of river works and earthen channels is evident. (See also W75-05192) (Sanderson-ISWS)
W75-05248

CHANNEL STABILITY IN RELATION TO BURIED UNCONSOLIDATED SEDIMENTS,
Dundee Univ., Newport-on-Tay (Scotland). Tay Estuary Research Center.
A. T. Buller, and J. McManus. 21In: Sediment Transportation, Vo
W75-05249

STABLE CHANNELS IN ALLUVIAL MATERIAL,
Regional Inst. of Tech., Jamshedpur (India). Dept. of Applied Mechanics.
S. V. K. Sarma.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 735-747, 1 fig, 1 tab, 9 ref.

Descriptors: *Channels, *Alluvial channels, *Stream stabilization, *Scour, *Tractive forces, Open channels, Channel erosion, Open channel flow, Bank stability, Sediment control, Slope stability, Beds, Hydraulics, Alluvium, Erosion, Cohesionless soils, Froude number, Canals, Flumes.
Identifiers: *Stable channel design, River mechanics.

The principles of design of stable channels in coarse non-cohesive material were studied by the application of tractive force analysis. Trapezoidal channels were investigated, but similiar principles can be equally applied to sections of any other shape channels. The method of approach by tractive force proved to be generally applicable for clear water channels. The Froude number criterion must be less than 0.3 for a channel to have no appreciable bed and bank scour. This is acceptable in alluvium of sand-size range and finer. There is a minimum slope necessary for channel sections to be stable from tractive force considerations, above the limit of which all sections will be safe. In the stable condition, the discharge bears a definite relation with wetted perimeter, wetted area, and hydraulic mean depth. The theoretical equations for velocity distribution are not applicable for channels in erodible material. However, a logarithmic law holds good for trapezoidal channels flowing comparatively free of sediment. (See also W75-05192) (Sanderson-ISWS)
W75-05250

DESIGN OF SCOUR-FREE CHANNELS ON MILD SLOPES,
Florida Univ., Gainesville. Dept. of Civil and Coastal Engineering.
B. A. Christensen.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 749-760. 7 fig, 12 ref.

Descriptors: *Scour, *Sediment control, *Channels, *Stability, Design, Analytical techniques, Slope stability, Channel erosion, Discharge(Water), Roughness(Hydraulic), Bank erosion, Soil properties, Cohesionless soils, Slopes.
Identifiers: Scour-free channels, River mechanics.

Composite drainage and irrigation systems often contain unlined channels excavated in alluvium or deposits having similar properties. The design and construction of such channels should be accomplished in such a way that erosion and deposition of sediments are hindered in order to prevent serious damage to the environment in the form of scour and consequential shoaling in other parts of the system. This may cause serious ecological damage and have adverse effects on navigation. The possible shapes of stable channel cross sections were discussed and special emphasis was placed upon the one corresponding to mild bed slopes. The basic differential equation for the shape of the wet perimeter of this cross section was established and integrated numerically. The influence of the hydrodynamic lift acting on the topmost layer of grains was taken into consideration by use of Einstein's lift coefficient. All formulas needed for the design and for development of the design charts were given. Final results were presented on a form that allows rapid determination of the shape and size of the cross section when bed slope, discharge, equivalent sand roughness, and soil properties of the bed material are known. (See also W75-05192) (Humphreys-ISWS)
W75-05251

SEDIMENT EQUILIBRIUM CONSIDERATIONS IN THE DESIGN OF IRRIGATION CANAL NETWORKS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
K. Mahmood.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 761-772. 1 fig, 9 ref.

Descriptors: *Sediment control, *Irrigation canals, *Irrigation systems, *Analytical techniques, Sediment discharge, Bed load, Suspended load, Canals, Alluvial channels, Regime, Network design, Sediment transport, Planning, Model studies, Equilibrium, Equations, Flow, Hydraulics.
Identifiers: Regime coefficients.

An irrigation canal network is in sediment discharge equilibrium when bed material inflow over a period of time equals the outflow. A network with 5000 cfs head discharge, resembling the systems in Pakistan, was simulated on a digital computer. The network was studied for the conditions imposed by sediment equilibrium considerations. The analyses of the network showed that: (1) if the system is designed with regime similarity, i.e., constant values of regime coefficients in the system, the uniformity of bed material load concentrations cannot be maintained in the system; (2) the value of alpha greatly affects the characteristics of the system. Alpha was determined by the rate of transport of the bed material, the ratio of the suspended to bed load transport, and the variation of slope along the system. Increasing alpha values for a decreasing size of the channel was found to yield more realistic values of bed material size variation in the system; (3) the bed material transport capacity of irrigation channels reduces with decreasing discharge in spite of the bed material size reduction along the downstream direction; and (4) the topographical controls of irrigation land were not considered. In the analysis of a prototype system the topography of land and the economic values of the variables like water, conveyance channels, channel lining, desilting work, etc. can also be considered to optimize the disposal of sediment. (See also W75-05192) (Humphreys-ISWS)
W75-05252

BED SLOPES OF AGGRADED CHANNELS WITH TWO DEGREES OF FREEDOM,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
S. P. Chee.
In: Sediment Transportation, Volume 1; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 785-794. 1 fig, 1 tab, 12 ref.

Descriptors: *Aggradation, *Hydraulic models, *Sediment transport, *Laboratory tests, Stream beds, Channels, Evaluation, Flow, Depths, Bed load, Beds, Shape, Sediment discharge, Scour, Deposition(Sediments), Dunes, Open channel flow, Hydraulics, Mannings equation, Chezy equation.
Identifiers: Bed load equations, Movable beds.

An investigation of the bed slopes of aggraded channls with two degrees of freedom was conducted with the aid of hydraulic models. Sediment beds were formed in laboratory stream channels by supplying sediment from a calibrated upstream hopper while water was circulated by pumping. Sediment bed slopes, bedforms, and the mechanics of sediment transportation were carefully observed. As the utilization of the bed load equations to calculate sediment discharge, bed slopes, and flow depths would require

knowledge of bedforms, the better known methods of predicting the type of bedform were studied in relation to these tests and the results were presented. The resistance equations Manning, Chezy, and Liu-Hwang are often used together with the bed load equations of Einstein, Kalinske, and Shields to compute bed slopes and flow depths. The use of the Kalinske bed load equation in conjunction with the Manning formula and taking into account bedform roughness as proposed by Einstein/Doland gave the closest correlation in the computation of sediment slopes. The same set of equations which predicted bed slopes with the greate,t accuracy also provided the closest estimate of flow depths. The determination of bedforms by using Simons' diagram gave sufficiently accurate results. (See also W75-05192) (Humphreys-ISWS)
W75-05254

SCOURING CAPACITY OF FLOW IN NARROW OPEN CHANNELS,
Osmania Univ., Warangal (India). Regional Engineering Coll.
N. T. Zhdankus.
In: Sediment Transportation, Volume i; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 831-839. 2 fig, 1 tab.

Descriptors: *Scour, *Laboratory tests, *Channel erosion, Hydraulic models, Flow, Movement, Evaluation, Velocity, *Open channels, Stream erosion, Turbulent flow, Saltation, Streambeds.
Identifiers: Trapezoidal channels, Movable beds, Permissible velocity, Non-scouring velocity.

The flow and bed interaction mechanism in narrow channels is different from that in wide channels. The difference must be taken into account when permissible (nonscouring) velocities in narrow channels are determined. Laboratory experiments, performed in trapezoidal channel models, showed that usual methods, designated for designing wide channels, can be used for determining permissible velocities in narrow channels, if correction coefficients, taking into account channels' form of cross-section, are used in computations. The correction coefficients were determined from experimental data. Evaluation of experimental data was based on using maximum momentary bottom velocity as the criterion of scouring capacity of flow. Correction coefficients based on laboratory data were tabulated. (See also W75-05192) (Humphreys-ISWS)
W75-05258

MEASURING SEWAGE FLOW USING WEIRS AND FLUMES,
Ontario Ministry of the Environment, Toronto. Project Operations Branch.
For primary bibliographic entry see Field 5D.
W75-05326

8C. Hydraulic Machinery

DISPERSION OF DREDGE SPOIL DUMPED IN NEAR-SHORE WATERS,
Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W75-05167

MEASURING SEWAGE FLOW USING WEIRS AND FLUMES,
Ontario Ministry of the Environment, Toronto. Project Operations Branch.
For primary bibliographic entry see Field 5D.
W75-05326

8D. Soil Mechanics

ESTABLISHMENT OF OPERATIONAL GUIDELINES FOR TEXAS COASTAL ZONE MANAGEMENT: INTERIM REPORT ON RESOURCE CAPABILITY,
Texas Univ. at Austin.
For primary bibliographic entry see Field 2L.
W75-04851

ENGINEERING AND ECOLOGICAL EVALUATION OF ARTIFICIAL-ISLAND DESIGN, RINCON ISLAND, PUNTA GORDA, CALIFORNIA,
Blume (John A.) and Associates, Engineers, San Francisco, Calif.
J. M. Keith, and R. E. Skjei.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 740, $4.75 in paper copy, $2.25 in microfiche. Technical Memorandum No. 43, March 1974. 76 p, 16 fig, 4 tab, 8 ref, append. DACW72-73-C-0004.

Descriptors: *Littoral drift, *Bottom sediments, *Islands, Bathymetry, Marine biology, *Ecology, Biota, Marine plants, Retaining walls, *California, Environmental effects.
Identifiers: *Rincon Island(Calif), Causeways.

Rincon Island, Punta Gorda, California, is an offshore island with an ocean exposure man-made in 1958. Located in 45 feet of water, it is composed of armor rock and tetrapod revetments enclosing a sand core. A pile-supported causeway about 2700 feet long connects the island to the shore. Major findings of an evaluation of the island's performance in the more than 14 years of its existence showed: that the revetment had not been damaged by wave attack; that subsidence ranging from about 3 inches to 1.5 feet had occurred, mainly due to the deterioration of some inferior material in the revetment; that littoral transport had been almost unaffected; that adjacent bottom topography showed minor changes; and that a large, thriving community of marine organisms had developed in the environment created by the island. Recommendations for instrumentation to provide measurement of waves and nearby bottom sedimentation were included. (Roberts-ISWS)
W75-05117

8G. Materials

THE CHEMICAL TREATMENT OF COOLING WATER,
Standard Oil Co. of California, San Francisco.
For primary bibliographic entry see Field 5D.
W75-04964

DEVELOPMENT OF A COMPUTER-AIDED PROCEDURE FOR THE NATIONAL PROGRAM OF INSPECTION OF DAM.,
National Aeronautics and Space Administration, Houston, Tes. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-05134

8I. Fisheries Engineering

WATER POLLUTION AS A CONSTRAINT TO THE DEVELOPMENT OF MARINE FARMING,
Nansei Regional Fisheries Research Lab., Maruishi (Japan).
For primary bibliographic entry see Field 5C.
W75-05013

FISHERY BULLETIN, VOL 69, NO 1, JANUARY 1971,
National Marine Fisheries Service, Seattle, Wash.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-73-10522, $3.25 in paper copy, $2.25 in microfiche. NOAA XFWFA 69-1. January 1971. 256 p, 77 fig, 85 tab, 284 ref.

Descriptors: *Shellfish, *Marine fish, Ecology, Fish physiology, Metabolism, Larvae, Reproduction, Proteins, Distribution, Pacific Ocean, Productivity, Growth rates, Oregon, Phytoplankton, Fish food organisms, Fish diseases, Chlorophyll, Shrimp, Model studies, Salmon, Fish management, Food processing industry, Proteins, Storage, Fish harvest, Fourier analysis, Hawaii, Organoleptic properties, Herrings, Fish farming.
Identifiers: Euphausia pacifica, Urophycis chuss, Cyprinodon macularius, Bairdiella icistia, Penaeus aztecus, Merluccius products, Clupea harengus pallasi.

Thirteen reports and two notes are presented on fishery science and fish processing. Kind and abundance of fish larvae in the eastern tropical Pacific are described. The abundance, accelerated growth rates, and size structure of Euphasia pacifica off Oregon were investigated. Phytoplankton production and ecological efficiency of a pelagic mysic shrimp were estimated. A linear-programming model was constructed to allocate the salmon catch among the days of the salmon run. One study determined whether cooking lean, whole fish before they are extracted by solvent affects the chemical nutritional characteristics of the resulting protein concentrate. Red hake, Urophysis chuss, stored in ice is suitable for fish protein concentrate production. The desert pupfish, Cyrinodon macularius, may be reared in the laboratory for study. Capture, transport, disease treatment, and laboratory maintenance of the gulf croaker, Bairdiella icistia, are described. Harmonic functions have been fitted to time-series, sea-surface temperatures and salinities to facilitate studies of the oceanographic climate near Hawaii and Christmas Island. Flavoring materials to mask the fish oil odor in pharmaceuticals were investigated. The larval and first postlarval stages of the brown shrimp are described. Protein autolysis rate was determined on hake and Pacific herring as it affects the yield of protein concentrates. (See also W75-05017 thru W75-05031) (Jones-Wisconsin)
W75-05016

KIND AND ABUNDANCE OF FISH LARVAE IN THE EASTERN TROPICAL PACIFIC, BASED ON COLLECTIONS MADE ON EASTROPAC I,
National Marine Fisheries Service, La Jolla, Calif. Fishery-Oceanography Center.
E. H. Ahlstrom.
Fishery Bulletin, Vol 69, No 1, p 3-77, 1971. 15 fig, 29 tab, 36 ref.

Descriptors: *Marine fish, *Larvae, *Pacific Ocean, *Tropical regions, Euphotic zone, Surveys, Varieties, Distribution.
Identifiers: California current.

Most oceanic fishes' pelagic eggs and/or larvae are distributed in or just below the photic zone, i.e., within the upper 150 to 200 m. Once larvae were identified and enumerated, it became obvious that this was an exceptionally useful tool for evaluating fish resources. Kinds and counts of fish larvae were obtained in 482 oblique plankton hauls taken over an extensive area of the eastern tropical Pacific on EASTROPAC I, a four-vesses cooperative survey during February-March 1967. On the basis of larvae abundance, the dominant fish group in oceanic waters are the myctophid lanternfishes (47%), gonostomatid lightfishes (23%), hatchet fishes, Sternoptychidae (6%), bathylagid smelts (5%). Scombrid larvae ranked fifth, and exceeded 2%. Two kinds of larvae were outstandingly abundant: larvae of the lanternfish Diogenichthys laternatus made up over 25% of the total, while larvae of the gonostamatid genus Vinciguerria made up almost 20%. More fish larvae were obtained per haul, on the average, in the eastern tropical Pacific than were obtained per haul in

the intensively surveyed waters of the California Current region off California and Baja California. (See also W75-05016) (Jones-Wisconsin)
W75-05017

SIZE STRUCTURE AND GROWTH RATE OF EUPHAUSIA PACIFICA OFF THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
M. C. Smiles, Jr., and W. G. Pearcy.
Fishery Bulletin, Vol 69, No 1, p 79-86, 1971. 5 fig, 1 tab, 30 ref. NSF GB-5494, AEC AT(45-1)-1750; RLO 1750-50.

Descriptors: *Marine animals, *Crustaceans, *Size, *Growth rates, *Oregon, Coasts, Fish food organisms, Pacific Ocean, Ecological distribution, Larvae, Spawning.
Identifiers: *Euphausia pacifica.

Euphausiids are an important food for many marine carnivores. Euphausia pacifica is one of the most abundant euphausiids in the North Pacific Ocean. Dense populations are found in subartic and transitional waters and off the Oregon coast. Because growth rates are needed to understand the ecology and energetics of a species, this study was undertaken on the abundance, size structure, and growth rate of E. pacifica off Oregon, where it has a maximum life expectancy of about 1 year; during this time it grows rapidly to a length of 22-24 mm. Furcilia larvae were found throughout the year but were most abundant during the autumn months. The population density and the proportion of juveniles was higher within 25 miles of the coast than in offshore oceanic waters. Growth rates off Oregon are about twice those previously reported for this species from other regions. Spawning also appears to be latter in the year. All these features may be explained by the high primary production which is extended throughout the summer by coastal upwelling and by the lack of wide seasonal fluctuations of water temperatures along the Oregon coast. (See also W75-05016) (Jones-Wisconsin)
W75-05018

ESTIMATING PHYTOPLANKTON PRODUCTION FROM AMMONIUM AND CHLOROPHYLL CONCENTRATIONS IN NUTRIENT-POOR WATER OF THE EASTERN TROPICAL PACIFIC OCEAN,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W75-05019

A LINEAR-PROGRAMMING SOLUTION TO SALMON MANAGEMENT,
Washington Univ., Seattle. Center for Quantitative Science; and Washington Univ., Seattle. Fisheries Research Inst.
B. J. Rothschild, and J. W. Balsiger.
Fishery Bulletin, Vol 69, No 1, p 117-140, 1971. 9 fig, 3 tab, 9 ref.

Descriptors: *Linear programming, *Salmon, *Fish management, *Value engineering, Fish harvest, Alaska, Economic efficiency, Decision making, Sockeye salmon.
Identifiers: *Salmon-run allocation, Bristol Bay(Alaska).

A linear-programming model was constructed to allocate the catch of salmon among the days of the salmon run. The objective of the model was to derive a management schedule for catching the salmon which would result in maximizing the value of the landings given certain constraints. On some occassions, the catch is limited by the cannery capacity. Because of the uncertainty of the constraint needed, the model was examined under a variety of escapement conditions, but keeping under each set, what would appear to be a conservatively high male-to-female ratio of at least one male for every three females. The shadow prices are useful in considering various management implications, for example, the egg shadow prices, the cannery shadow prices, and the run shadow prices. An an example, the model was applied to a run of sockeye salmon in Bristol Bay, Alaska. It indicated that the required processing time could be reduced by several days and the value of the fish on the dock increased. (See also W75-05016) (Jones-Wisconsin)
W75-05021

CHEMICAL AND NUTRITIONAL CHARACTERISTICS OF FISH PROTEIN CONCENTRATE PROCESSED FROM HEATED WHOLE RED HAKE, UROPHYCIS CHUSS,
National Marine Fisheries Service, College Park, Md. National Center for Fish Protein Concentrate.
For primary bibliographic entry see Field 3E.
W75-05022

EFFECT OF ICE STORAGE ON THE CHEMICAL AND NUTRITIVE PROPERTIES OF SOLVENT-EXTRACTED WHOLE FISH--RED HAKE, UROPHYCIS CHUSS,
National Marine Fisheries Service, College Park, Md. National Center for Fish Protein Concentrate.
For primary bibliographic entry see Field 3E.
W75-05023

LABORATORY REARING OF THE DESERT PUPFISH, CYPRINODON MACULARIUS,
California State Dept. of Fish and Game, Sacramento. Inland Fisheries Branch.
D. Crear, and I. Haydock.
Fishery Bulletin, Vol 69, No 1, p 151-156, 2 tab, 16 ref.

Descriptors: *Fish, *Laboratory animals, *Spawning, *Killifishes, Technology, Fish reproduction, Laboratory tests, Bioassay, Fish conservation, Fish diseases.
Identifiers: *Desert pupfish, *Euryhaline fish.

The desert pupfish, Cyprinodon macularius is a killifish (Cyprinodontidae native to the Lower Colorado River Basin from southern Arizona to southern California and the Sonoyta River of northern Sonora, Mexico. Its ability to survive in harsh desert environments, plus other important biological characteristics renders it an exceptionally hardy laboratory animal potentially valuable for research in the study of embryology, genetics, physiology, and behavior. It is euryhaline (0-70 salinity) and eurythermal (8-44.6C) and may be useful as a bioassay for either freshwater or marine pollutants. The recent introduction of exotic species and the encroachment of civilization in the Salton Sea area of California have drastically reduced the formerly abundant pupfish populations. Laboratory rearing eliminates the need for continuous exploitation of a rapidly contracting natural population and could supply adequate stocks for sanctuaries, thereby preserving the species from extinction. Laboratory apparatus and conditions are described for maintaining larval and adult pupfish. Parasites and diseases encountered are discussed and successful treatments described. Methods for spawning and rearing the desert pupfish in the laboratory are detailed. (See also W75-05016) (Jones-Wisconsin)
W75-05024

GONAD MATURATION AND HORMONE-INDUCED SPAWNING OF THE GULF CROAKER, BAIRDIELLA ICISTIA,
California State Dept. of Fish and Game, Sacramento. Inland Fisheries Branch.
I. Haydock.
Fishery Bulletin, Vol 69, No 1, p 157-180, 1971. 3 fig, 12 tab, 51 ref.

Descriptors: *Laboratory animals, *Fish reproduction, *Gonads, *Spawning, Salinity, Marine fish, Bioassay, Life cycles, Sexual maturity.
Identifiers: *Gulf croaker, Bairdiella icistia.

The use of hormones was studied in inducing maturation and spawning of the gulf croaker, Bairdiella icistia, both for obtaining eggs for physiological studies of salinity tolerance and for studying factors which influence spawning in marine fishes. Once spawning fish under controlled laboratory conditions had been achieved, influences of biological and physical factors on the spawning process were examined in detail. Succesful methods of capture, transport, disease treatment, and laboratory maintenance of the gulf croaker are described. Gonad maturation was achieved out of season by use of appropriate controlled photoperiods, temperatures, and abundant feeding. Mature fish or fish brought to maturity in the laboratory were spawned with suitable hormone injections and the time of spawning could be accurately predicted. Eggs obtained from hormone-induced spawning were normal in all respects and the larvae were reared through metamorphosis using rotifers and brine shrimp nauplii as food; thus, the life history of this marine fish can, for the first time, be completed under controlled laboratory conditions. The techniques developed for croakers may apply to mariculture, bioassay of marine pollution, and in general research on marine fish reproduction. (See also W75-05016) (Jones-Wisconsin)
W75-05025

HARMONIC FUNCTIONS FOR SEA-SURFACE TEMPERATURES AND SALINITIES, KOKO HEAD, OAHU, 1956-69, AND SEA-SURFACE TEMPERATURES, CHRISTMAS ISLAND, 1954-69,
National Marine Fisheries Service, Monterey, Calif. Environmental and Fishery Forecasting Center.
For primary bibliographic entry see Field 2L.
W75-05026

MASKING UNDESIRABLE FLAVORS IN FISH OILS,
California Univ., Davis. Dept. of Food Science and Technology.
G. Jellinek, and M. E. Stansby.
Fishery Bulletin, Vol 69, No 1, p 215-222, 1971. 1 fig, 3 tab, 4 ref.

Descriptors: *Fish, *Oil, Organoleptic properties, Atlantic menhaden.
Identifiers: *Pharmaceuticals.

Consumer-type panels tested flavoring materials, approved by the Food and Drug Administration, added to medicinal menhaden oil (the fish oil produced in the largest quantity in the United States) to determine its palatability after various storage periods. During a search for suitable masking materials, fresh, specially refined menhaden oil, having a minimum of flavor, was stored with and without added flavoring materials for 5 days at 75F and for longer periods at several lower temperatures. In initial preliminary screening tests with 66 different flavoring materials, the masking of rancid or other unpalatable flavors developing in the stored oil was evaluated by a small panel. In later tests, a larger panel consisting of untrained laboratory personnel was used to determine the preference for the flavors of those materials that were most acceptable in the screening test. Several flavoring materials showed promise, particularly those having the flavor of root beer, lemon, wintergreen (methyl salicylate), and wild cherry. (See also W75-05016) (Jones-Wisconsin)
W75-05027

EARLY DEVELOPMENTAL STAGES OF THE BROWN SHRIMP, PENAEUS AZTECUS IVES, REARED IN THE LABORATORY,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
H. L. Cook, and M. A. Murphy.
Fishery Bulletin, Vol 69, No 1, p 223-239, 1971. 13 fig, 1 tab, 6 ref.

Descriptors: *Shrimp, *Embryonic growth stage, *Larvae, Growth stages, Systematics, Gulf of Mexico, Pink shrimp, Commercial shellfish.
Identifiers: *Brown shrimp, White shrimp.

Thirteen species of panaeid shrimp representing five genera inhabit the shallow nearshore waters of the northwestern Gulf of Mexico. At this time their larvae can only be identified the genus. Within genera the larvae are so similar morphologically that at any given stage the various species cannot yet be distinguished. To answer basic questions about larval distribution, growth, and survival of each species, accurate identification of larvae is essential. The larval and early postlarval stages of the pink shrimp and of the white shrimp had been described. These shrimp have five nauplial, three protozeal, three mysis, and several postlarval stages. Their morphological characteristics during these states are so alike that biologists still encounter difficulty in differentiating them. since the early developmental stages of the brown shrimp have not been described, the larval and first postlarval stages of the brown shrimp, Panaeus aztecus, reared from eggs spawned in the laboratory, as well as the eggs themselves, are described and illustrated. The larvae and first postlarva are compared with those of the pink shrimp, P. duorarum and white shrimp, P. setiferus. (See also W75-05016) (Jones-Wisconsin)
W75-05028

PROTEIN AUTOLYSIS RATES AT VARIOUS PH'S AND TEMPERATURES IN HAKE, MERLUCCIUS PRODUCTUS, AND PACIFIC HERRING, CLUPEA HARENGUS PALLASI, OF FISH PROTEIN CONCENTRATE,
National Marine Fisheries Service, Seattle, Wash. Technology. Lab.
B. Koury, J. Spinelli, and D. Weig.
Fishery Bulletin, Vol 69, No 1, p 241-246, 1971. 6 fig, 11 ref.

Descriptors: *Marine fish, *Food processing industry, *Proteins, Hydrogen ion concentration, Temperature, Herrings, Enzymes.
Identifiers: *Autolysis rates, *Fish protein concentrate, Pacific herring, Hake.

Production of fish protein concentrate requires a process that efficiently removes oil and water from the fish and provides high protein yields. Although FPC can be prepared by several different methods, the most effective procedures developed to date are based on systems in which comminuted fish is successively extracted with a suitable solvent system. . The endogenous proteolytic enzymes in fish hydrolyze the proteins into subunits that are not coagulable by the isopropanol concentration normally used in the preparation of FPC. The preparation FPC made from autolyzing hake showed that the yield bore a close inverse relation to the degree of autolysis. The autolysis rate in Pacific herring and hake were related to pH and temperature, the rates showing an increase with increasing temperature, the rates showing an increase with increasing temperature and a decreasing pH. Maximum activity was reached at about 50C. Inactivation of the enzymic systems occurred when temperatures exceeded 70C. Since the economic success of any method that is used for the preparation of FPC is largely dependent on the yield of finished product obtained from a given amount of raw material, autolysis rates are a process parameter that should be closely controlled. (See also W75-05016) (Jones-Wisconsin)
W75-05029

EQUIPMENT FOR HOLDING AND RELEASING PENAEID SHRIMP DURING MARKING EXPERIMENTS,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
D. A. Emiliani.
Fishery Bulletin, Vol 69, No 1, p 247-250, 1971. 8 fig, 2 ref.

Descriptors: *Laboratory equipment, *Marking techniques, *Shrimp, Fish handling facilities.
Identifiers: Shrimp holding tanks.

The factors considered in the design of a shrimp holding tank are that it had to be relatively light in weight, require little maintenance, and be nontoxic to shrimp. Provisions also were needed to permit rapid water exchange, minimize water turbulence within the tank, and control water temperature. The tank design described in detail meets these specifications and has proved successful for both sea- and land-based operations. To protect shrimp from exposure to predation during their return to the sea floor, an expendable release canister is described which can be put overboard while a vessel is underway, and a release tube for use in shallow water. The canister is constructed of high-impact styrene plastic formed into a hollow cylinder. The design and operation of the canister and release tube are detailed. (See also W75-05016) (Auen-Wisconsin)
W75-05030

AN ADULT BLUEFIN TUNA, THUNNUS THYNUSS, FROM A FLORIDA WEST COAST URBAN WATERWAY,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
R. W. Topp, and F. H. Hoff.
Fishery Bulletin, Vol 69, No 1, p 251-252, 1971. 7 ref.

Descriptors: *Marine fish, *Florida, *Distribution, Gulf of Mexico.
Identifiers: *Bluefin tuna.

The unusual occurrence and capture on May 10, 1970 of a bluefin tuna in the Florida west coast waterway near Hudson adds to the information on the origin and distribution of Gulf of Mexico bluefin tuna stocks. The female specimen, captured with harpoons, weighted 239 kg, was 244 cm in fork length, and 168 cm in girth. Histological examination indicated recent spawning. It is speculated that the specimen is from Caribbean stock or from a stock wintering in the Gulf of Mexico. (See also W75-05016) (Auen-Wisconsin)
W75-05031

RESULTS OF CROSSING BETWEEN WILD AND DOMESTIC CARP (CYPRINUS CARPIO L.), (IN GERMAN),
Institut fuer Binnenfischerei, Berlin (East Germany).
W. Steffens.
Biol Zentralbl. Vol 93, No 2, p 129-139. 1974, Illus.
Identifiers: *Breeding, *Carp(Hybrid), Cyprinus-Carpio, Fish production, Production.

During a hybridization test, domestic female mirror carp were mated with male wild carp, the hybrids then being bred in ponds--for 3 yr--together with pure domestic mirror carp. During the 1st and 2nd breeding yr, the individual weight increase of the hybrids was a little lower than or equal to that of the domestic carp. However, the smaller losses of the hybrids made possible a more favorable increase per ha during these 2 yr. During the 3rd breeding yr there was a lower weight increase of the single fish and also a lower increase in area, with very small losses. As to their body form the hybrids are more slender than the domestic carp. The factors of corpulence of the hybrids are closer to those of the domestic carp than to those of the wild carp. In content of Hb and the number of erythrocytes there is not a difference between the hybrids and the domestic carp. Since there is no interest in scaled carp as edible fish, proposals are made for the production of hybrids back-crossed with mirror carp.--Copyright 1974, Biological Abstracts, Inc.
W75-05164

PRIMARY AND BACTERIAL PRODUCTION OF SOME FISHERY PONDS OF THE VOLGA DELTA, (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Astrakhan (USSR).
A. F. Sokol'skii.
Gidrobiol Zh. Vol 9, No 6, p 77-82. 1973, Illus.
Identifiers: *Bacterial production, Carp, Deltas, Fertilizers(Organic), *Fishery ponds, *Primary production, Sturgeion, *USSR(Volga delta).

Data are presented on the primary and bacterial production of 2 carp finishing ponds and 2 carp and 2 sturgeon fingerling ponds in the Volga delta (USSR), with and without the application of fertilizer. The role of bacterioplankton in production was very low, which indicated a need to increase the application of organic fertilizers.--Copyright 1974, Biological Abstracts, Inc.
W75-05334

9. MANPOWER, GRANTS AND FACILITIES

PUERTO RICO NUCLEAR CENTER, ANNUAL REPORT, 1973.
Puerto Rico Univ., San Juan.
For primary bibliographic entry see Field 5A.
W75-05350

9A. Education (Extramural)

ANNUAL REPORT, FY 1974, WATER RESOURCES RESEARCH INSTITUTE OF THE UNIVERSITY OF NORTH CAROLINA.
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 9D.
W75-04937

WATER RESOURCES CENTER ANNUAL REPORT, JULY 1, 1973-JUNE 30, 1974.
California Univ., Davis. Water Resources Center.
For primary bibliographic entry see Field 9D.
W75-05266

9C. Research Facilities

WORLD DIRECTORY OF ENVIRONMENTAL RESEARCH CENTERS.
For primary bibliographic entry see Field 10D.
W75-04971

9D. Grants, Contracts, and Research Act Allotments

ANNUAL REPORT, FY 1974, WATER RESOURCES RESEARCH INSTITUTE OF THE UNIVERSITY OF NORTH CAROLINA.
North Carolina Water Resources Research Inst., Raleigh.
Available from the National Technical Information Service Springfield Va 22161 as PB-239 794, $4.25 in paper copy, $2.25 in microfiche. Report UNC-WRRI-74-00, (1974), 72 p. OWRT A-999-NC(44), 14-31-0001-3533.

Descriptors: *Water Resources, Education, *North Carolina, *Water Resources Institute, Research and development, Universities, Training, Projects, Grants, Contracts.

The Water Resources Research Institute is The university of North Carolina's water research center. Located at N.C. State University at Raleigh, the Institute serves all sixteen campuses of the University of North Carolina System. It works closely with the Department of Natural and Economic Resources and other agencies in the formulation of a research program responsive to State water resource problems. A 26-man Advisory Committee representative of State and Federal water agencies, industry, conservation, agriculture, local government, and the general public provides program guidance and review. The Institute's research program for FY 1973-74 was supported by an annual allotment and 13 matching grants from the Office of Water Research and Technology, USDI; a grant from EPA; matching State appropriations; matching funds from Pickle Packers International, Inc.(made direct to the principal investigator); and grants from the Division of Environmental Management, N.C. Department of Natural and Economic Resources. All senior colleges and universities in North Carolina are eligible to participate in the Institute's program. During FY 1973-74, projects were conducted at N.C. State University, University of North Carolina at Chapel Hill, Duke University, and East Carolina University. (Howells-North Carolina State)
W75-04937

WATER RESOURCES CENTER ANNUAL REPORT, JULY 1, 1973-JUNE 30, 1974.
California Univ., Davis. Water Resources Center.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 953, $4.75 in paper copy, $2.25 in microfiche. University of California Water Resources Center Report No. 30, February 1975, 90 p. OWRT A-999-CAL(9).

Descriptors: Project planning, *Research and development, Water resources, *California, *Water Resources Institute, Universities, Training, Grants, Contracts, *Projects, Project purposes.

The principal investigators of fresh water projects sponsored by the University of California Water Resources Center have submitted their annual reports, from which the most essential information has been abstracted. The narratives have been purposely kept brief. Each emphasizes, wherever possible, the hard results and the actual or potential applications of those results to benefit affected interests. Shown also are starting and scheduled ending dates for each research project. The reader may infer from these the relative degree of progress achieved to date, together with an indication of when further information might become available--usually at least six months after completion of the project for any detailed account. Both State of California and Federally funded research activities are included. (Snyder-Californi, Davis)
W75-05266

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

INFORMATION SYSTEMS IN ENVIRONMENTAL RESEARCH AND DECISION-MAKING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6B.
W75-05301

WAMIS--A BIBLIOGRAPHIC INFORMATION SYSTEM FOR WATER YIELD IMPROVEMENT,
Arizona Unov., Tuscon. Dept. of Watershed Management.
L. M. White.
Arizona Water Resources Project Information, Project Bulletin No 6, August 1974, 3 p. OWRT A-042-ARIZ(5) 14-31-0001-3803.

Descriptors: *Information retrieval, *Bibliographies, *Water yield improvement, *Vegetation effects, *Land management, *Watershed management, Forest management, Water yield, Water sources, Arizona, Southwest U.S., Computers.

A computer is being used to provide references to other research efforts and published results of studies for water resource managers, through the Watershed Management Information System (WAMIS), at the University of Arizona. This bibliographic information system centers on research relevant to the development of the Arizona Watershed Program. The primary topic covered in WAMIS is vegetation management practices and treatments (Such as clearcutting, conversion, chemical controls, or burning) and their effects on water, other natural resources, or resource-based products in the treated areas. By storing the citations to appropriate documents and their abstracts on computer tape and by indexing them according to their content, not by just words used in the title of the citation, WAMIS can respond to individual requests for bibliographic references on a specific basis or a general basis, depending on the needs of the user, who receives a computer printout of citation, abstract, and keywords. Documents are indexed under a varity of keywords, such as interception, erosion control, livestock, timber management, forage production, land use, and wildlife management. WAMIS works in cooperation with the Arid Lands Information System, also at the University of Arizona. (See also W75-05303)
W75-05302

A BIBLIOGRAPHIC INFORMATION SYSTEM FOR WATER YIELD IMPROVEMENT PRACTICES,
Arizona Univ., Tucson. Dept. of Watershed Management.
L. M. White.
In: Hydrology and Water Resources in Arizona and the Southwest, Vol 4, p 231-235, Proceedings of the 1974 meetings of the American Water Resources Association, Arizona Section, and the Arizona Academy of Science, Hydrology Section, Flagstaff, Arizona, April 19-20, 1974. 1 fig, 2 ref. OWRT A-042-ARIZ(4) 14-31-0001-3803.

Descriptors: *Information retrieval, *Bibliographies, *Water yield improvement, *Vegetation effects, *Land management, *Watershed management, *Arizona, Forest management, Water yield, Water sources, Southwest U.S., Computers.

Effects of vegetation management on water and other renewable natural resources and amenities are subjects of a computerized reference retrieval information system operated out of the Department of Watershed Management, University of Arizona. Although WAMIS (Watershed Management Information System is a subsystem of the Arid Lands Information System, it has its own unique scope. The system, which serves as a link between bibliographic material and users who need access to the information, provides a personalized bibliography for the user in his area of interest. Documents identified as relevant to the system's scope are abstracted and indexed, and references stored in a computer bank. In response to specific inquiries from users, the computer tapes are searched under indexing terms, author, and/or data, and a printout of citations (Giving author, data, title, source, abstract, and indexing terms) relevant to the inquiry is sent to the user. (See also W75-05302)
W75-05303

10B. Reference and Retrieval

TECHNIQUES FOR TRACING SEDIMENT MOVEMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2J.
W75-04889

BIBLIOGRAPHY OF WATER POLLUTION CONTROL BENEFITS AND COSTS,
Development Planning and Research Associates, Inc., Manhattan, Kans.
For primary bibliographic entry see Field 5G.
W75-05077

LIVESTOCK AND THE ENVIRONMENT, A BIBLIOGRAPHY WITH ABSTRACTS,
East Central State Coll., Ada, Okla. School of Environmental Science.
R. H. Ramsey.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $3.50. Environmental Protection Agency, Technology Series Report, EPA-660/2-74-024, April 1974, 357 p. R801454.

Descriptors: *Bibliographies, Cattle, Sheep, Hogs, Poultry, *Fish farming, *Feedlots, *Confinement pens, *Research and development, *Farm wastes, Waste identification, Waste treatment, Waste storage, Waste disposal, Agricultural runoff, Abstracts.
Identifiers: *Waste management, Title index, Author index, Keyword index, Animal information categories index.

Management and research information on animal wastes has expanded rapidly in recent years. This material has appeared in diverse sources such as journal articles, conference proceedings papers, university or government publications, magazine articles, books, and theses. This bibliography (an updated and revised extension of the BIBLIOGRAPHY OF LIVESTOCK WASTE MANAGEMENT EPA-R2-72-101 which was published by J. R. Miner, D. Bundy, and G. Christenbury at Iowa State University, See W73-06214) was compiled in order to speed the flow of information on findings in one segment of the livestock industry to other segments that could benefit from this technology. Included are the following indexes: (1) title, (2) author, (3) keyword, (4) animal information categories. These indexes are followed by a section of abstracts of each reference entry found in the bibliography. Single copies of most articles can be obtained in hard copy or microfiche form at cost from the Animal Waste Technical Information Center, School of Environmental Science, East Central State College, Ada, Oklahoma 74820. (EPA)
W75-05084

WATER RESOURCES DEVELOPMENT, 1950-1965, AN INTERNATIONAL BIBLIOGRAPHY,
Center of Scientific and Technological Information, Tel Aviv (Israel). Library Services.
H. Wellisch.
Israel Program for Scientific Translations, Jerusalem (Israel), p 135, 1967.

Descriptors: *Bibliographies, *Water resources, Water chemistry, Hydraulic equipment, Hydrodynamics, Irrigation, Drainage, Public health, Waste treatment, Water resources development, Water supply, Water treatment, Documentation, Information retrieval.

This bibliography is composed of three parts. Part I contains a listing of over 1780 books and monographs, arranged in classified order according to the Universal Decimal Classification (UDC). Two subject indexes were provided, an alphabetical subject index and a subject index by UDC num-

bers. A name index contains names of authors, editors, translators, and corporate bodies both as authors and sponsoring agencies. Part II contains a list of 142 periodicals and yearbooks, along with a subject index. Part III has a tabulation of abstracting and indexing services, also a subject index. Catagories of the Part III subject index are: chemistry of water, hydraulic machines, hydrodynamics, hydrology, irrigation and drainage, public health engineering, waste treatment, water resources development, water supply, and water treatment. (Sims-ISWS)
W75-05154

INFORMATION SYSTEMS IN ENVIRONMENTAL RESEARCH AND DECISION-MAKING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6B.
W75-05301

WASTEWATER COLLECTION (LITERATURE REVIEW),
Nottingham (H.D.) and Associates, McLean, Va.
For primary bibliographic entry see Field 5D.
W75-05335

10C. Secondary Publication And Distribution

A REVIEW OF THE LITERATURE CONCERNING THE STEEL INDUSTRY AND POLLUTION. PART 1. THE BACKGROUND TO POLLUTION,
British Steel Corp., Sheffield (England). Information Services.
For primary bibliographic entry see Field 5G.
W75-05093

BIBLIOGRAPHIES PERTINENT TO WILDLAND HYDROLOGY,
Utah State Univ., Logan. Dept. of Range Science.
G. F. Gifford.
Watershed Science Unit Bibliography Series No 2, p 9, 1975.

Descriptors: *Bibliographies, *Hydrology, *Watershed management, *Water resources, *Water pollution, Remote sensing, Wastes, Thermal pollution, Runoff, Erosion, Groundwater, Geothermal studies, Droughts, Evapotranspiration, Evaporation control, Strip mines, Sedimentation, Snowmelt, Forest fires, Economics, Documentation, Information retrieval.
Identifiers: Wildlands, Botany.

Listed were 94 bibliographical entries related to wildland hydrology. Subject areas covered were very broad and included, but were not limited to, the following catagories: hydrology, remote sensing, watershed management, water resources, wastes, water pollutin, thermal pollution, runoff, erosion, groundwater, geothermal resources, droughts, evapotranspiration, evaporation suppression, strip-mine reclamation, sedimentation, snow hysrology, forest fires, botany, and economics. (Sims-ISWS)
W75-05153

10D. Specialized Information Center Services

ENVIRONMENT U.S.A.: A GUIDE TO AGENCIES, PEOPLE, AND RESOURCES.
For primary bibliographic entry see Field 6G.
W75-04946

WORLD DIRECTORY OF ENVIRONMENTAL RESEARCH CENTERS.
Oryx Press/R. R. Bowker Company (New York and London), 2nd Edition, 1974, 330 p. W K Wilson, M D Dowd, and P Sholtys, editors.

Descriptors: *Research facilities, *Environmental, Biology, Engineering, Geology, Physics, Social aspects, Personnel, Administration, Organizations, Education, Governments, Professional societies, Industries, Laboratories, Institutions, Water resources.
Identifiers: *Directories.

This list of global research institutes concerned with environmental biology, chemistry, engineering, geology, physics, social sciences, and interdisciplinary studies gives the names, addresses, and directors/administrators of various educational-academic, government, professional, industrial-commercial, and miscellaneous organizations in two sequencies, namely, by discipline and by country. (Brown-IPC)
W75-04971

MASS MEDIA HANDBOOK FOR WATER RESOURCES RESEARCH DIRECTORS,
Missouri Univ., Columbia. Coll. of Agriculture.
For primary bibliographic entry see Field 06B.
W75-05261

10F. Preparation Of Reviews

WASTEWATER COLLECTION (LITERATURE REVIEW),
Nottingham (H.D.) and Associates, McLean, Va.
For primary bibliographic entry see Field 05D.
W75-05335

SUBJECT INDEX

2

GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

ABSORPTION

Feeding in the Porcelain Crab, Petrolisthes Cinctipes (Randall) (Anomura: Porcellanidae),
W75-04907 2I

Nomographic Interpretation of Water Absorption Data in Terms of a Two-Parametric Diffusivity-Water Content Function,
W75-05180 2G

The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

ACCURACY

Interlaboratory Quality Control Study No 6: Specific Conductance, pH, Colour and Residue,
W75-04887 2K

ACIDIC WATERS

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

ACTIVATED CARBON

Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

ACTIVATED SLUDGE

Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

Cost Optimization of Activated Sludge Systems,
W75-04990 5D

ADJUSTMENT ASSISTANCE POLICIES

Evaluation of Adjustment Assistance Programs with Application for Pollution Control,
W75-05074 5G

ADMINISTRATION

Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

ADMINISTRATIVE AGENCIES

An Approach to the Control of Toxic Substances,
W75-05300 5G

California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

ADSORPTION

Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

AERATION

Bethlehem Treats 80 Million Gallons of Wastewater Each Day.
W75-04993 5D

AERIAL PHOTOGRAPHY

Remote Sensing Potentials for Resource Management,
W75-04922 5A

Use of Remote Sensing in Agriculture,
W75-05107 7B

The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

AEROBIC TREATMENT

Cost Optimization of Activated Sludge Systems,
W75-04990 5D

AGE

Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

AGGRADATION

Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

Bed Slopes of Aggraded Channels with Two Degrees of Freedom,
W75-05254 8B

AGGRESSIVE BEHAVIOUR (FISH)

Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

AGRICULTURAL RUNOFF

Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

AGRICULTURE

Use of Remote Sensing in Agriculture,
W75-05107 7B

Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

Research in Remote Sensing of Agriculture, Earth Resources, and Man's Environment,
W75-05132 7B

Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

AIR DIFFUSERS

They're Forever Blowing Bubbles.
W75-05328 5D

AIR POLLUTION

Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

AIR-SEA INTERACTIONS

Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

AIRCRAFT

Second Annual Report, Dot-CIAP Program,
W75-05349 2B

ALABAMA

Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

ALASKA

Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

ALBERTA

Hydrogeology of the Lethbridge-Fernie Area, Alberta,
W75-05151 2F

ALBERTA (CANADA)

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

ALGAE

Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

ALGAL CONTROL
The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

ALGORITHMS
A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

ALLUVIAL CHANNELS
Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

Flow Resistance in Sand Bed Channels,
W75-05220 8B

Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

The Influence of the Relative Depth on Threshold of Grain Motion,
W75-05222 2J

Instantaneous Turbulent Flow Acts on the Sand Particle to Start the Rotation on the Bed,
W75-05223 2J

A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

Studies on Bed-Load Transport Rate in Open Channel Flows,
W75-05226 8B

Bed Material Transport in Sand Bed Channels,
W75-05233 2J

Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

Condition for the Formation of Alternate Bars in Straight Alluvial Channels,
W75-05245 8B

Stable Channels in Alluvium,
W75-05248 8B

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

Stable Channels in Alluvial Material,
W75-05250 8B

ALTERNATE PLANNING
Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

ALTERNATIVE PLANNING
Optimal Expansion of a Water Resources System,
W75-05315 6A

ALUM TREATMENT
Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

ALUMINA ADSORPTION
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

ALUMINUM
Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

AMMONIA RECOVERY
Recovery of Residual Ammonia from Weak Aqueous Solutions Thereof,
W75-05332 5D

AMORPHOUS SOLID D20
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

AMORPHOUS SOLID WATER
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

AMPEROMETRIC METHOD
Measurement of Residual Chlorine Levels in Cooling Water--Amperometric Method,
W75-05088 5A

ANACORTES (WASH)
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

ANAEROBIC CONDITIONS
Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

ANAEROBIC DIGESTION
Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

ANALYTICAL TECHNIQUES
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

Remote Sensing Potentials for Resource Management,
W75-04922 5A

Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

Theory of Viscous Flow in Wide Curved Open Channels,
W75-05208 8B

Sediment Equilibrium Considerations in the Design of Irrigation Canal Networks,
W75-05252 8B

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

Total Mercury Monitor,
W75-05333 5A

ANTECEDENT PRECIPITATION
Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

ANTIMONY
Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

AQUATIC ENVIRONMENT
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

AQUATIC LIFE
Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

AQUATIC WEED CONTROL
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

History of Aquatic Herbicides, Biological Control, Practical Aspects of the Use of Chemicals in Water Weed Control,
W75-05041 5G

Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

AQUEOUS SOLUTIONS
Water and Aqueous Solutions: Introduction to a Molecular Theory,
W75-04970 1B

Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

AQUICULTURE
Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

AQUIFER MANAGEMENT
Management of Waste Fluids in Salaquifers,
W75-05191 5B

AQUIFERS
Geohydrologic Relationships in Water Pollution,
W75-05128 5G

ARCTIC
Research Projects in Glaciology - 1974,
W75-04884 2C

Runoff from a Small Arctic Watershed,
W75-05144 2C

AREAL HYDROGEOLOGY
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

ARIZONA
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

AROCLOR
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

ARSENIC
Arsenic Contamination of Drinking Water and Food-Stuffs Causing Endemic Chronic Poisoning,
W75-05177 5C

ARSENIC COMPOUNDS
Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

ARTIFICIAL PRECIPITATION
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

ASSESSMENT
Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

ASSESSMENTS
Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

ATLANTIC OCEAN
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

Mean Length of Runs of Ocean Waves,
W75-05160 8B

ATMOSPHERE
Second Annual Report, Dot-CIAP Program,
W75-05349 2B

ATMOSPHERIC CHEMISTRY
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

ATOMIC ABSORPTION SPECTROMETRY
The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

ATTISHOLZ PROCESS
Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

ATTITUDES
Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

The Effect of Park Use on Surface Water Quality,
W75-05306 5B

AUSTRALIA
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

AUSTRALIA (LANG LANG RIVER)
Lang Lang River, Victoria Attempts to Control Sediment, Erosion and Floods,
W75-05212 4D

AUSTRALIA (TASMANIA)
Plankton Populations of Lake Leake and Tooms Lake: Oligotrophic Tasmanian Lakes,
W75-05183 5C

AUTOLYSIS RATES
Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

AUTOMATIC CONTROL
Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

Treat Wastewater Like Downtown Traffic,
W75-05329 5D

AUTOMATION
A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

B1-AVITAMINOSIS
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

BACKWASHING
Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

BACTERIA
Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

BACTERIA GROWTH KINETICS
Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

BACTERIAL PRODUCTION
Primary and Bacterial Production of Some Fishery Ponds of the Volga Delta, (In Russian),
W75-05334 8I

BALTIC SEA (GULF OF BOTHNIA)
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

BANGLADESH (TEESTA RIVER)
Sediment Transport Characteristics of the Teesta River,
W75-05235 2J

BEACHES
Oil Contaminated Beach Cleanup,
W75-05100 5G

BED LOAD
Debris Slopes Above Sand Barriers,
W75-05196 2J

BED LOAD

Bed Material Transport in Sand Bed Channels,
W75-05233 2J

Statistical Regularities in the Movement of Bed Load,
W75-05239 2J

Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

BEETS
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

BEHAVIOR
Behavioral Effects of Methylmercury,
W75-05288 5A

BENEFICIAL USE
Estimating Water Quality Benefits,
W75-05068 5G

BENEFIT MAXIMIZATION
Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

BENEFITS
Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

Estimating Water Quality Benefits,
W75-05068 5G

Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

The Economic and Environmental Benefits from Improving Electrical Rate Structures,
W75-05309 6B

BENTHIC FAUNA
Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

BENTHOS
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

BENTON HARBOR (MICH)
Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

BIBLIOGRAPHIES
Techniques for Tracing Sediment Movement,
W75-04889 2J

Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

A Review of the Literature Concerning the Steel Industry and Pollution. Part 1. The Background to Pollution,
W75-05093 5G

Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

Water Resources Development, 1950-1965, An International Bibliography,
W75-05154 10B

Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

Wastewater Collection (Literature Review),
W75-05335 5D

BILGEWATER
Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

BIO-DISC REACTORS
Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

BIOACCUMULATION
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

BIOASSAY
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

BIOCHEMICAL OXYGEN DEMAND
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

BIOCONTROL
History of Aquatic Herbicides, Biological Control, Practical Aspects of the Use of Chemicals in Water Weed Control,
W75-05041 5G

Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

BIODEGRADATION
Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

BIOINDICATOR
Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

BIOINDICATORS
Indicators of Eutrophication: Visual, Chemical, Physical, Biological,
W75-05046 5C

The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

The Indicator Organisms and their Ecological Variability,
W75-05055 5C

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

BIOLOGICAL COMMUNITIES
Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

BIOLOGICAL TREATMENT
Effluent Toxicity Removal on the West Coast,
W75-04942 5D

Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

BIOSTIMULATION
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

BIOTA
Cluster Analysis and Diversity in Recovery of Damaged Streams,
W75-04934 5C

BIRD EGGS
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

BIRDS
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

BLACK HILL (S. DAK)
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

BLACK LIQUOR
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

BLACKNOSE DACE
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

BLEACHING WASTES
Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

BLUE CRABS
Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

BLUEFIN TUNA
An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

BOILER FEED WATER
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

BORROW PITS
Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

BOTANY
Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

BOTTOM PANELING
Chao Phya River Training Works,
W75-05213 8A

BOTTOM SEDIMENTS
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

BOUNDARIES (SURFACES)
Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

BOUNDARY LAYERS
The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

BRANDYWINE CREEK (DEL)
Flood Plain Information: Brandywine Creek, New Castle County, Delaware,
W75-04855 4A

BREAKWATERS
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

BREEDING
Results of Crossing Between Wild and Domestic Carp (Cyprinus Carpio L.), (In German),
W75-05164 8I

BRIDGES
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

BRINE PONDS
Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

BROWN PELICAN
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

BROWN SHRIMP
Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

BUBBLES
They're Forever Blowing Bubbles.
W75-05328 5D

BULLHEADS
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

CADMIUM
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

CALCINATION
Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

CALIFORNIA
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

Water Resources Center Annual Report, July 1, 1973-June 30, 1974.
W75-05266 9D

CALIFORNIA ENVIRONMENTAL QUALITY ACT
California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

CALVERT CLIFFS SITE (MD)
Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

Benthic Animal-Sediment,
W75-05343 5A

Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

CAMERAS
An Automatic Underwater Camera System,
W75-05048 5A

CANADA
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

Hydrologic Forecasting in the Water Resources Branch,
W75-04881 4A

Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

CANADA

Research Projects in Glaciology - 1974,
W75-04884 2C

Sediment Loads in Canadian Rivers,
W75-04886 2J

Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

At Abitibi, Iroquois Falls, $2.5-Million Primary Treatment System Nears Completion.
W75-04976 5D

Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

Discharge of Selected Rivers of Canada.
W75-05136 2E

Discharge of Selected Rivers of Canada, Supplement 1.
W75-05137 2E

Permafrost Hydrology.
W75-05138 2C

Permafrost-Hydrology Studies at Boot Creek and Peter Lake Watersheds, N.W.T.,
W75-05143 2C

Groundwater in Permafrost Regions of Canada,
W75-05150 2C

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

CANADIAN NATIONAL COMMITTEE
Discharge of Selected Rivers of Canada, Supplement 1.
W75-05137 2E

CANALS
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

CAPILLARY MEMBRANE DIALYSIS
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

CARBOHYDRATES
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

CARBON
Carbon and Color Distribution in Various Size Fractions of Treated Pulp Mill and Board Mill Waste Effluents,
W75-04948 5B

CARBON TO AMMONIA NITROGEN RATIO
Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

CARP
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

CARP (HYBRID)
Results of Crossing Between Wild and Domestic Carp (Cyprinus Carpio L.), (In German),
W75-05164 8I

CARRYING CAPACITY
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

CAYUGA LAKE (NY)
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

CELLULOSE ACETATE
Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

CHANNEL EROSION
Scouring Capacity of Flow in Narrow Open Channels,
W75-05258 8B

CHANNEL IMPROVEMENT
Chao Phya River Training Works,
W75-05213 8A

CHANNEL MORPHOLOGY
Condition for the Formation of Alternate Bars in Straight Alluvial Channels,
W75-05245 8B

Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

CHANNEL SYSTEM CONCEPT
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

CHANNELS
A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

Stable Channels in Alluvium,
W75-05248 8B

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

Stable Channels in Alluvial Material,
W75-05250 8B

Design of Scour-Free Channels on Mild Slopes,
W75-05251 8B

CHELATION
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

CHEMCONTROL
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

Physical-Chemical Processes,
W75-04984 5D

Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations,
W75-05044 5G

CHEMICAL ANALYSIS
Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

CHEMICAL DEGRADATION
Weathering of Oil at Sea,
W75-05106 5B

CHESAPEAKE BAY
Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

Benthic Animal-Sediment,
W75-05343 5A

Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

CHILE (ANTOFAGASTA)
Arsenic Contamination of Drinking Water and Food-Stuffs Causing Endemic Chronic Poisoning,
W75-05177 5C

CHLORAMINES
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

CHLORIDES
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

CHLORINATED HYDROCARBON
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

CHLORINATED HYDROCARBON PESTICIDES
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

CHLORINE
Measurement of Residual Chlorine Levels in Cooling Water--Amperometric Method,
W75-05088 5A

Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

CHLOROPHYLL
Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

Distribution of Chlorophyll a and Related Variables in Ontario Waters of Lake St. Clair,
W75-04900 5C

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

CHOCOLATE BAYOU (TEX)
Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

CHRISTMAS ISLAND
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

CHROMATOGRAPHY
GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

CITRATE
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

CITY PLANNING
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

CIVIL ENGINEERING
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

CLADOPHORA
Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

CLADOPHORA-GLOMERATA
The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

CLASSIFICATION
Delineation of Great Lakes Estuaries,
W75-04912 2H

CLAYPAN SOIL
Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

CLEAR-CUTTING
Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

CLIMATOLOGY
Second Annual Report, Dot-CIAP Program,
W75-05349 2B

CLINCH RIVER (VA-TENN)
Cluster Analysis and Diversity in Recovery of Damaged Streams,
W75-04934 5C

CLINOPTILOLITE
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

CLOSED SYSTEMS
Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

CLOUD PHYSICS
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

Numerical Models for Precipitation Scavenging,
W75-05112 5B

CLOUD SEEDING
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

CLOUDS
Numerical Models for Precipitation Scavenging,
W75-05112 5B

CLUSTER ANALYSIS
Cluster Analysis and Diversity in Recovery of Damaged Streams,
W75-04934 5C

COAGULATION
Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

COAL GASIFICATION
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

COASTAL AQUIFERS
Digital Simulation of Horizontal Salt-Water Encroachment Induced by Fresh-Water Pumping,
W75-04875 2L

COASTAL ENGINEERING
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

COASTAL FISHERIES
Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

COASTAL MARSHES
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

COASTAL STRUCTURES
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

COASTS
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

COLD REGIONS
Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

COLOR
Carbon and Color Distribution in Various Size Fractions of Treated Pulp Mill and Board Mill Waste Effluents,
W75-04948 5B

COLOR

Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

COLORADO
Snow Interception and Redistribution in the Forest,
W75-04917 2C

Agricultural Land Use in the Poudre Valley,
W75-05260 3F

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

COLORADO RIVER
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

COLORADO RIVER BASIN
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

COLORIMETRY
Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

COMBINED SEWERS
City of Toronto Sewer System,
W75-04864 8A

A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

COMBINED TREATMENT (CHEM-BIO)
Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

COMMUNICATION
Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

COMPETITION
Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

COMPREHENSIVE PLANNING
Introduction,
W75-05316 6A

COMPRESSIBLE FLOW
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

COMPUTER MODELS
Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

COMPUTER PROGRAMS
Stream Programmer's Manual.
W75-04874 7C

Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

Development of a Two-Channel Linear Discriminant Function for Detecting and Identifying Surface Water Using ERTS-1 Data.
W75-05103 7C

Evaluation of Computer-Aided Procedure for Detecting Surface Water.
W75-05104 7C

Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

Development of a Computer-Aided Procedure for the National Program of Inspection of Dam.,
W75-05134 7C

CONFERENCES
Permafrost Hydrology.
W75-05138 2C

Sediment Transportation, Volume I.
W75-05192 2J

CONFINEMENT PENS
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

CONNECTICUT
Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

CONSTRUCTION
Wastewater Collection (Literature Review),
W75-05335 5D

CONSTRUCTION COSTS
Dollar Gain to Top Cost Climb in 1975 Sewerage Construction.
W75-05325 5D

CONSTRUCTION RELATED EROSION
Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

CONSUMPTIVE USE
Agricultural Land Use in the Poudre Valley,
W75-05260 3F

CONTAMINANTS
Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

CONTINENTAL SHELF
Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

CONTINUOUS RANDOM NETWORK
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

CONTROL SYSTEMS
Treat Wastewater Like Downtown Traffic,
W75-05329 5D

CONVECTION
Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

COOLING TOWERS
The Chemical Treatment of Cooling Water,
W75-04964 5D

Measurement of Residual Chlorine Levels in Cooling Water--Amperometric Method,
W75-05088 5A

COOLING WATER
The Chemical Treatment of Cooling Water,
W75-04964 5D

CORN (FIELD)
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

CORRELATION ANALYSIS
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

Cluster Analysis and Diversity in Recovery of Damaged Streams,
W75-04934 5C

Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

CORROSION
Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

COSHOCTON (OHIO)
Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

COST-BENEFIT ANALYSIS
Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

COST COMPARISONS
Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

COST MINIMIZATION
A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

COST SAVINGS
The Economic and Environmental Benefits from Improving Electrical Rate Structures,
W75-05309 6B

COST SHARING
Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

COSTS
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

Cost Optimization of Activated Sludge Systems,
W75-04990 5D

COTTON
Diurnal Cycling in Root Resistance to Water Movement,
W75-04885 3F

COULOMETRY ANALYZERS
Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

CRABS
Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

CRABS (PORCELAIN)
Feeding in the Porcelain Crab, Petrolisthes Cinctipes (Randall) (Anomura: Porcellanidae),
W75-04907 2I

CROP INSURANCE
Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

CROP PRODUCTION
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

CROPS PRODUCTION
Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

CRUSTACEANS
Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

CULVERTS
Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

CURRENTS (WATER)
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

CYANIDE COMPLEXING
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

CYANOPHTYA
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

CYANOPHYTA
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

CYCLING (DIURNAL)
Diurnal Cycling in Root Resistance to Water Movement,
W75-04885 3F

CYCLING NUTRIENTS
The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

CYTOLOGICAL STUDIES
The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

DACTYLIS-GLOMERATA
The Course and Magnitude of Water Stress in Lolium Perenne and Dactylis Glomerata,
W75-05056 3F

DALLAS (TEXAS)
Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

DAMS
Development of a Computer-Aided Procedure for the National Program of Inspection of Dam.,
W75-05134 7C

Scour at Downstream End of Dams in Taiwan,
W75-05204 8B

Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

DAPHNIA
Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

DATA COLLECTIONS
Environmental Contaminants Inventory Study No 1: Statistics on the Use of Pest Control Products in Canada,
W75-04880 5G

Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

Discharge of Selected Rivers of Canada.
W75-05136 2E

Discharge of Selected Rivers of Canada, Supplement 1.
W75-05137 2E

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

DATA PROCESSING
A Procedure for Automated Land Use Mapping Using Remotely Sensed Multispectral Scanner Data,
W75-05096 7C

Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

DATA STORAGE AND RETRIEVAL
Stream Programmer's Manual.
W75-04874 7C

Hydrological Data Bank - Present Status,
W75-04882 7C

Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

DATA SYNTHESIS (RAINFALL)
On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

DDD
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

DDE
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

DDT
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

DEBRIS SLOPES
Debris Slopes Above Sand Barriers,
W75-05196 2J

DECISION MAKING
Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

DECOMPOSING ORGANIC MATTER
The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

DEEP PERCOLATION
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

DEGRADATION (STREAM)
Comprehensive Graphs of Regime Data,
W75-05247 2J

DEHYDROGENASE ACTIVITY
Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

DELAWARE
Flood Plain Information: Brandywine Creek, New Castle County, Delaware,
W75-04855 4A

DEMONSTRATION WATERSHEDS
Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

DENITRIFICATION
The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

DEPOSITION (SEDIMENTS)
Debris Slopes Above Sand Barriers,
W75-05196 2J

Effect of Physico-Chemical Properties of Fine Suspended Sediment on the Degree of Deposition,
W75-05230 2J

Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

DEPOSITIONSEDIMENTS)
Sediment Transportation, Volume I.
W75-05192 2J

DEPTH
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

DESALINATION
Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

DESERT PUPFISH
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

DESIGN
Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

Influence of Suspended Sediment Distribution on Settling Basin Designs,
W75-05216 8B

Wastewater Collection (Literature Review),
W75-05335 5D

DETENTION RESERVOIRS
Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

DETERGENTS
Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

DETOXIFICATION
Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

DETRITUS
Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

DEWATERING
Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

DIATOMACEOUS EARTH
Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

DIATOMS
The Distribution of Diatoms on the Superficial Sediments of Lake Ontario,
W75-04899 5C

Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

DIELDRIN
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

DIESEL OIL
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

DIETS
Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

DIFFUSION
Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

Two Dimensional Jet Diffusion on Sloping Floors Under Finite Submergence,
W75-05193 8B

DIFFUSIVITY
Nomographic Interpretation of Water Absorption Data in Terms of a Two-Parametric Diffusivity-Water Content Function,
W75-05180 2G

DIRECTORIES
Environment U.S.A.: A Guide to Agencies, People, and Resources.
W75-04946 6G

World Directory of Environmental Research Centers.
W75-04971 10D

DISCHARGE (WATER)
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

DISINFECTION
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

DISPERSION
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

DISSOLVED AIR FLOTATION
Shrimp Canning Waste Treatment Study,
W75-05087 5A

DISSOLVED OXYGEN
A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

DISTRIBUTION
Environmental Contaminants Inventory Study No 1: Statistics on the Use of Pest Control Products in Canada,
W75-04880 5G

Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Distribution of Chlorophyll a and Related Variables in Ontario Waters of Lake St. Clair,
W75-04900 5C

Variations in the Physico-Chemical Properties of Lake Superior,
W75-04909 5C

Some Factors Affecting the Distribution of Crenobia Alpina (Dana), Polycelis Felina (Dalyell) and Phagocata Vitta (Duges) (Platyhelminthes) in Caernarvonshire, North Wales,
W75-04980 5C

An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

DISTRIBUTION (FISH)

Ecology of the Bucharan Roach Rutilus Rutilus Bucharensis G. Nikolskij of the Uchkyzyl Reservoir of the Surkhan-Darya River Basin, (In Russian),
W75-05102 2H

DISTRIBUTION PATTERNS

Distribution of Mean Monthly Precipitation and Rainfall Intensities,
W75-05105 2B

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

DNA

The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

DOCUMENTATION

Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

DOLOMITE

Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

DOMESTIC WASTES

Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

DRAINAGE

Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

DRAINAGE PROGRAMS

Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

DREDGE SPOIL

Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

DREDGING

Lake Dredging Options and Mechanical Water Weed Harvesters,
W75-05042 5G

Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

Chao Phya River Training Works,
W75-05213 8A

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

DUMPING OPERATIONS

Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

DUNES

On The Cause of Meandering of Rivers,
W75-05244 2J

DYES

Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

DYNAMIC PROGRAMMING

City of Toronto Sewer System,
W75-04864 8A

ECOLOGICAL DISTRIBUTION

The Indicator Organisms and their Ecological Variability,
W75-05055 5C

Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

ECOLOGY

Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

ECONOMIC ASPECTS

Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

ECONOMIC EFFICIENCY

Estimating Water Quality Benefits,
W75-05068 5G

ECONOMIC IMPACT

Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

ECONOMIC JUSTIFICATION

National Need - An Industry View of Research,
W75-05299 5G

ECONOMIC PREDICTION

Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

ECONOMICS

Optimal Expansion of a Water Resources System,
W75-05315 6A

ECOSYSTEMS

Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

ECUADOR (JUBONES RIVER)

The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

EFFECTS

Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

EFFLUENTS

Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents

EFFLUENTS

d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

ELECTRIC POWER RATES
The Economic and Environmental Benefits from Improving Electrical Rate Structures,
W75-05309 6B

ELECTROMAGNETIC WAVES
Remote Sensing Potentials for Resource Management,
W75-04922 5A

EMBRYONIC GROWTH STAGE
Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

EMULSIONS
Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

ENCROACHMENT
Digital Simulation of Horizontal Salt-Water Encroachment Induced by Fresh-Water Pumping,
W75-04875 2L

ENDEMIC CHRONIC POISONING
Arsenic Contamination of Drinking Water and Food-Stuffs Causing Endemic Chronic Poisoning,
W75-05177 5C

ENERGY
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

ENERGY BUDGET
Energy Balance Considerations in Permafrost Hydrology,
W75-05147 2C

ENERGY CONVERSION
Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

ENERGY SOURCES
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

ENGINEERING
Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

ENVIRONMENT
Environment U.S.A.: A Guide to Agencies, People, and Resources.
W75-04946 6G

Research in Remote Sensing of Agriculture, Earth Resources, and Man's Environment,
W75-05132 7B

ENVIRONMENTAL
World Directory of Environmental Research Centers.
W75-04971 10D

ENVIRONMENTAL CONTROL
Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

ENVIRONMENTAL EFFECTS
Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

Distribution and Environmental Relationships of Permafrost,
W75-05139 2C

Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

The Effect of Park Use on Surface Water Quality,
W75-05306 5B

Benthic Animal-Sediment,
W75-05343 5A

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

ENVIRONMENTAL IMPACT
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

ENZYMES
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

EQUATIONS
Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

EQUILIBRIUM TRANSPORT RATE
Sediment Transport Through a Porous Column,
W75-05231 2J

EQUIPMENT
Sediment Loads in Canadian Rivers,
W75-04886 2J

Development of a Prototype Airborne Oil Surveillance System - Volume III - Subsystem Specifications.
W75-05120 5A

They're Forever Blowing Bubbles.
W75-05328 5D

ERIE COUNTY (NY)
Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

EROSION
The Overland Flow Process Under Natural Conditions,
W75-04920 4A

Experimental Study of Rill Erosion,
W75-05178 2J

Experimental Study of Rill Erosion,
W75-05178 2J

Scour in River Basin and in its Bed Mechanism, Forecast,
W75-05199 2J

EROSION CONTROL
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

Sediment Yield as Related to Vegetation on Semiarid Watersheds,
W75-04927 2J

The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

Deformed Piers to Control the Downstream Erosion,
W75-05202 8B

The Effect of Sills on River Bed,
W75-05207 8B

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

EROSION RATES
Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

ERTS-1
Development of a Two-Channel Linear Discriminant Function for Detecting and Identifying Surface Water Using ERTS-1 Data.
W75-05103 7C

Evaluation of Computer-Aided Procedure for Detecting Surface Water.
W75-05104 7C

Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

Development of a Computer-Aided Procedure for the National Program of Inspection of Dam.,
W75-05134 7C

ESTIMATING
Estimating Water Quality Benefits,
W75-05068 5G

Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

ESTIMATING EQUATIONS
Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

ESTUARIES
Delineation of Great Lakes Estuaries,
W75-04912 2H

Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

ESTUARINE ENVIRONMENT
The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

Benthic Animal-Sediment,
W75-05343 5A

EUPHAUSIA PACIFICA
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

EURYHALINE FISH
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

EUTROPHICATION
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

'Eutrophication'--Its Causes and Effects in Fresh Water Lakes,
W75-05038 5C

Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

Indicators of Eutrophication: Visual, Chemical, Physical, Biological,
W75-05046 5C

Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

EVALUATION
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

EVAPORATION
Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

A Water Balance Recorder for Hydroclimatic and Agroclimatic Measurement of Precipitation and Evaporation,
W75-04914 2D

Relative Significance of Soil and Plant Evaporation in Estimating Evpotranspiration,
W75-04915 2D

Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

EVAPOTRANSPIRATION
Relative Significance of Soil and Plant Evaporation in Estimating Evpotranspiration,
W75-04915 2D

Factors Affecting Potential Evapotranspiration,
W75-04916 2D

Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

EVERGLADES
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

EVOLUTION
Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

EXPERIMENTAL LAKES AREA (CANADA)
Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

EXPLORATION
Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

FARM WASTES
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

FEASIBILITY STUDIES
Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

Application of Remote Sensing to Hydrology.
W75-05131 2A

FEDERAL PROJECT POLICY
Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

FEDERAL WATER POLLUTION CONTROL ACT
The Federal Water Pollution Control Act and Forestry,
W75-04957 5G

A Look at the National Permit Program,
W75-04995 5G

Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

FEEDLOTS
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

FERTILIZERS
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

The Effect of Plant Spacing, Nitrogen Fertilizer and Irrigation on the Appearance of Symptoms and Spread of Virus Yellows in Sugar Beet Crops,
W75-05020 5C

Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

FIBER RECOVERY
Water Conservation and Fiber Economy,
W75-04956 3E

FILTER DISC
A Water Balance Recorder for Hydroclimatic and Agroclimatic Measurement of Precipitation and Evaporation,
W75-04914 2D

FILTERING SYSTEMS
An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

FILTERS
Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

FILTRATION
High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

FINGER LAKES (N.Y.)
Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

FINITE-ELEMENT ANALYSIS
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

FINLAND
Environmental Protection in the Finnish Pulp and Paper Industry (Umweltschutz in der Finnischen Zellstoff- und Papierindustrie),
W75-04949 5G

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

FISH
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

Masking Undesirable Flavors in Fish Oils,
W75-05027 8I

Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

FISH BEHAVIOR
Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

FISH BEHAVIOUR
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

FISH DISEASES
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

FISH FARMING
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

FISH MANAGEMENT
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

FISH PRODUCTIVITY
Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

FISH PROTEIN CONCENTRATE
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

FISH REPRODUCTION
Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

FISHERIES
A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

FISHERY PONDS
Primary and Bacterial Production of Some Fishery Ponds of the Volga Delta, (In Russian),
W75-05334 8I

FISHKILL
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

FJORDS
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

FLOAT WASH FRACTIONATOR
'Float Wash' – A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

FLOCCULATION
Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

FLOOD CONTROL
Flood Plain Information: Kansas and Wakarusa Rivers, Lawrence, Kansas,
W75-04852 4A

Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

Flood Plain Information: Brandywine Creek, New Castle County, Delaware,
W75-04855 4A

Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

Flood Frequency and Risk,
W75-04876 4A

Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

Sediment Control and Remedial Works in the Brantas River, Java, Indonesia,
W75-05211 4D

Lang Lang River, Victoria Attempts to Control Sediment, Erosion and Floods,
W75-05212 4D

FLOOD DAMAGE
Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

Lang Lang River, Victoria Attempts to Control Sediment, Erosion and Floods,
W75-05212 4D

FLOOD FORECASTING
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

Flood Flow Frequency Techniques,
W75-05262 2E

FLOOD FREQUENCY
Flood Flow Frequency Techniques,
W75-05262 2E

FLOOD PROFILES
Flood Plain Information: Brandywine Creek, New Castle County, Delaware,
W75-04855 4A

FLOOD PROTECTION
Flood Plain Information: Kansas and Wakarusa Rivers, Lawrence, Kansas,
W75-04852 4A

Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

Flood Plain Information: Brandywine Creek, New Castle County, Delaware,
W75-04855 4A

Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

FLOODING
Flood Plain Information: Kansas and Wakarusa Rivers, Lawrence, Kansas,
W75-04852 4A

LOODS
Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

Flood Frequency and Risk,
W75-04876 4A

To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

LORIDA
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

LOTATION
Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

Shrimp Canning Waste Treatment Study,
W75-05087 5A

LOW AROUND OBJECTS
Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

Deformed Piers to Control the Downstream Erosion,
W75-05202 8B

LOW CHARACTERISTICS
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

Instantaneous Turbulent Flow Acts on the Sand Particle to Start the Rotation on the Bed,
W75-05223 2J

A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

LOW CONTROL
Return Sludge Flow Control,
W75-04982 5D

LOW NETS
Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

LOW RATES
A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

LOW RESISTANCE
The Overland Flow Process Under Natural Conditions,
W75-04920 4A

Flow Resistance in Sand Bed Channels,
W75-05220 8B

Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

FLUID MECHANICS
Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

FLUMES
Measuring Sewage Flow Using Weirs and Flumes,
W75-05326 5D

FLUOROMETRY
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

FLUVIAL MORPHOLOGY
Experimental Study of Rill Erosion,
W75-05178 2J

Experimental Study of Rill Erosion,
W75-05178 2J

Comprehensive Graphs of Regime Data,
W75-05247 2J

FLY ASH
Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

FLYGTOL PROCESS
Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

FOG
Microstructure of Precipitation Deposited on Horizontal Surfaces in Fog,
W75-05101 2B

FOG DEPOSITION
Microstructure of Precipitation Deposited on Horizontal Surfaces in Fog,
W75-05101 2B

FOOD CHAINS
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

FOOD PROCESSING INDUSTRY
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

FORECASTING
Flood Frequency and Risk,
W75-04876 4A

Hydrologic Forecasting in the Water Resources Branch,
W75-04881 4A

FOREST MANAGEMENT
The Federal Water Pollution Control Act and Forestry,
W75-04957 5G

FOREST WATERSHEDS
Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

FORESTRY
The Federal Water Pollution Control Act and Forestry,
W75-04957 5G

Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

FORESTS
Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

FOX RIVER (WIS)
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

FREE VORTEX
Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

FREQUENCY
Flood Frequency and Risk,
W75-04876 4A

FREQUENCY ANALYSIS
Analysis of Oil Spill Statistics,
W75-05034 5C

Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

Flood Flow Frequency Techniques,
W75-05262 2E

FROZEN SOILS
Specific Heats of Components of Frozen Soil,
W75-05149 2C

FUSARIUM INFECTION
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

GAS CHROMATOGRAPHY
Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

GEOCHEMISTRY
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

Hydrogeology of the Lethbridge-Fernie Area, Alberta,
W75-05151 2F

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

GEOCHEMISTRY

Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

GEOGRAPHY
Remote Sensor Utilization for Environmental System Studies, Volume II,
W75-05124 7B

Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

GEOLOGIC CONTROL
Hydrogeology of the Lethbridge-Fernie Area, Alberta,
W75-05151 2F

GEOLOGIC INVESTIGATIONS
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

GEOLOGY
Geology and Permafrost in Relation to Hydrology and Geophysics,
W75-05141 2C

GEOMORPHOLOGY
Comprehensive Graphs of Regime Data,
W75-05247 2J

GEOPHYSICS
Geology and Permafrost in Relation to Hydrology and Geophysics,
W75-05141 2C

GEOTHERMAL ENERGY
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

GLACIERS
Research Projects in Glaciology - 1974,
W75-04884 2C

GLACIOLOGY
Research Projects in Glaciology - 1974,
W75-04884 2C

GONADS
Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

GRADIENTS (STREAMS)
Comprehensive Graphs of Regime Data,
W75-05247 2J

GRAND VALLEY (COLO)
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

GRASS CARP
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

GRAVITY WAVES
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

GREAT LAKES
Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

Delineation of Great Lakes Estuaries,
W75-04912 2H

GREAT PLAINS
Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

GREEN BAY (LAKE MICHIGAN)
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

Recreational Uses of Green Bay: Bay/Non-Bay Users Compared,
W75-04913 6B

GREENS BAYOU (TEX)
Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

GROUND HOUSEHOLD REFUSE
Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

GROUNDWATER
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

Hydrology and Permafrost With Reference to North America,
W75-05140 2C

Groundwater in Permafrost Regions of Canada,
W75-05150 2C

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

GROUNDWATER BASINS
Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

GROUNDWATER MOVEMENT
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

Geohydrologic Relationships in Water Pollution,
W75-05128 5G

Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

Management of Waste Fluids in Salaquifers,
W75-05191 5B

Sediment Transport Through a Porous Column,
W75-05231 2J

Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

GROUNDWATER RESOURCES
The Geology and Hydrogeology of the New Lead Belg, Missouri,
W75-05175 2F

GROWTH RATE
Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

GROWTH RATES
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

GULF COASTAL PLAIN
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

GULF CROAKER
Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

GULF OF ALASKA
Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

HAFF DISEASE
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

HALLS BAYOU (TEX)
Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

HARMONIC FUNCTION
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

HAWAII
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

HEAT TREATMENT
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

HEATED WATER
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

HEAVY METALS
Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

IEAVY WATER
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

IERBICIDES
The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

History of Aquatic Herbicides, Biological Control, Practical Aspects of the Use of Chemicals in Water Weed Control,
W75-05041 5G

GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

IGH PLAINS
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

IGH SOLIDS FLUME WATER
Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

UMAN PATHOLOGY
A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

Behavioral Effects of Methylmercury,
W75-05288 5A

UMAN PHYSIOLOGY
Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

HUMAN POISONING
Arsenic Contamination of Drinking Water and Food-Stuffs Causing Endemic Chronic Poisoning,
W75-05177 5C

HUMAN RESOURCES
Environment U.S.A.: A Guide to Agencies, People, and Resources.
W75-04946 6G

HUNGARY (DRAVA RIVER)
Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

HUNGARY (HERNAD RIVER)
Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

HYDRAULIC DESIGN
City of Toronto Sewer System,
W75-04864 8A

HYDRAULIC MODELS
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

Bed Slopes of Aggraded Channels with Two Degrees of Freedom,
W75-05254 8B

HYDRAULIC RESISTENCE
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

HYDRAULIC STRUCTURES
Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

Modeling of Local Scour Around Spur Dikes in Streams,
W75-05206 8B

Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

Water Intake Problems in Torrents,
W75-05217 8B

HYDRAULIC TRANSPORTATION
Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

HYDRAULICS
Continuous Hydrological Time-Series Discretization,
W75-05165 2A

Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

HYDROBIOLOGY
Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

HYDRODYNAMICS
Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

HYDROGEN ENERGY SOURCES
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

HYDROGEN SULFIDE
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

HYDROGEOLOGY
Geohydrologic Relationships in Water Pollution,
W75-05128 5G

Hydrogeology of the Lethbridge-Fernie Area, Alberta,
W75-05151 2F

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

HYDROGRAPH ANALYSIS
Runoff from a Small Arctic Watershed,
W75-05144 2C

HYDROGRAPHS
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

HYDROLOGIC ASPECTS
Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

HYDROLOGIC DATA
Hydrological Data Bank - Present Status,
W75-04882 7C

Continuous Hydrological Time-Series Discretization,
W75-05165 2A

HYDROLOGIC MODELS
A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume I: Summary Report.
W75-05108 2A

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume II: Supporting Technical Details.
W75-05109 2A

Application of Remote Sensing to Hydrology.
W75-05131 2A

HYDROLOGIC SYSTEMS
Stormflow Production from Permeable Upland Basins,
W75-04925 2A

HYDROLOGY
Hydrologic Forecasting in the Water Resources Branch,
W75-04881 4A

To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

Hydrological Basis for Forecasting and Calculating Runoff by Space Images of the Earth's Surface,
W75-05135 4A

Permafrost Hydrology.
W75-05138 2C

Hydrology and Permafrost With Reference to North America,
W75-05140 2C

Geology and Permafrost in Relation to Hydrology and Geophysics,
W75-05141 2C

River Hydrology in Permafrost Areas,
W75-05142 2C

Permafrost-Hydrology Studies at Boot Creek and Peter Lake Watersheds, N.W.T.,
W75-05143 2C

Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

Energy Balance Considerations in Permafrost Hydrology,
W75-05147 2C

Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

Continuous Hydrological Time-Series Discretization,
W75-05165 2A

HYDROMETEOROLOGICAL DATA
Hydrological Data Bank - Present Status,
W75-04882 7C

HYPOLIMNION
Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

An Automatic Underwater Camera System,
W75-05048 5A

Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

ICE
Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

ICE COVER
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

ICE PROPERTIES
Research Projects in Glaciology - 1974,
W75-04884 2C

ICE-WATER INTERFACES
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

IDAHO
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

ILLINOIS
Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

IMPACT STUDIES
Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

IN-STREAM WATER USES
Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

INCINERATION
Incineration of Solid Wastes,
W75-04969 5E

INCLINED FLOW
Sediment Transport Through a Porous Column,
W75-05231 2J

INCOMPRESSIBLE FLUIDS
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

INDIA
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

INDIA (CHERRAPUNJI OBSERVATORY)
A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2B

INDIA (RIVER HOOGHLY)
Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

INDIANA
Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

INDICATORS
Indicators of Eutrophication: Visual, Chemical, Physical, Biological,
W75-05046 5C

INDONESIA (BRANTAS RIVER)
Sediment Control and Remedial Works in the Brantas River, Java, Indonesia,
W75-05211 4D

INDUSTRIAL WASTES
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

Industrial Water Purification,
W75-04968 5D

Incineration of Solid Wastes,
W75-04969 5E

Bethlehem Treats 80 Million Gallons of Wastewater Each Day.
W75-04993 5D

Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Shrimp Canning Waste Treatment Study,
W75-05087 5A

New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

A Review of the Literature Concerning the Steel Industry and Pollution. Part 1. The Background to Pollution,
W75-05093 5G

Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

National Need - An Industry View of Research,
W75-05299 5G

Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

INDUSTRIAL WATER
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

Water Conservation and Fiber Economy,
W75-04956 3E

Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

The Chemical Treatment of Cooling Water,
W75-04964 5D

INFILTRATION
Infiltration of Water into the Soil Profile,
W75-04918 2G

Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

INFILTRATION EQUATION
A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

INFILTROMETERS
A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

INFORMATION EXCHANGE
Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

INFORMATION RETRIEVAL
Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

INFRARED ANALYSIS
A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

INHIBITION
The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

INSTITUTIONS
Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

INSTRUCTION
Puerto Rico Nuclear Center, Annual Report, 1973.
W75-05350 5A

INSTRUMENTATION
A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

INTAKES
Water Intake Problems in Torrents,
W75-05217 8B

INTERCEPTOR SEWERS
City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

INTERMITTENT-FLOW BIOASSAYS
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

INTERNAL WAVES
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

INTERNATIONAL HYDROLOGICAL DECADE
Discharge of Selected Rivers of Canada.
W75-05136 2E

Discharge of Selected Rivers of Canada, Supplement 1.
W75-05137 2E

Permafrost Hydrology.
W75-05138 2C

INTERSTICES
Sediment Transport Through a Porous Column,
W75-05231 2J

INVESTMENT
National Need - An Industry View of Research,
W75-05299 5G

ION EXCHANGE
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

IOWA
Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

IROQUOIS FALLS (ONTARIO-CANADA)
At Abitibi, Iroquois Falls, $2.5-Million Primary Treatment System Nears Completion.
W75-04976 5D

IRRIGATION
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

IRRIGATION CANALS
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

Sediment Equilibrium Considerations in the Design of Irrigation Canal Networks,
W75-05252 8B

IRRIGATION EFFECTS
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

IRRIGATION EFFICIENCY
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

IRRIGATION SYSTEMS
Sediment Equilibrium Considerations in the Design of Irrigation Canal Networks,
W75-05252 8B

ISLANDS
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

JAPAN
Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

JEMEZ MOUNTAINS (N MEX)
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

JETS
Two Dimensional Jet Diffusion on Sloping Floors Under Finite Submergence,
W75-05193 8B

Incipient Motion of Bed Material,
W75-05203 8B

JUNCTIONS
River-Bed Variations at Confluences,
W75-05253 2J

KANSAS
Flood Plain Information: Kansas and Wakarusa Rivers, Lawrence, Kansas,
W75-04852 4A

Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

KILLIFISHES
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

KINEMATIC WAVE EQUATIONS
Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

KINETICS
Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

KOKO HEAD (OAHU)
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

KRAFT PULPING
Calculation of Concentration of Impurities in the Recycling System of Process Water in

KRAFT PULPING

Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

KROG'S 'NORMAL CURVE'
Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

LABORATORY ANIMALS
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

LABORATORY EQUIPMENT
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

Equipment for Holding and Releasing Penaeid Shrimp During Marking Experiments,
W75-05030 8I

LABORATORY TESTS
Interlaboratory Quality Control Study No 6: Specific Conductance, pH, Colour and Residue,
W75-04887 2K

Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

Two Dimensional Jet Diffusion on Sloping Floors Under Finite Submergence,
W75-05193 8B

Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

Deformed Piers to Control the Downstream Erosion,
W75-05202 8B

Incipient Motion of Bed Material,
W75-05203 8B

Modeling of Local Scour Around Spur Dikes in Streams,
W75-05206 8B

The Effect of Sills on River Bed,
W75-05207 8B

Secondary Currents in Subsequent Model Bends,
W75-05209 8B

The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

Turbulence Measurements over Sand Beds,
W75-05219 8B

Instantaneous Turbulent Flow Acts on the Sand Particle to Start the Rotation on the Bed,
W75-05223 2J

A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

Effect of Wash Load on Sediment Transportation,
W75-05227 2J

Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

Sediment Diffusion Over a Wavy, Mobile Bed,
W75-05237 8B

Effect of Characteristics of Bed Material and Fluid on Ripple Formation,
W75-05243 8B

Condition for the Formation of Alternate Bars in Straight Alluvial Channels,
W75-05245 8B

Bed Slopes of Aggraded Channels with Two Degrees of Freedom,
W75-05254 8B

Scouring Capacity of Flow in Narrow Open Channels,
W75-05258 8B

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

LACEY'S EQUATIONS
Stable Channels in Alluvium,
W75-05248 8B

LAGOONS
Possibilities of Converting Part of the Piritu Lagoon (State of Anzoategui) into an Artificial Salt Pit, (In Spanish),
W75-05276 3E

LAKE BASINS
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

LAKE BEDS
Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

LAKE ERIE
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

Delineation of Great Lakes Estuaries,
W75-04912 2H

An Automatic Underwater Camera System,
W75-05048 5A

A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

LAKE ESTUARIES
Delineation of Great Lakes Estuaries,
W75-04912 2H

LAKE HURON
Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

LAKE MANAGEMENT
Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

LAKE MEAD
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

LAKE MENDOTA (WIS)
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

LAKE MICHIGAN
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

LAKE ONTARIO
Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

The Distribution of Diatoms on the Superficial Sediments of Lake Ontario,
W75-04899 5C

Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

Regional Characterizations of the Thermal Properties of Lake Ontario,
W75-04911 2H

LAKE POWELL (ARIZ)
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

LAKE REHABILITATION
Lake Dredging Options and Mechanical Water Weed Harvesters,
W75-05042 5G

Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

LAKE SEDIMENTS
The Distribution of Diatoms on the Superficial Sediments of Lake Ontario,
W75-04899 5C

Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

LAKE ST. CLAIR
Distribution of Chlorophyll a and Related Variables in Ontario Waters of Lake St. Clair,
W75-04900 5C

LAKE SUPERIOR
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Variations in the Physico-Chemical Properties of Lake Superior,
W75-04909 5C

Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

LAKE WACCABUC (NY)
Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

LAKE WASHINGTON (WASH)
Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

LAKES
Distribution of Chlorophyll a and Related Variables in Ontario Waters of Lake St. Clair,
W75-04900 5C

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

'Human-Accelerated Eutrophication of Fresh-Water Lakes,' Proceedings of a Conference,
W75-05037 5C

'Eutrophication'--Its Causes and Effects in Fresh Water Lakes,
W75-05038 5C

Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

Lake Dredging Options and Mechanical Water Weed Harvesters,
W75-05042 5G

Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

LAMINAR FLOW
Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

LAND MANAGEMENT
The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

LAND USE
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

Land Use and Zoning, Septic Effluents and the Responsibility for Adequate Control,
W75-05045 5G

A Procedure for Automated Land Use Mapping Using Remotely Sensed Multispectral Scanner Data,
W75-05096 7C

To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

Agricultural Land Use in the Poudre Valley,
W75-05260 3F

LANDSLIDES
Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

LARVAE
Kind and Abundance of Fish Larvae in the Eastern Tropical Pacific, Based on Collections Made on Eastropac I,
W75-05017 8I

Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

LAS VEGAS
Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

LAS VEGAS WASH/BAY
Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

LEACHING
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

LEAD
Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

National Need - An Industry View of Research,
W75-05299 5G

LEGISLATION
Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

New Developments in Effluent Legislation, Especially Laws Governing Effluent Disposal (Neuerungen auf dem Abwasserrechts-Sektor -- insbesondere Abwasserabgabengesetz),
W75-04950 5G

A Look at the National Permit Program,
W75-04995 5G

Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

An Approach to the Control of Toxic Substances,
W75-05300 5G

California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

LETHAL LIMIT
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

LEVEES
Flood Plain Information: Kansas and Wakarusa Rivers, Lawrence, Kansas,
W75-04852 4A

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

LIGNINS
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

LIGNOSULFONATES
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

LIME
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

LIMITING FACTORS
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

LINEAR PROGRAMMING
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

LIQUID WASTES
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

Recovery of Residual Ammonia from Weak Aqueous Solutions Thereof,
W75-05332 5D

LITTLE OTTER LAKE (ONTARIO)
The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

LITTORAL DRIFT
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

LOLIUM-PERENNE
The Course and Magnitude of Water Stress in Lolium Perenne and Dactylis Glomerata,
W75-05056 3F

LOW FLOW
A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

LOWER FRASER RIVER (CANADA)
Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

LYNNHAVEN BAY (VA)
The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

MAGNESIUM CARBONATE-LIME TREATMENT
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

MAINE
To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

MALAYSIA
Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

MANAGEMENT
Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

Carrying Capacity in Regional Environmental Management,
W75-05069 6B

Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

Problems and Opportunities in Interdisciplinary Research: The Molybdenum Project,
W75-05298 5G

National Need - An Industry View of Research,
W75-05299 5G

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

MANGANESE
Manganese Removal from Potable Water,
W75-05270 5F

MANGROVE SWAMPS
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

MAPPING
A Procedure for Automated Land Use Mapping Using Remotely Sensed Multispectral Scanner Data,
W75-05096 7C

MARINE ALGAE
Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

MARINE ANIMALS
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

MARINE FISH
Fishery Bulletin, Vol 69, No 1, January 1971,
W75-05016 8I

Kind and Abundance of Fish Larvae in the Eastern Tropical Pacific, Based on Collections Made on Eastropac I,
W75-05017 8I

Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

MARKING TECHNIQUES
Equipment for Holding and Releasing Penaeid Shrimp During Marking Experiments,
W75-05030 8I

MARSH MANAGEMENT
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

MARSHES
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

MARYLAND
Bethlehem Treats 80 Million Gallons of Wastewater Each Day.
W75-04993 5D

Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

Benthic Animal-Sediment,
W75-05343 5A

Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

MASS MEDIA
Mass Media Handbook for Water Resource Research Directors,
W75-05261 6

MASS SPECTRA
Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

MASS SPECTROMETRY
Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

MASS TRANSFER
The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

MATHEMATICAL MODELS
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

On the Concept of the Wash Load,
W75-05238 2J

MATHEMATICAL STUDIES
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

Two Dimensional Jet Diffusion on Sloping Floors Under Finite Submergence,
W75-05193 8B

Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

Theory of Viscous Flow in Wide Curved Open Channels,
W75-05208 8B

On The Cause of Meandering of Rivers,
W75-05244 2J

River-Bed Variations at Confluences,
W75-05253 2J

MCILROY EQUATION
Factors Affecting Potential Evapotranspiration,
W75-04916 2D

MEANDERS
On The Cause of Meandering of Rivers,
W75-05244 2J

MEASUREMENT
A Guide to the Measurement of Marine Primary Production Under Some Special Conditions,
W75-05047 5A

Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

MECHANICAL EQUIPMENT
Lake Dredging Options and Mechanical Water Weed Harvesters,
W75-05042 5G

MEMBRANES
Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

MERCURY
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

Behavioral Effects of Methylmercury,
W75-05288 5A

The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

Total Mercury Monitor,
W75-05333 5A

The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

METABOLISM
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

METAL FINISHING WASTEWATERS
New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

METAL PIPES
The Neath Valley Sewerage Scheme.
W75-05000 5D

METALS
Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

METALS RECOVERY
Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

METEOROLOGY
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

Second Annual Report, Dot-CIAP Program,
W75-05349 2B

METHANE
Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

METHODOLOGY
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

A Guide to the Measurement of Marine Primary Production Under Some Special Conditions,
W75-05047 5A

Methods for Studies of Plankton (In Swedish),
W75-05061 7B

METHYLMERCURY
Behavioral Effects of Methylmercury,
W75-05288 5A

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

MICHIGAN
Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

MICROWAVE MAPS
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

MIGRATION
Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

MINE DRAINAGE
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

MINE WATER
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

The Geology and Hydrogeology of the New Lead Belg, Missouri,
W75-05175 2F

MINERAL IMBALANCE
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

MINING
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

MINNESOTA
Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

MISSOURI
The Geology and Hydrogeology of the New Lead Belg, Missouri,
W75-05175 2F

National Need - An Industry View of Research,
W75-05299 5G

MODEL STUDIED
Incipient Motion of Bed Material,
W75-05203 8B

MODEL STUDIES
A Practical Approach to Water Quality Management Planning,
W75-04857 5G

Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

Stormflow Production from Permeable Upland Basins,
W75-04925 2A

Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

Carrying Capacity in Regional Environmental Management,
W75-05069 6B

Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

Numerical Models for Precipitation Scavenging,
W75-05112 5B

Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

Modeling of Local Scour Around Spur Dikes in Streams,
W75-05206 8B

The Effect of Sills on River Bed,
W75-05207 8B

Chao Phya River Training Works,
W75-05213 8A

Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

Statistical Regularities in the Movement of Bed Load,
W75-05239 2J

Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

Optimal Expansion of a Water Resources System,
W75-05315 6A

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

Second Annual Report, Dot-CIAP Program,
W75-05349 2B

MOLECULAR STRUCTURE
Water and Aqueous Solutions: Introduction to a Molecular Theory,
W75-04970 1B

MOLYBDENUM
Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

Problems and Opportunities in Interdisciplinary Research: The Molybdenum Project,
W75-05298 5G

MONITORING
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

Shrimp Canning Waste Treatment Study,
W75-05087 5A

Development of a Prototype Airborne Oil Surveillance System - Volume II - Design Report.
W75-05119 5A

Development of a Prototype Airborne Oil Surveillance System - Volume III - Subsystem Specifications.
W75-05120 5A

Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

Total Mercury Monitor,
W75-05333 5A

Benthic Animal-Sediment,
W75-05343 5A

MONOMOLECULAR FILMS
Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

MORPHOLOGICAL MODIFICATION
Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

MORPHOLOGY
Ecology of the Bucharan Roach Rutilus Rutilus Bucharensis G. Nikolskij of the Uchkyzyl Reservoir of the Surkhan-Darya River Basin, (In Russian),
W75-05102 2H

MORTALITY
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

MOUND-TYPE DISPOSAL SYSTEMS
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

MOVEMENT
The Influence of the Relative Depth on Threshold of Grain Motion,
W75-05222 2J

MUDFLOWS
Sediment Control and Remedial Works in the Brantas River, Java, Indonesia,
W75-05211 4D

MULTIPLE PURPOSE
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

MULTIPLE-PURPOSE PROJECTS
Optimal Expansion of a Water Resources System,
W75-05315 6A

Introduction,
W75-05316 6A

Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

MUNICIPAL WASTE TREATMENT
Survey of Needs for Municipal Waste Treatment Facilities.
W75-04978 5D

MUNICIPAL WASTES
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

NARA RIVER (USSR)
Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

NATURAL RESOURCES
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

NATURAL STREAMS
Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

NAVIGABLE WATERS
Chao Phya River Training Works,
W75-05213 8A

NEATH VALLEY (GT BRIT)
The Neath Valley Sewerage Scheme.
W75-05000 5D

NEUTRON ACTIVATION ANALYSIS
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

NEUTRON DIFFRACTION
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

NEVADA
City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

NEW HAMPSHIRE
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

NEW LEAD BELT AREA (MO)
The Geology and Hydrogeology of the New Lead Belg, Missouri,
W75-05175 2F

NEW MEXICO
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

NEW YORK
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

'Human-Accelerated Eutrophication of Fresh-Water Lakes,' Proceedings of a Conference,
W75-05037 5C

'Eutrophication'--Its Causes and Effects in Fresh Water Lakes,
W75-05038 5C

Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations,
W75-05044 5G

Land Use and Zoning, Septic Effluents and the Responsibility for Adequate Control,
W75-05045 5G

Treat Wastewater Like Downtown Traffic,
W75-05329 5D

NILE RIVER
The Upper Nile Swamps, A Tropical Wetland Study,
W75-04996 2H

NITRATES
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

NITRIFICATION
Growth Kinetics of Nitrifying Microorganisms,
W75-05267 5D

Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

Nitrogen Removal Obtained Through Heterotrophic Growth in Trickling Filters,
W75-05269 5D

NITROGEN
The Effect of Plant Spacing, Nitrogen Fertilizer and Irrigation on the Appearance of Symptoms and Spread of Virus Yellows in Sugar Beet Crops,
W75-05020 5C

Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

NITROGEN COMPOUNDS
The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

NITROGEN FERTILIZER
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

NITROGEN FIXATION
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

NITROGEN FIXING BACTERIA
Growth Kinetics of Nitrifying Microorganisms,
W75-05267 5D

Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

Nitrogen Removal Obtained Through Heterotrophic Growth in Trickling Filters,
W75-05269 5D

NITROGEN SOURCES
The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

NON-STRUCTURAL ALTERNATIVES
Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

NORTH AMERICA
Permafrost Hydrology.
W75-05138 2C

Hydrology and Permafrost With Reference to North America,
W75-05140 2C

NORTH CAROLINA
Annual Report, Fy 1974, Water Resources Research Institute of the University of North Carolina.
W75-04937 9D

Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

NORTHEASTERN ILLINOIS METROPOLITAN AREA (NIMA)
Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

NORWAY
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

NUCLEAR ENERGY
Puerto Rico Nuclear Center, Annual Report, 1973.
W75-05350 5A

NUCLEAR POWERPLANTS
Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

Benthic Animal-Sediment,
W75-05343 5A

Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

NURTIENT REMOVAL
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

NUTRIENT REMOVAL
Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

NUTRIENT REQUIREMENTS
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

NUTRIENTS
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

OBSTRUCTION TO FLOW
The Overland Flow Process Under Natural Conditions,
W75-04920 4A

OCEAN WAVES
Mean Length of Runs of Ocean Waves,
W75-05160 8B

OCEANOGRAPHY
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

OCEANS
A Guide to the Measurement of Marine Primary Production Under Some Special Conditions,
W75-05047 5A

Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

ODOR
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

OFFSHORE PLATFORMS
Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

OHIO
Delineation of Great Lakes Estuaries,
W75-04912 2H

Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

OIL
Masking Undesirable Flavors in Fish Oils,
W75-05027 8I

A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

OIL-CONTROL FILMS
Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

OIL FIELDS
Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

OIL POLLUTION
Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

Oil Contaminated Beach Cleanup,
W75-05100 5G

Weathering of Oil at Sea,
W75-05106 5B

OIL SLICKS
The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

OIL SPILL INCIDENCE
Analysis of Oil Spill Statistics,
W75-05034 5C

OIL SPILL RECOVERY
Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

OIL SPILL TRAJECTORIES
Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

OIL SPILLS
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

Analysis of Oil Spill Statistics,
W75-05034 5C

Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

Oil Contaminated Beach Cleanup,
W75-05100 5G

Weathering of Oil at Sea,
W75-05106 5B

Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

Development of a Prototype Airborne Oil Surveillance System - Volume II - Design Report.
W75-05119 5A

Development of a Prototype Airborne Oil Surveillance System - Volume III - Subsystem Specifications.
W75-05120 5A

OIL WASTES
Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

OIL WELLS
Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

OILY WATER
Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

OKLAHOMA
A Practical Approach to Water Quality Management Planning,
W75-04857 5G

OLIGOTROPHIC LAKES
Plankton Populations of Lake Leake and Tooms Lake: Oligotrophic Tasmanian Lakes,
W75-05183 5C

ON-SITE COLLECTIONS
Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

ON-SITE DATA COLLECTIONS
Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

Sediment Transport Characteristics of the Teesta River,
W75-05235 2J

Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

ON-SITE INVESTIGATIONS
Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

Contribution to the Study of General Scour,
W75-05255 2J

Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

OPEN CHANNEL FLOW
Theory of Viscous Flow in Wide Curved Open Channels,
W75-05208 8B

The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

Turbulence Measurements over Sand Beds,
W75-05219 8B

Flow Resistance in Sand Bed Channels,
W75-05220 8B

Studies on Bed-Load Transport Rate in Open Channel Flows,
W75-05226 8B

Sediment Diffusion Over a Wavy, Mobile Bed,
W75-05237 8B

OPEN CHANNELS
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

Stable Channels in Alluvium,
W75-05248 8B

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

Scouring Capacity of Flow in Narrow Open Channels,
W75-05258 8B

OPERATION AND MAINTENANCE
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

Wastewater Collection (Literature Review),
W75-05335 5D

OPERATION AND MAINTENANCE MANUAL
Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

OPTICAL-MECHANICAL SCANNER
Remote Sensing Potentials for Resource Management,
W75-04922 5A

OPTIMIZATION
Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

Optimal Expansion of a Water Resources System,
W75-05315 6A

Introduction,
W75-05316 6A

A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

OPTIMUM DEVELOPMENT PLANS
Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

OREGON
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

ORGANIC COMPOUNDS
Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

Aquathermal Fluid Migration,
W75-05182 4B

Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

Behavioral Effects of Methylmercury,
W75-05288 5A

Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

ORGANIC MATTER
Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

ORGANIC WASTES
Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

ORGANIZATIONS
Environment U.S.A.: A Guide to Agencies, People, and Resources.
W75-04946 6G

ORGANOCHLORINE INSECTICIDES
Volatilization Losses of Pesticides from Soils,
W75-05075 5B

ORGANOMETALLICS
Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

OROGRAPHY
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

OTTAWA RIVER (CANADA)
Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

OUT-OF-STREAM WATER USES
Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

OUTLET WORKS
Scour at Downstream End of Dams in Taiwan,
W75-05204 8B

OVERLAND FLOW
The Overland Flow Process Under Natural Conditions,
W75-04920 4A

Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

OXIDATION
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

Manganese Removal from Potable Water,
W75-05270 5F

OXIDATION-REDUCTION POTENTIAL
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

OXIDES
Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

OXYGENATION
Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

OYSTERS
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

OZONATION
Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

OZONE
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

PACIFIC OCEAN
Kind and Abundance of Fish Larvae in the Eastern Tropical Pacific, Based on Collections Made on Eastropac I,
W75-05017 8I

Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

PAMLICO SOUND (NC)
Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

PARAMETRIC HYDROLOGY
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

PARKS
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

PARTICLE SIZE
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

Carbon and Color Distribution in Various Size Fractions of Treated Pulp Mill and Board Mill Waste Effluents,
W75-04948 5B

Sediment Transport Through a Porous Column,
W75-05231 2J

PARTICULATE TRANSPORT
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

PATENTS
Industrial Water Purification,
W75-04968 5D

Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

Recovery of Residual Ammonia from Weak Aqueous Solutions Thereof,
W75-05332 5D

Total Mercury Monitor,
W75-05333 5A

PATH OF POLLUTANTS
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

Volatilization Losses of Pesticides from Soils,
W75-05075 5B

Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

Numerical Models for Precipitation Scavenging,
W75-05112 5B

Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

PATTERN SEARCH
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

PAWTUCKAWAY STATE PARK (NH)
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

PERMAFROST
Permafrost Hydrology.
W75-05138 2C

Distribution and Environmental Relationships of Permafrost,
W75-05139 2C

Hydrology and Permafrost With Reference to North America,
W75-05140 2C

Geology and Permafrost in Relation to Hydrology and Geophysics,
W75-05141 2C

River Hydrology in Permafrost Areas,
W75-05142 2C

Permafrost-Hydrology Studies at Boot Creek and Peter Lake Watersheds, N.W.T.,
W75-05143 2C

Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

Energy Balance Considerations in Permafrost Hydrology,
W75-05147 2C

Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

Specific Heats of Components of Frozen Soil,
W75-05149 2C

Groundwater in Permafrost Regions of Canada,
W75-05150 2C

PERMITS
A Look at the National Permit Program,
W75-04995 5G

Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations,
W75-05044 5G

PEST CONTROL
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

PESTICIDE RESIDUES
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

PESTICIDE TOXICITY
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

PESTICIDES
Environmental Contaminants Inventory Study No 1: Statistics on the Use of Pest Control Products in Canada,
W75-04880 5G

Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

Volatilization Losses of Pesticides from Soils,
W75-05075 5B

Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

PHAEOPHYTA
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

PHARMACEUTICALS
Masking Undesirable Flavors in Fish Oils,
W75-05027 8I

PHENOLS
Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

PHOSPHATES
Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

PHOSPHORUS
Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

PHOTODISSOCIATION RATE
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

PHOTOGRAPHY
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

Remote Sensor Utilization for Environmental System Studies, Volume II,
W75-05124 7B

Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

PHOTOLYSIS
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

PHYSICAL-CHEMICAL TREATMENT
Physical-Chemical Processes,
W75-04984 5D

PHYSICAL CONTROL
Physical-Chemical Processes,
W75-04984 5D

PHYSICAL PROPERTIES
Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

PHYSICOCHEMICAL PROPERTIES
Variations in the Physico-Chemical Properties of Lake Superior,
W75-04909 5C

PHYTOPLANKTON
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

PHYTOTOXICITY
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

PICHE FILTER DISC
A Water Balance Recorder for Hydroclimatic and Agroclimatic Measurement of Precipitation and Evaporation,
W75-04914 2D

PIPE FLOW
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

PIPELINES
The Neath Valley Sewerage Scheme.
W75-05000 5D

PIPES
The Neath Valley Sewerage Scheme.
W75-05000 5D

PLANARIA (POLYCELIS FELINA)
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

PLANKTON
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

Methods for Studies of Plankton (In Swedish),
W75-05061 7B

PLANKTON POPULATIONS
Plankton Populations of Lake Leake and Tooms Lake: Oligotrophic Tasmanian Lakes,
W75-05183 5C

PLANNING
A Practical Approach to Water Quality Management Planning,
W75-04857 5G

City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

PLANT EVAPORATION
Relative Significance of Soil and Plant Evaporation in Estimating Evpotranspiration,
W75-04915 2D

PLANT GROWTH
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

PLANT PHYSIOLOGY
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

PLATYHELMINTHES
Some Factors Affecting the Distribution of Crenobia Alpina (Dana), Polycelis Felina (Dalyell) and Phagocata Vitta (Duges) (Platyhelminthes) in Caernarvonshire, North Wales,
W75-04980 5C

PLUTONIUM
LASL Waste System Backs up into Street.
W75-05327 5D

POLAND
The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

POLAROGRAPHIC ANALYSIS
Measurement of Residual Chlorine Levels in Cooling Water--Amperometric Method,
W75-05088 5A

POLLUTANT IDENTIFICATIN
The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

POLLUTANT IDENTIFICATION
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

Interlaboratory Quality Control Study No 6: Specific Conductance, pH, Colour and Residue,
W75-04887 2K

Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

Development of a Prototype Airborne Oil Surveillance System - Volume II - Design Report.
W75-05119 5A

Development of a Prototype Airborne Oil Surveillance System - Volume III - Subsystem Specifications.
W75-05120 5A

Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

Behavioral Effects of Methylmercury,
W75-05288 5A

The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

Total Mercury Monitor,
W75-05333 5A

Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

POLLUTANTS
Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

POLLUTION ABATEMENT
Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

Evaluation of Adjustment Assistance Programs with Application for Pollution Control,
W75-05074 5G

Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

Oil Contaminated Beach Cleanup,
W75-05100 5G

POLLUTION CONTROL
Evaluation of Adjustment Assistance Programs with Application for Pollution Control,
W75-05074 5G

POLYCHLORINATED BIPHENYLS
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

POLYMER MEMBRANES
New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

PONDS
'Human-Accelerated Eutrophication of Fresh-Water Lakes,' Proceedings of a Conference,
W75-05037 5C

PORE WATER
Aquathermal Fluid Migration,
W75-05182 4B

PORES
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

POROUS MEDIA
Sediment Transport Through a Porous Column,
W75-05231 2J

POROUS WALLED BREAKWATER
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

POTABLE WATER
Arsenic Contamination of Drinking Water and Food-Stuffs Causing Endemic Chronic Poisoning,
W75-05177 5C

POTENTIAL EVAPOTRANSPIRATION
Factors Affecting Potential Evapotranspiration,
W75-04916 2D

POUDRE VALLEY (COLO)
Agricultural Land Use in the Poudre Valley,
W75-05260 3F

POWER SPECTRAL DENSITY
An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

PRE-TREATMENT (WATER)
The Chemical Treatment of Cooling Water,
W75-04964 5D

PRECIPITATION (ATMOSPHERIC)
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

Microstructure of Precipitation Deposited on Horizontal Surfaces in Fog,
W75-05101 2B

Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2B

PRECIPITATION INTENSITY
Distribution of Mean Monthly Precipitation and Rainfall Intensities,
W75-05105 2B

PRECIPITATION SCAVENGING
Numerical Models for Precipitation Scavenging,
W75-05112 5B

PREDATOR-PREY RELATIONSHIPS
Feeding in the Porcelain Crab, Petrolisthes Cinctipes (Randall) (Anomura: Porcellanidae),
W75-04907 2I

PRESSURE
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

PRICING
The Economic and Environmental Benefits from Improving Electrical Rate Structures,
W75-05309 6B

PRIMARY PRODUCTION
Primary and Bacterial Production of Some Fishery Ponds of the Volga Delta, (In Russian),
W75-05334 8I

PRIMARY PRODUCTIVITY
Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

A Guide to the Measurement of Marine Primary Production Under Some Special Conditions,
W75-05047 5A

Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

PROBABILISTIC POTENTIAL THEORY
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

PROBABILITY
Flood Frequency and Risk,
W75-04876 4A

Analysis of Oil Spill Statistics,
W75-05034 5C

PRODUCTIVITY
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

PROGRAMMING MANUALS
Stream Programmer's Manual.
W75-04874 7C

PROJECT EXPANSION
Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

PROJECT PLANNING
Problems and Opportunities in Interdisciplinary Research: The Molybdenum Project,
W75-05298 5G

PROJECTS
Water Resources Center Annual Report, July 1, 1973-June 30, 1974.
W75-05266 9D

PROPABILITY
Probabilistic Analysis and Simulation of the Short Time Increment Rainfall Process,
W75-05173 2B

PROPANES
Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

PROTEINS
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

PUBLIC HEALTH
Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations,
W75-05044 5G

PUBLIC RELATIONS
Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

PUERTO RICO
Puerto Rico Nuclear Center, Annual Report, 1973.
W75-05350 5A

PUGET SOUND (WASH)
Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

PULP AND PAPER INDUSTRY
Training Manual on the Basic Technology of the Pulp and Paper Industry and its Waste Reduction Practices,
W75-04871 5D

Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

Environmental Protection in the Finnish Pulp and Paper Industry (Umweltschutz in der Finnischen Zellstoff- und Papierindustrie),
W75-04949 5G

Water Conservation and Fiber Economy,
W75-04956 3E

Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

PULP WASTES
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

Effluent Toxicity Removal on the West Coast,
W75-04942 5D

Carbon and Color Distribution in Various Size Fractions of Treated Pulp Mill and Board Mill Waste Effluents,
W75-04948 5B

Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

At Abitibi, Iroquois Falls, $2.5-Million Primary Treatment System Nears Completion.
W75-04976 5D

Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

QUALITY CONTROL
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

QUICK-TIME INSTRUMENTAL MEASUREMENTS
Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

RADAR
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

RADIOACTIVE TRACERS
Techniques for Tracing Sediment Movement,
W75-04889 2J

RADIOACTIVE WASTE DISPOSAL
Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

RADIOACTIVE WASTES
LASL Waste System Backs up into Street.
W75-05327 5D

Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

RADIOACTIVITY
Benthic Animal-Sediment,
W75-05343 5A

RADIOACTIVITY TECHNIQUES
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

RAIN GAGES
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2B

RAINFALL
Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2B

Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

Analyses of the Effect of Urbanization on Rainfall Characteristics I,
W75-05172 4C

Probabilistic Analysis and Simulation of the Short Time Increment Rainfall Process,
W75-05173 2B

Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

RAINFALL DISPOSITION
On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

RAINFALL INTENSITY
On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

RAINFALL-RUNOFF RELATIONSHIP
An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

RAINFALL-RUNOFF RELATIONSHIPS
Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

River Hydrology in Permafrost Areas,
W75-05142 2C

Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

RATIONAL FORMULA
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

RECHARGE
Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

RECIRCULATED WATER
Water Conservation and Fiber Economy,
W75-04956 3E

Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

RECLAIMED WATER
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

RECREATION
Recreational Uses of Green Bay: Bay/Non-Bay Users Compared,
W75-04913 6B

Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

RECYCLING
Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

RED HAKE
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish–Red Hake, Urophycis Chuss,
W75-05023 3E

REFLECTANCE
Remote Sensing Potentials for Resource Management,
W75-04922 5A

REGIONAL ANALYSIS
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume I: Summary Report.
W75-05108 2A

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume II: Supporting Technical Details.
W75-05109 2A

REGIONS
Regional Characterizations of the Thermal Properties of Lake Ontario,
W75-04911 2H

REGRESSION ANALYSIS
Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

Flood Flow Frequency Techniques,
W75-05262 2E

REGULATION
An Approach to the Control of Toxic Substances,
W75-05300 5G

REHABILITATION
Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

REMOTE SENSING
Remote Sensing Potentials for Resource Management,
W75-04922 5A

An Automatic Underwater Camera System,
W75-05048 5A

Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

A Procedure for Automated Land Use Mapping Using Remotely Sensed Multispectral Scanner Data,
W75-05096 7C

Development of a Two-Channel Linear Discriminant Function for Detecting and Identifying Surface Water Using ERTS-1 Data.
W75-05103 7C

Evaluation of Computer-Aided Procedure for Detecting Surface Water.
W75-05104 7C

Use of Remote Sensing in Agriculture,
W75-05107 7B

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume I: Summary Report.
W75-05108 2A

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume II: Supporting Technical Details.
W75-05109 2A

Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

Development of a Prototype Airborne Oil Surveillance System - Volume II - Design Report.
W75-05119 5A

Development of a Prototype Airborne Oil Surveillance System - Volume III - Subsystem Specifications.
W75-05120 5A

Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

Remote Sensor Utilization for Environmental System Studies, Volume II,
W75-05124 7B

Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

Application of Remote Sensing to Hydrology.
W75-05131 2A

Research in Remote Sensing of Agriculture, Earth Resources, and Man's Environment,
W75-05132 7B

Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

Development of a Computer-Aided Procedure for the National Program of Inspection of Dam.,
W75-05134 7C

Hydrological Basis for Forecasting and Calculating Runoff by Space Images of the Earth's Surface,
W75-05135 4A

Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

REPAIRING
Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

REPRODUCTION
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

RESEARCH AND DEVELOPMENT
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

Water Resources Center Annual Report, July 1, 1973-June 30, 1974.
W75-05266 9D

Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

RESEARCH FACILITIES
Research Projects in Glaciology - 1974,
W75-04884 2C

World Directory of Environmental Research Centers.
W75-04971 10D

RESEARCH PRIORITIES
Estimating Water Quality Benefits,
W75-05068 5G

RESERVOIR OPERATION
Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

RESERVOIR SILTING
Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

RESERVOIRS
Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

RESIN ACIDS
Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

RESISTIVITY
Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

RESONATING CHAMBER
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

RESOURCE ALLOCATION
Evaluation of Adjustment Assistance Programs with Application for Pollution Control,
W75-05074 5G

RETAINING WALLS
Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

RETURN FLOW
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

REVERSE OSMOSIS
Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

REVIEWS
Industrial Water Purification,
W75-04968 5D

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

A Review of the Literature Concerning the Steel Industry and Pollution. Part 1. The Background to Pollution,
W75-05093 5G

Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

Stochastic Models of Sediment Transport,
W75-05241 2J

Wastewater Collection (Literature Review),
W75-05335 5D

RHODE ISLAND
Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

RHODESIA
Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

RICE
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

RIDEAU RIVER (CANADA)
Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

RILL EROSION
Experimental Study of Rill Erosion,
W75-05178 2J

Experimental Study of Rill Erosion,
W75-05178 2J

RINCON ISLAND (CALIF)
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

RIPPLE MARKS
Effect of Characteristics of Bed Material and Fluid on Ripple Formation,
W75-05243 8B

RISK ANALYSIS
Flood Frequency and Risk,
W75-04876 4A

RISKS
Flood Frequency and Risk,
W75-04876 4A

RIVER BASIN DEVELOPMENT
Optimal Expansion of a Water Resources System,
W75-05315 6A

Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

RIVER BASINS
The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

RIVER BEDS
Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

River-Bed Variations at Confluences,
W75-05253 2J

Contribution to the Study of General Scour,
W75-05255 2J

Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

RIVER MECHANICS
Sediment Transportation, Volume I.
W75-05192 2J

Flow Resistance in Sand Bed Channels,
W75-05220 8B

A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

Calculations of Suspended Load in Alluvial Channel,
W75-05229 2J

Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

On the Concept of the Wash Load,
W75-05238 2J

A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

On The Cause of Meandering of Rivers,
W75-05244 2J

Condition for the Formation of Alternate Bars in Straight Alluvial Channels,
W75-05245 8B

River-Bed Variations at Confluences,
W75-05253 2J

RIVER TRAINING
Chao Phya River Training Works,
W75-05213 8A

The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

RIVERS
Sediment Loads in Canadian Rivers,
W75-04886 2J

River Hydrology in Permafrost Areas,
W75-05142 2C

Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

ROACH
Ecology of the Bucharan Roach Rutilus Rutilus Bucharensis G. Nikolskij of the Uchkyzyl Reservoir of the Surkhan-Darya River Basin, (In Russian),
W75-05102 2H

ROOKERY BAY SANCTUARY (FLA)
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

ROOT DEVELOPMENT
Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

ROOT SYSTEMS
Diurnal Cycling in Root Resistance to Water Movement,
W75-04885 3F

RUNNING WATERS
Comprehensive Graphs of Regime Data,
W75-05247 2J

RUNOFF
Hydrological Basis for Forecasting and Calculating Runoff by Space Images of the Earth's Surface,
W75-05135 4A

Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

RUNOFF FORECASTING
Hydrologic Forecasting in the Water Resources Branch,
W75-04881 4A

Hydrological Basis for Forecasting and Calculating Runoff by Space Images of the Earth's Surface,
W75-05135 4A

RUNOFF PEAK RATES
Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

RUTHNER SYSTEM
Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

SAFETY
The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

SAGINAW BAY (LAKE HURON)
Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

SALAQUIFERS
Management of Waste Fluids in Salaquifers,
W75-05191 5B

SALINE GROUNDWATER
Management of Waste Fluids in Salaquifers,
W75-05191 5B

SALINE GROUNDWATER COLLECTION
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

SALINE WATER-FRESHWATER INTERFACES
Digital Simulation of Horizontal Salt-Water Encroachment Induced by Fresh-Water Pumping,
W75-04875 2L

SALINE WATER INTRUSION
Digital Simulation of Horizontal Salt-Water Encroachment Induced by Fresh-Water Pumping,
W75-04875 2L

Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

SALINITY
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

SALINITY CONTROL
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

SALMON
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

SALMON-RUN ALLOCATION
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

SALT CREEK (ILL)
Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

SALT MARSHES
The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

SALT PITS (ARTIFICIAL)
Possibilities of Converting Part of the Piritu Lagoon (State of Anzoategui) into an Artificial Salt Pit, (In Spanish),
W75-05276 3E

SALTATION
Instantaneous Turbulent Flow Acts on the Sand Particle to Start the Rotation on the Bed,
W75-05223 2J

A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

Statistical Regularities in the Movement of Bed Load,
W75-05239 2J

SAMPLING
Methods for Studies of Plankton (In Swedish),
W75-05061 7B

Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

SAN FRANCISCO BAY (CALIF)
Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

SAN JACINTO GROUNDWATER BASIN (CALIF)
Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

SAPROMAT TECHNIQUE
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

SATELLITES (ARTIFICIAL)
Development of a Two-Channel Linear Discriminant Function for Detecting and Identifying Surface Water Using ERTS-1 Data.
W75-05103 7C

Evaluation of Computer-Aided Procedure for Detecting Surface Water.
W75-05104 7C

Research in Remote Sensing of Agriculture, Earth Resources, and Man's Environment,
W75-05132 7B

Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

SCENEDESMUS DIMORPHUS
The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

SCHEDULING
The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

SCOTLAND (RIVER TAY)
Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

SCOUR
Sediment Transportation, Volume I.
W75-05192 2J

Scour in River Basin and in its Bed Mechanism, Forecast,
W75-05199 2J

Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

Deformed Piers to Control the Downstream Erosion,
W75-05202 8B

Scour at Downstream End of Dams in Taiwan,
W75-05204 8B

Modeling of Local Scour Around Spur Dikes in Streams,
W75-05206 8B

The Effect of Sills on River Bed,
W75-05207 8B

Stable Channels in Alluvium,
W75-05248 8B

Stable Channels in Alluvial Material,
W75-05250 8B

Design of Scour-Free Channels on Mild Slopes,
W75-05251 8B

Contribution to the Study of General Scour,
W75-05255 2J

Scouring Capacity of Flow in Narrow Open Channels,
W75-05258 8B

SEA WATER
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

SEASONAL
Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

SECONDARY FLOW
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

SEDIMENT CONTROL
Sediment Transportation, Volume I.
W75-05192 2J

Sediment Control and Remedial Works in the Brantas River, Java, Indonesia,
W75-05211 4D

Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

Water Intake Problems in Torrents,
W75-05217 8B

Design of Scour-Free Channels on Mild Slopes,
W75-05251 8B

Sediment Equilibrium Considerations in the Design of Irrigation Canal Networks,
W75-05252 8B

Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

SEDIMENT DEPOSITION
An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

SEDIMENT DISCHARGE
Scour in River Basin and in its Bed Mechanism, Forecast,
W75-05199 2J

Studies on Bed-Load Transport Rate in Open Channel Flows,
W75-05226 8B

Calculations of Suspended Load in Alluvial Channel,
W75-05229 2J

Bed Material Transport in Sand Bed Channels,
W75-05233 2J

Sediment Transport Characteristics of the Teesta River,
W75-05235 2J

Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

SEDIMENT DISTRIBUTION
The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

SEDIMENT LOAD
Sediment Loads in Canadian Rivers,
W75-04886 2J

Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

Sediment Transport Relations Using Concept of Effective Shear Stress,
W75-05232 2J

SEDIMENT REMOVAL
Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

SEDIMENT SORTING
Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

SEDIMENT TRANSFER COEFFICIENT
The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

SEDIMENT TRANSPORT
Sediment Loads in Canadian Rivers,
W75-04886 2J

Techniques for Tracing Sediment Movement,
W75-04889 2J

Sediment Transportation, Volume I.
W75-05192 2J

Debris Slopes Above Sand Barriers,
W75-05196 2J

Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

Studies on Bed-Load Transport Rate in Open Channel Flows,
W75-05226 8B

Sediment Transport Through a Porous Column,
W75-05231 2J

Sediment Transport Relations Using Concept of Effective Shear Stress,
W75-05232 2J

Bed Material Transport in Sand Bed Channels,
W75-05233 2J

Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

Sediment Transport Characteristics of the Teesta River,
W75-05235 2J

Sediment Diffusion Over a Wavy, Mobile Bed,
W75-05237 8B

On the Concept of the Wash Load,
W75-05238 2J

Statistical Regularities in the Movement of Bed Load,
W75-05239 2J

Stochastic Models of Sediment Transport,
W75-05241 2J

Effect of Characteristics of Bed Material and Fluid on Ripple Formation,
W75-05243 8B

Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

River-Bed Variations at Confluences,
W75-05253 2J

Bed Slopes of Aggraded Channels with Two Degrees of Freedom,
W75-05254 8B

Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

SEDIMENT YIELD
Sediment Yield as Related to Vegetation on Semiarid Watersheds,
W75-04927 2J

Sediment Transportation, Volume I.
W75-05192 2J

Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

Debris Slopes Above Sand Barriers,
W75-05196 2J

An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

SEDIMENTARY ROCKS
Aquathermal Fluid Migration,
W75-05182 4B

SEDIMENTATION
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

Effect of Physico-Chemical Properties of Fine Suspended Sediment on the Degree of Deposition,
W75-05230 2J

Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

SEDIMENTATION RATES
Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

Influence of Suspended Sediment Distribution on Settling Basin Designs,
W75-05216 8B

SEDIMENTOLOGY
Effect of Wash Load on Sediment Transportation,
W75-05227 2J

SEDIMENTS
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

Debris Slopes Above Sand Barriers,
W75-05196 2J

The Influence of the Relative Depth on Threshold of Grain Motion,
W75-05222 2J

Benthic Animal-Sediment,
W75-05343 5A

SEEPAGE
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

SELF-PURIFICATION
Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

SEMIARID WATERSHEDS
Sediment Yield as Related to Vegetation on Semiarid Watersheds,
W75-04927 2J

SENSITIVITY ANALYSIS
The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

SEPARATION TECHNIQUES
Industrial Water Purification,
W75-04968 5D

Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

SEPTIC TANKS
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

Land Use and Zoning, Septic Effluents and the Responsibility for Adequate Control,
W75-05045 5G

SETTLING BASINS
Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

Influence of Suspended Sediment Distribution on Settling Basin Designs,
W75-05216 8B

SETTLING VELOCITY
Effect of Wash Load on Sediment Transportation,
W75-05227 2J

SEWAGE DISPOSAL
Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations,
W75-05044 5G

Measuring Sewage Flow Using Weirs and Flumes,
W75-05326 5D

SEWAGE EFFLUENTS
The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

SEWAGE TREATMENT
At Abitibi, Iroquois Falls, $2.5-Million Primary Treatment System Nears Completion.
W75-04976 5D

Survey of Needs for Municipal Waste Treatment Facilities.
W75-04978 5D

Return Sludge Flow Control,
W75-04982 5D

Physical-Chemical Processes,
W75-04984 5D

Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

They're Forever Blowing Bubbles.
W75-05328 5D

SEWERAGE
City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

City of Toronto Sewer System,
W75-04864 8A

Dollar Gain to Top Cost Climb in 1975 Sewerage Construction.
W75-05325 5D

SEWERS
City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

The Neath Valley Sewerage Scheme.
W75-05000 5D

LASL Waste System Backs up into Street.
W75-05327 5D

Wastewater Collection (Literature Review),
W75-05335 5D

SHAPE
Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

SHELLFISH
Fishery Bulletin, Vol 69, No 1, January 1971,
W75-05016 8I

SHORT PIPE
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

SHRIMP
Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

Equipment for Holding and Releasing Penaeid Shrimp During Marking Experiments,
W75-05030 8I

SHRIMP PROCESSING WASTEWATERS
Shrimp Canning Waste Treatment Study,
W75-05087 5A

SILT SURVEY LINES
Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

SIMAZINE
The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

SIMULATED RAINFALL
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

SIMULATED RUNOFF
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

SITES
Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

SIZE
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

SKAHA LAKE (BRITISH COLUMBIA)
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

SLOPE RATIO
Debris Slopes Above Sand Barriers,
W75-05196 2J

SLUDGE
Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

SLUDGE DISPOSAL
Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

SLUDGE TREATMENT
Return Sludge Flow Control,
W75-04982 5D

Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

SMALL WATERSHEDS
Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume I: Summary Report.
W75-05108 2A

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume II: Supporting Technical Details.
W75-05109 2A

SMOG
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

SNAILS
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

SNOW
Snow Interception and Redistribution in the Forest,
W75-04917 2C

SNOW COVER
Snow Interception and Redistribution in the Forest,
W75-04917 2C

SNOW SURVEYS
Snow Interception and Redistribution in the Forest,
W75-04917 2C

SOCKEYE SALMON
Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

SODIUM COMPOUNDS
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

SOFAR CHANNEL
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

SOIL ANALYSIS
Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

SOIL EROSION
The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

Experimental Study of Rill Erosion,
W75-05178 2J

Experimental Study of Rill Erosion,
W75-05178 2J

SOIL EVAPORATION
Relative Significance of Soil and Plant Evaporation in Estimating Evpotranspiration,
W75-04915 2D

SOIL MANAGEMENT
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

SOIL PHYSICAL PROPERTIES
Infiltration of Water into the Soil Profile,
W75-04918 2G

Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

Proposed Indices for Estimating the Inherent Wind Erodibility of Soils,
W75-05168 2J

SOIL PHYSICS
A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

SOIL PORES
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

SOIL PRESSURE
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

SOIL STRUCTURE
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

SOIL SURFACE ROUGHNESS
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

SOIL SURFACES
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

SOIL WATER
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

SOIL WATER MOVEMENT
Infiltration of Water into the Soil Profile,
W75-04918 2G

Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

SOIL-WATER-PLANT RELATIONSHIPS
A Water Balance Recorder for Hydroclimatic and Agroclimatic Measurement of Precipitation and Evaporation,
W75-04914 2D

Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

Problems and Opportunities in Interdisciplinary Research: The Molybdenum Project,
W75-05298 5G

SOIL-WATER PRESSURE
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

SOILS
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

SOLAR ENERGY
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

SOLAR RADIATION
Factors Affecting Potential Evapotranspiration,
W75-04916 2D

SOLID WASTES
Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

Incineration of Solid Wastes,
W75-04969 5E

Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

SORPTION
Nomographic Interpretation of Water Absorption Data in Terms of a Two-Parametric Diffusivity-Water Content Function,
W75-05180 2G

SOUND PROPAGATION
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

SOUND SPEED
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

SOUTH DAKOTA
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

SOYBEANS
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

SPARK SOURCE MASS SPECTROMETRY
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

SPARKS (NEVADA)
City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

SPARROWS POINT (MD)
Bethlehem Treats 80 Million Gallons of Wastewater Each Day.
W75-04993 5D

SPATIAL DISTRIBUTION
The Distribution of Diatoms on the Superficial Sediments of Lake Ontario,
W75-04899 5C

Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The

transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

SPAWNING
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

SPECIES COMPOSITION
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

SPECIFIC HEAT
Specific Heats of Components of Frozen Soil,
W75-05149 2C

SPECTRA
Mean Length of Runs of Ocean Waves,
W75-05160 8B

SPECTRAL ANALYSIS (BIDIMENSIONAL)
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

SPECTRAL MODEL
Mean Length of Runs of Ocean Waves,
W75-05160 8B

SPECTROSCOPY
Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

SPRINKLER INFILTROMETER DATA
A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

ST. FRANCOIS RIVER BASIN (CANADA)
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

STABILITY
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

Design of Scour-Free Channels on Mild Slopes,
W75-05251 8B

STABLE CHANNEL DESIGN
Stable Channels in Alluvium,
W75-05248 8B

Stable Channels in Alluvial Material,
W75-05250 8B

STABLE ISOTOPES
Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

STANDING CROPS
Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

STANFORD WATERSHED MODEL
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

STATE PARKS
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

STATISTICAL ANALYSIS
A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

STATISTICAL METHODS
Flood Flow Frequency Techniques,
W75-05262 2E

STATISTICAL MODELS
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

Stochastic Models of Sediment Transport,
W75-05241 2J

Flood Flow Frequency Techniques,
W75-05262 2E

STATISTICS
Environmental Contaminants Inventory Study No 1: Statistics on the Use of Pest Control Products in Canada,
W75-04880 5G

STIGEOCLONIUM-TENUE
The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

STOCHASTIC PROCESSES
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

Flood Flow Frequency Techniques,
W75-05262 2E

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

STORAGE
Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

STORM DRAINS
City of Toronto Sewer System,
W75-04864 8A

STORM HYDROGRAPH
Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

STORM RUNOFF
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

Stormflow Production from Permeable Upland Basins,
W75-04925 2A

Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

STORMS
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

STRATISTICAL METHODS
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

STREAM EROSION
Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

Lang Lang River, Victoria Attempts to Control Sediment, Erosion and Floods,
W75-05212 4D

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

STREAM-FLOW
Discharge of Selected Rivers of Canada.
W75-05136 2E

STREAM STABILIZATION
Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

Stable Channels in Alluvium,
W75-05248 8B

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

Stable Channels in Alluvial Material,
W75-05250 8B

The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

STREAMBEDS
Incipient Motion of Bed Material,
W75-05203 8B

Sediment Diffusion Over a Wavy, Mobile Bed,
W75-05237 8B

Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

STREAMFLOW
Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

Stream Programmer's Manual.
W75-04874 7C

Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

Discharge of Selected Rivers of Canada, Supplement 1.
W75-05137 2E

Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

STREAMFLOW FORECASTING
Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

STREAMS
The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

STRUCTURAL MODELS
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

STRUCTURE FACTOR
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

SUB-LETHAL EFFECTS
Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

SUBSURFACE INVESTIGATIONS
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

SUBSURFACE RUNOFF
Stormflow Production from Permeable Upland Basins,
W75-04925 2A

SUGAR BEET WASTE TREATMENT
Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

SUGAR BEETS
The Effect of Plant Spacing, Nitrogen Fertilizer and Irrigation on the Appearance of Symptoms and Spread of Virus Yellows in Sugar Beet Crops,
W75-05020 5C

Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

SULFITE LIQUORS
Effluent Toxicity Removal on the West Coast,
W75-04942 5D

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

SULFONATES
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

SULFUR COMPOUNDS
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

SUNKHAZE STREAM (MAINE)
To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

SURFACE DRAINAGE
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

SURFACE-GROUNDWATER RELATIONSHIPS
Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

SURFACE RUNOFF
Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

SURFACE WATERS
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

Development of a Two-Channel Linear Discriminant Function for Detecting and Identifying Surface Water Using ERTS-1 Data.
W75-05103 7C

Evaluation of Computer-Aided Procedure for Detecting Surface Water.
W75-05104 7C

Development of a Computer-Aided Procedure for the National Program of Inspection of Dam.,
W75-05134 7C

Hydrology and Permafrost With Reference to North America,
W75-05140 2C

SURFACES
Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

SURINAM
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

SURVEYS
Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

Survey of Needs for Municipal Waste Treatment Facilities.
W75-04978 5D

Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

SUSPENDED LOAD
Effect of Wash Load on Sediment Transportation,
W75-05227 2J

Calculations of Suspended Load in Alluvial Channel,
W75-05229 2J

Effect of Physico-Chemical Properties of Fine Suspended Sediment on the Degree of Deposition,
W75-05230 2J

On the Concept of the Wash Load,
W75-05238 2J

SUSPENDED SOLIDS
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

SUSPENDED SOLIDS SEPARATION
An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

SUSPENSION
A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

SUSQUEHANNA RIVER
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

SWAMPS
The Upper Nile Swamps, A Tropical Wetland Study,
W75-04996 2H

SYNEDRA
Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

SYNTHESIS
Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

SYNTHETIC HYDROLOGY
Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

SYNTHETIC RAINFALL GENERATION
Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

SYSTEMATICS
Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

TACONITE TAILINGS
Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

TAILINGS PONDS
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

TAIWAN
Scour at Downstream End of Dams in Taiwan,
W75-05204 8B

Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

TECHNICAL PRESENTATIONS
Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

TEMPERATURE
Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

TEMPORAL DISTRIBUTION
Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

TENNESSEE
Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

TENSIOMETERS
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

TERTIARY TREATMENT
Status of Advanced Waste Treatment,
W75-04983 5D

TESTING
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

TEXAS
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

TEXTILES
Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

THAILAND (BHUMIBOL RESERVOIR)
Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

THAILAND (CHAO PHYA RIVER)
Chao Phya River Training Works,
W75-05213 8A

THEORETICAL ANALYSIS
The Influence of the Relative Depth on Threshold of Grain Motion,
W75-05222 2J

THERMAL IMAGERY
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

THERMAL POLLUTION
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

THERMAL PROPERTIES
Regional Characterizations of the Thermal Properties of Lake Ontario,
W75-04911 2H

THIAMINASE
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

TIDAL EFFECTS
Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

TIDAL RIVER STABILITY
Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

TIDAL STREAMS
Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

TIME SERIES ANALYSIS
Continuous Hydrological Time-Series Discretization,
W75-05165 2A

TIOGA COUNTY (NEW YORK)
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

TISSUE ANALYSIS
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

TOLERANCE LEVELS
The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

TOPOGRAPHY
An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

TORONTO
City of Toronto Sewer System,
W75-04864 8A

TORONTO (CANADA)
High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

TOXICANTS
Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

TOXICITY
Effluent Toxicity Removal on the West Coast,
W75-04942 5D

Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

Behavioral Effects of Methylmercury,
W75-05288 5A

The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

TOXINS
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

An Approach to the Control of Toxic Substances,
W75-05300 5G

TRACE ELEMENTS
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

RACERS
Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

RACKING TECHNIQUES
Techniques for Tracing Sediment Movement,
W75-04889 2J

TRACTIVE FORCES
Stable Channels in Alluvial Material,
W75-05250 8B

TRAINING
Training Manual on the Basic Technology of the Pulp and Paper Industry and its Waste Reduction Practices,
W75-04871 5D

Puerto Rico Nuclear Center, Annual Report, 1973.
W75-05350 5A

TRANSFER
Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

TRANSITION FLOW
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

TRANSPORT EQUATIONS
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

TRANSPORTATION
Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

Second Annual Report, Dot-CIAP Program,
W75-05349 2B

TRAP EFFICIENCY
Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

TREATMENT FACILITIES
Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

At Abitibi, Iroquois Falls, $2.5-Million Primary Treatment System Nears Completion.
W75-04976 5D

Survey of Needs for Municipal Waste Treatment Facilities.
W75-04978 5D

Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

Dollar Gain to Top Cost Climb in 1975 Sewerage Construction.
W75-05325 5D

TRIBUTARIES
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

TRICKLING FILTERS
Nitrogen Removal Obtained Through Heterotrophic Growth in Trickling Filters,
W75-05269 5D

TRINITROTOLUENE (TNT)
Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

TROPHIC LEVEL
Indicators of Eutrophication: Visual, Chemical, Physical, Biological,
W75-05046 5C

TROPICAL REGIONS
Kind and Abundance of Fish Larvae in the Eastern Tropical Pacific, Based on Collections Made on Eastropac I,
W75-05017 8I

TURBIDITY
Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

TURBULENCE
Turbulence Measurements over Sand Beds,
W75-05219 8B

TURBULENT FLOW
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

TURBULENT TRANSPORT
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

TURKEY (MERIC RIVER-ERGENE RIVER)
Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

UNDERGROUND STORAGE
Management of Waste Fluids in Salaquifers,
W75-05191 5B

UNITED KINGDOM (WALES)
Some Factors Affecting the Distribution of Crenobia Alpina (Dana), Polycelis Felina (Dalyell) and Phagocata Vitta (Duges) (Platyhelminthes) in Caernarvonshire, North Wales,
W75-04980 5C

UNIVERSITIES
Puerto Rico Nuclear Center, Annual Report, 1973.
W75-05350 5A

UNSTEADY FLOW
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

UPPER KLAMATH LAKE (ORE)
Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

URBAN DRAINAGE
City of Toronto Sewer System,
W75-04864 8A

URBAN HYDROLOGY
Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

URBAN RUNOFF
Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

URBAN SOCIOLOGY
Analyses of the Effect of Urbanization on Rainfall Characteristics I,
W75-05172 4C

URBAN WATER SYSTEMS
Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

URBANIZATION
Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

Analyses of the Effect of Urbanization on Rainfall Characteristics I,
W75-05172 4C

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

USSR (RYBINSK RESERVOIR)
Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

USSR (UCHKYZYL RESERVOIR)
Ecology of the Bucharan Roach Rutilus Rutilus Bucharensis G. Nikolskij of the Uchkyzyl Reservoir of the Surkhan-Darya River Basin, (In Russian),
W75-05102 2H

USSR (UKRAINE)
Microstructure of Precipitation Deposited on Horizontal Surfaces in Fog,
W75-05101 2B

USSR (VOLGA DELTA)
Primary and Bacterial Production of Some Fishery Ponds of the Volga Delta, (In Russian),
W75-05334 8I

UTAH
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

VALUE ENGINEERING
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

VEGATION EFFECTS
The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

VEGETABLE CROPS
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

VEGETATION
Sediment Yield as Related to Vegetation on Semiarid Watersheds,
W75-04927 2J

The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

VEGETATION EFFECTS
Factors Affecting Potential Evapotranspiration,
W75-04916 2D

Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

VEGTATION EFFECTS
Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

VELOCITY DEFECT LAW
The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

VENEZUELA (PIRITU LAGOON)
Possibilities of Converting Part of the Piritu Lagoon (State of Anzoategui) into an Artificial Salt Pit, (In Spanish),
W75-05276 3E

VICTORIAN RESERVOIRS
Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

VIRGINIA
The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

VIRUS YELLOWS
The Effect of Plant Spacing, Nitrogen Fertilizer and Irrigation on the Appearance of Symptoms and Spread of Virus Yellows in Sugar Beet Crops,
W75-05020 5C

VIRUSES
Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

VISCOSITY
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

VISCOUS FLOW
Theory of Viscous Flow in Wide Curved Open Channels,
W75-05208 8B

VOLATILIZATION
Volatilization Losses of Pesticides from Soils,
W75-05075 5B

VOLCANOES
Sediment Control and Remedial Works in the Brantas River, Java, Indonesia,
W75-05211 4D

WALES
The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

WASHINGTON
A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

An Agricultural Irrigation Model for a Watershed,
W75-05307 3F

Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

WASTE DISPOSAL
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

WASTE DISPOSAL WELLS
Management of Waste Fluids in Salaquifers,
W75-05191 5B

WASTE MANAGEMENT
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

WASTE PAPER
Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

WASTE TREATMENT
Training Manual on the Basic Technology of the Pulp and Paper Industry and its Waste Reduction Practices,
W75-04871 5D

Incineration of Solid Wastes,
W75-04969 5E

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

Status of Advanced Waste Treatment,
W75-04983 5D

Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

WASTE WATER COLLECTION
Wastewater Collection (Literature Review),
W75-05335 5D

WASTE WATER DISPOSAL
Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

New Developments in Effluent Legislation, Especially Laws Governing Effluent Disposal (Neuerungen auf dem Abwasserrechts-Sektor -- insbesondere Abwasserabgabengesetz),
W75-04950 5G

WASTE WATER TREATMENT
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

Effluent Toxicity Removal on the West Coast,
W75-04942 5D

Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

Industrial Water Purification,
W75-04968 5D

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

At Abitibi, Iroquois Falls, $2.5-Million Primary Treatment System Nears Completion.
W75-04976 5D

Survey of Needs for Municipal Waste Treatment Facilities.
W75-04978 5D

Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

Return Sludge Flow Control,
W75-04982 5D

Status of Advanced Waste Treatment,
W75-04983 5D

Physical-Chemical Processes,
W75-04984 5D

Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

Cost Optimization of Activated Sludge Systems,
W75-04990 5D

Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

Bethlehem Treats 80 Million Gallons of Wastewater Each Day.
W75-04993 5D

Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Shrimp Canning Waste Treatment Study,
W75-05087 5A

New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

Growth Kinetics of Nitrifying Microorganisms,
W75-05267 5D

Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

Nitrogen Removal Obtained Through Heterotrophic Growth in Trickling Filters,
W75-05269 5D

Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

Measuring Sewage Flow Using Weirs and Flumes,
W75-05326 5D

They're Forever Blowing Bubbles.
W75-05328 5D

Treat Wastewater Like Downtown Traffic,
W75-05329 5D

Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

Recovery of Residual Ammonia from Weak Aqueous Solutions Thereof,
W75-05332 5D

Wastewater Collection (Literature Review),
W75-05335 5D

WASTES

Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

WASTEWATER TREATMENT

The Chemical Treatment of Cooling Water,
W75-04964 5D

WATER ALLOCATION (POLICY)

A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

WATER ANALYSIS

Interlaboratory Quality Control Study No 6: Specific Conductance, pH, Colour and Residue,
W75-04887 2K

Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

Groundwater in Permafrost Regions of Canada,
W75-05150 2C

Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

WATER AVAILABILITY

A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

WATER BALANCE

A Water Balance Recorder for Hydroclimatic and Agroclimatic Measurement of Precipitation and Evaporation,
W75-04914 2D

Microstructure of Precipitation Deposited on Horizontal Surfaces in Fog,
W75-05101 2B

Hydrology and Permafrost With Reference to North America,
W75-05140 2C

WATER CHEMISTRY

Groundwater in Permafrost Regions of Canada,
W75-05150 2C

WATER CONSERVATION

Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

Water Conservation and Fiber Economy,
W75-04956 3E

Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

WATER CONSUMPTION (EXCEPT CONSUMPTIVE USE)

Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

WATER DISTRIBUTION (APPLIED)

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

WATER HARVESTING

Air Pressures Over Surfaces Exposed to Wind - I. Water Harvesting Catchments,
W75-05179 3B

WATER LEVELS

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

WATER MANAGEMENT (APPLIED)

Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

WATER POLICY

Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

WATER POLLUTION

The Indicator Organisms and their Ecological Variability,
W75-05055 5C

Geohydrologic Relationships in Water Pollution,
W75-05128 5G

Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

WATER POLLUTION CONTROL

A Practical Approach to Water Quality Management Planning,
W75-04857 5G

Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

Environmental Protection in the Finnish Pulp and Paper Industry (Umweltschutz in der Finnischen Zellstoff- und Papierindustrie),
W75-04949 5G

Water Conservation and Fiber Economy,
W75-04956 3E

Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

A Look at the National Permit Program,
W75-04995 5G

'Human-Accelerated Eutrophication of Fresh-Water Lakes,' Proceedings of a Conference,
W75-05037 5C

Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

WATER POLLUTION CONTROL ENVIRONMENTAL EFFECTS
Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

WATER POLLUTION EFFECTS
Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

WATER POLLUTION SOURCES
Training Manual on the Basic Technology of the Pulp and Paper Industry and its Waste Reduction Practices,
W75-04871 5D

Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

'Eutrophication'--Its Causes and Effects in Fresh Water Lakes,
W75-05038 5C

Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

WATER PROPERTIES
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

WATER PURIFICATION
'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

WATER QUALITY
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

Recreational Uses of Green Bay: Bay/Non-Bay Users Compared,
W75-04913 6B

Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

The Federal Water Pollution Control Act and Forestry,
W75-04957 5G

Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

Estimating Water Quality Benefits,
W75-05068 5G

Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

The Effect of Park Use on Surface Water Quality,
W75-05306 5B

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

WATER QUALITY CONTROL
A Practical Approach to Water Quality Management Planning,
W75-04857 5G

Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

Remote Sensing Potentials for Resource Management,
W75-04922 5A

WATER QUALITY STANDARDS
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

WATER RESOURCES
Annual Report, Fy 1974, Water Resources Research Institute of the University of North Carolina.
W75-04937 9D

Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

Water Resources Development, 1950-1965, An International Bibliography,
W75-05154 10B

Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

WATER RESOURCES DEVELOPMENT
Introduction,
W75-05316 6A

WATER RESOURCES INSTITUTE
Annual Report, Fy 1974, Water Resources Research Institute of the University of North Carolina.
W75-04937 9D

Water Resources Center Annual Report, July 1, 1973-June 30, 1974.
W75-05266 9D

WATER REUSE
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

WATER STRESS
The Course and Magnitude of Water Stress in Lolium Perenne and Dactylis Glomerata,
W75-05056 3F

WATER STRUCTURE
Water and Aqueous Solutions: Introduction to a Molecular Theory,
W75-04970 1B

Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

WATER STRUCTURE

Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

WATER SUPPLY
Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

Energy Balance Considerations in Permafrost Hydrology,
W75-05147 2C

Groundwater in Permafrost Regions of Canada,
W75-05150 2C

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

WATER TEMPERATURE
Some Factors Affecting the Distribution of Crenobia Alpina (Dana), Polycelis Felina (Dalyell) and Phagocata Vitta (Duges) (Platyhelminthes) in Caernarvonshire, North Wales,
W75-04980 5C

WATER TREATMENT
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

Handbook of Environmental Control. (1) Air Pollution. (2) Solid Waste. (3) Water Supply and Treatment. (4) Wastewater: Treatment and Disposal,
W75-04945 5D

Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

Manganese Removal from Potable Water,
W75-05270 5F

High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

WATER UTILIZATION
Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

Water Conservation and Fiber Economy,
W75-04956 3E

WATER YIELD IMPROVEMENT
Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

WATERBORNE DEBRIS
Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

WATERSHED MANAGEMENT
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

WATERSHEDS (BASINS)
Stormflow Production from Permeable Upland Basins,
W75-04925 2A

Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume I: Summary Report.
W75-05108 2A

A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume II: Supporting Technical Details.
W75-05109 2A

Permafrost-Hydrology Studies at Boot Creek and Peter Lake Watersheds, N.W.T.,
W75-05143 2C

Runoff from a Small Arctic Watershed,
W75-05144 2C

Air Pressures Over Surfaces Exposed to Wind - I. Water Harvesting Catchments,
W75-05179 3B

Scour in River Basin and in its Bed Mechanism, Forecast,
W75-05199 2J

WAVE-LENGTH REGION
An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

WAVE RUN LENGTH
Mean Length of Runs of Ocean Waves,
W75-05160 8B

WAVES (WATER)
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

Mean Length of Runs of Ocean Waves,
W75-05160 8B

WEATHER MODIFICATION
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

WEATHERING
Weathering of Oil at Sea,
W75-05106 5B

WEIRS
Measuring Sewage Flow Using Weirs and Flumes,
W75-05326 5D

WEST GERMANY
New Developments in Effluent Legislation, Especially Laws Governing Effluent Disposal (Neuerungen auf dem Abwasserrechts-Sektor -- insbesondere Abwasserabgabengesetz),
W75-04950 5G

WEST GERMANY (RHUMSPRINGE)
System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

WEST VIRGINIA
Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

WET AND DRY SEQUENCE
Probabilistic Analysis and Simulation of the Short Time Increment Rainfall Process,
W75-05173 2B

WETLANDS (TROPICAL)
The Upper Nile Swamps, A Tropical Wetland Study,
W75-04996 2H

WHEAT (WINTER)
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

WHEATGRASS
Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

WHITE SEA (KARELIA)
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

WHITE WATER (PAPER MACHINE)
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

WIND EROSION
Proposed Indices for Estimating the Inherent Wind Erodibility of Soils,
W75-05168 2J

WIND PRESSURE
Air Pressures Over Surfaces Exposed to Wind - I. Water Harvesting Catchments,
W75-05179 3B

WINDS
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

Second Annual Report, Dot-CIAP Program,
W75-05349 2B

WISCONSIN
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

Recreational Uses of Green Bay: Bay/Non-Bay Users Compared,
W75-04913 6B

Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

X-RAY FLUORESCENCE
Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

YAKIMA RIVER BASIN
Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

YAKIMA RIVER (WASH)
An Agricultural Irrigation Model for a Watershed,
W75-05307 3F

ZERO DISCHARGE
A Look at the National Permit Program,
W75-04995 5G

ZONING
Land Use and Zoning, Septic Effluents and the Responsibility for Adequate Control,
W75-05045 5G

ZOOPLANKTON
Methods for Studies of Plankton (In Swedish),
W75-05061 7B

AUTHOR INDEX

21IN: SEDIMENT TRANSPORTATION, J. MCMANUS. VO
Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

ADAMS, C. E.
A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

ADAMS, C. E. JR.
Variations in the Physico-Chemical Properties of Lake Superior,
W75-04909 5C

AGEMIAN, H.
Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

AHLSTROM, E. H.
Kind and Abundance of Fish Larvae in the Eastern Tropical Pacific, Based on Collections Made on Eastropac I,
W75-05017 8I

AITKEN, A. P.
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

AKSOY, S.
The Influence of the Relative Depth on Threshold of Grain Motion,
W75-05222 2J

ALBEN, R.
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

ALFARO, F. J. E.
Contribution to the Study of General Scour,
W75-05255 2J

ALTUNIN, V. S.
Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

AMANOV, A. A.
Ecology of the Bucharan Roach Rutilus Rutilus Bucharensis G. Nikolskij of the Uchkyzyl Reservoir of the Surkhan-Darya River Basin, (In Russian),
W75-05102 2H

AMBLER, D. C.
Runoff from a Small Arctic Watershed,
W75-05144 2C

AMIRHOR, P.
Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

AMUNDSEN, C. C.
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

ANDERSON, C. G.
Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

ANDERSON, J. C.
Permafrost-Hydrology Studies at Boot Creek and Peter Lake Watersheds, N.W.T.,
W75-05143 2C

ANDERSON, M. N.
National Need - An Industry View of Research,
W75-05299 5G

APMANN, R. P.
Sediment Diffusion Over a Wavy, Mobile Bed,
W75-05237 8B

ARSAN, O. M.
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

ASHIDA, K.
Studies on Bed-Load Transport Rate in Open Channel Flows,
W75-05226 8B

AUBERTON, G. M.
Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

AYARS, J. E.
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

BACHMANN, R. W.
Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

BAGLAN, R. J.
A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

BALCH, N.
Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

BALSIGER, J. W.
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

BALTISBERGER, R. J.
The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

BANSAL, I. K.
Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

BARBER, S. A.
Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

BARGER, W. R.
Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

BARLOW, J. P.
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

BAUMGARDNER, R. E.
Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

BEARD, L. R.
Flood Flow Frequency Techniques,
W75-05262 2E

BEIER, C. J.
A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

BELISLE, A. A.
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

BELL, J. B.
Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

BEN-NAIM, A.
Water and Aqueous Solutions: Introduction to a Molecular Theory,
W75-04970 1B

BENNETT, RAY S.
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

BEVENSEE, R. M.
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

BEWTRA, J. K.
A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

BHAGWAT, A. M.
Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

BHATIA, H. L.
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

BIBBY, R.
Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

BINKS, A. E.
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

BIRD, G. C.
Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

BIRGER, T. I.
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

BISAZ, E.
The Effect of Sills on River Bed,
W75-05207 8B

BISHOP, A. B.
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

BISHOP, J. E.
Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

BITTELL, J. E.
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

BLACK, A. P.
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

BLANTON, C. J.
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

BLEAK, A. T.
Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

BLENCH, T.
Comprehensive Graphs of Regime Data,
W75-05247 2J

BLUS, L. J.
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

BOCSOR, J. G.
Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

BOCZ, E.
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

BOLT, G. H.
Nomographic Interpretation of Water Absorption Data in Terms of a Two-Parametric Diffusivity-Water Content Function,
W75-05180 2G

BONDURANT, J. A.
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

BOUMA, J.
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

BOURODIMOS, E. L.
Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

BOUTRON, P.
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

BOYD, C. E.
The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

BRAMAN, R. S.
Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

BRANT, R. A.
Delineation of Great Lakes Estuaries,
W75-04912 2H

BREMNER, R. M.
City of Toronto Sewer System,
W75-04864 8A

BRESLAW, J. A.
Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

BRIGGS, W.
Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

BRILL, A. B.
A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

BRINN, D. G.
A Review of the Literature Concerning the Steel Industry and Pollution. Part 1. The Background to Pollution,
W75-05093 5G

BROTHERS, J. A.
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

BROWN, D.
Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

BROWN, M. J.
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

BROWN, R. J. E.
Distribution and Environmental Relationships of Permafrost,
W75-05139 2C

BRULEY, A. J.
Training Manual on the Basic Technology of the Pulp and Paper Industry and its Waste Reduction Practices,
W75-04871 5D

BRUNS, W. A.
Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

BUDININKAS, P.
Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

BULKLEY, J. W.
Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

BULLER, A. T.
Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

BURNS, B. R.
Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

BURNS, N. M.
Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

BURSALI, S.
Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

BUSCH, R. A.
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

BUSH, B.
Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

CALHOUN, F. F.
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

CAPUANO, I. A.
Total Mercury Monitor,
W75-05333 5A

CARLSON, R. F.
Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

CARPENTER, R.
Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

CARTER, D. L.
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

CARVAJAL ROJAS, J.
Possibilities of Converting Part of the Piritu Lagoon (State of Anzoategui) into an Artificial Salt Pit, (In Spanish),
W75-05276 3E

CECEN, K.
Water Intake Problems in Torrents,
W75-05217 8B

CHAKRABARTI, S. K.
Mean Length of Runs of Ocean Waves,
W75-05160 8B

CHAMBERS, M. D.
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

CHANDLER, J. H. JR.
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

CHANG, T. C.
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

CHAPIN, J. D.
Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

CHAPPEL, C. F.
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

CHAPPELL, W. R.
Problems and Opportunities in Interdisciplinary Research: The Molybdenum Project,
W75-05298 5G

CHAUDHURI, M.
Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

CHEE, S. P.
Bed Slopes of Aggraded Channels with Two Degrees of Freedom,
W75-05254 8B

Incipient Motion of Bed Material,
W75-05203 8B

CHEN, R. L.
The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

CHENCHAYYA, B. T.
Probabilistic Analysis and Simulation of the Short Time Increment Rainfall Process,
W75-05173 2B

CHEONG, H. F.
Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

CHESTERS, G.
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

CHIAN, E. S. K.
Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

CHIEN, C. W.
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

CHING, C. T. K.
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

CHITALE, S. V.
Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

CHITCHOB, S.
Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

CHRISTENSEN, B. A.
Design of Scour-Free Channels on Mild Slopes,
W75-05251 8B

CHURCH, B. D.
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

CHURCH, M.
Hydrology and Permafrost With Reference to North America,
W75-05140 2C

CLARK, G. M.
Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

CLARK, T. A.
Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

CLARKE, A. B.
Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

COAKLEY, J. P.
Techniques for Tracing Sediment Movement,
W75-04889 2J

COBIAN, K. E.
New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

COHEN, J. M.
Physical-Chemical Processes,
W75-04984 5D

COLBORN, J. G.
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

COLE, C. V.
Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

COLEMAN, N. L.
The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

CONROY, N.
The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

COOK, H. L.
Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

COOPER, R. H.
Comprehensive Graphs of Regime Data,
W75-05247 2J

COPENHAVER, E. D.
Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

CORDERY, I.
Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

COWLEY, J. E.
Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

CRAFT, T. F.
Manganese Removal from Potable Water,
W75-05270 5F

CRAWFORD, A. B.
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

CREAR, D.
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

CRECELIUS, E. A.
Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

CROOME, R. L.
Plankton Populations of Lake Leake and Tooms Lake: Oligotrophic Tasmanian Lakes,
W75-05183 5C

CROW, L. W.
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

CUMBERLAND, J. H.
Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

CUMMINGS, F. H.
Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

CURREY, D. T.
Lang Lang River, Victoria Attempts to Control Sediment, Erosion and Floods,
W75-05212 4D

CURRIE, F.
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

CURTIS, D. L.
Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

DANIEL, T. C.
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

DE VRIEND, H. J.
Theory of Viscous Flow in Wide Curved Open Channels,
W75-05208 8B

DEBOLSKI, V. K.
Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

DEDRICK, A. R.
Air Pressures Over Surfaces Exposed to Wind - I. Water Harvesting Catchments,
W75-05179 3B

DELL'ACQUA, R.
Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

DENMEAD, O. T.
Relative Significance of Soil and Plant Evaporation in Estimating Evpotranspiration,
W75-04915 2D

DER, J. J.
Oil Contaminated Beach Cleanup,
W75-05100 5G

DERZANSKY, L. J.
Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

DESELM, H. R.
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

DEVANNEY, J. W.
Analysis of Oil Spill Statistics,
W75-05034 5C

Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

DHAR, O. N.
A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2B

DICKSON, E. M.
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

DITTON, R. B.
Recreational Uses of Green Bay: Bay/Non-Bay Users Compared,
W75-04913 6B

DIXIT, J. G.
Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

DIXON, R. M.
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

DOBSON, H. H.
Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

DOELHOMID, S.
Sediment Control and Remedial Works in the Brantas River, Java, Indonesia,
W75-05211 4D

DORION, G. H.
Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

DOSS, B. D.
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

DOTY, R. D.
Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

DOTZENKO, A. D.
Proposed Indices for Estimating the Inherent Wind Erodibility of Soils,
W75-05168 2J

DRAYCOTT, A. P.
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

DUBOSE, A. T.
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

DUBROW, D. J.
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

DUBROW, D. L.
Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

DUCKSTEIN, L.
Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

DURRANT, M. J.
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

DUTHIE, H. C.
The Distribution of Diatoms on the Superficial Sediments of Lake Ontario,
W75-04899 5C

DUTKA, B. J.
Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

EDGINGTON, D. N.
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

EGAN, J. A.
Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

EHRSAM, L. C. JR.
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

ELLIS, D.
Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

EMILIANI, D. A.
Equipment for Holding and Releasing Penaeid Shrimp During Marking Experiments,
W75-05030 8I

ENDELMAN, F. J.
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

ENGELBRECHT, R. S.
Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

ENGLAND, C. B.
Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

ENGSTROM, D. G.
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

ERNST, U. F. W.
Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

ERONEN, L.
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

EVANS, H. L.
Behavioral Effects of Methylmercury,
W75-05288 5A

EVANS, R. G.
Agricultural Land Use in the Poudre Valley,
W75-05260 3

FANG, H. H. P.
Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5

FARMER, W. J.
Volatilization Losses of Pesticides from Soils,
W75-05075 5

FAROOQUI, S. M. T.
A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2

FARRELL, R. S.
To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

FAST, A. W.
Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

FEDOROV, V. D.
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

FEE, E. J.
Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

FELDHAUSEN, P. H.
Mean Length of Runs of Ocean Waves,
W75-05160 8B

FELDT, L. E.
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

FINDLEY, D. I.
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

FINDLEY, D. L.
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

FISCHER, J. H.
Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

FISHER, P. N.
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

FISHER, W. L.
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

FLEET, W.
A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

FLEMER, D. A.
Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

FLETCHER, C. S.
The Geology and Hydrogeology of the New Lead Belg, Missouri,
W75-05175 2F

FLETCHER, J. E.
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

FOGEL, M. M.
Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

FOLSOM, R.
Lake Dredging Options and Mechanical Water Weed Harvesters,
W75-05042 5G

FOREBACK, C. C.
Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

FORSS, K.
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

FOSTER, G. R.
The Overland Flow Process Under Natural Conditions,
W75-04920 4A

FOX, G. T. J.
Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

FRANKENFELD, J. W.
Weathering of Oil at Sea,
W75-05106 5B

FREA, J. I.
Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

FREEMAN, A. M. III.
Evaluation of Adjustment Assistance Programs with Application for Pollution Control,
W75-05074 5G

FRETTE, T.
Water Conservation and Fiber Economy,
W75-04956 3E

FRICK, G. E.
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

FRITSCH, J. M.
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

FRUH, E. G.
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

FUJIYA, M.
Water Pollution as a Constraint to the Development of Marine Farming,
W75-05013 5C

FUKUOKA, S.
Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

FULLERTON, H. H.
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

GAHLER, A. R.
Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

GARCIA, L. C.
Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

GARDE, R. J.
Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

Sediment Transport Relations Using Concept of Effective Shear Stress,
W75-05232 2J

GARRETT, W. D.
Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

GASNER, L. L.
Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

GEIGER, K.
Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

GEINOPOLOS, A.
Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

GESSLER, J.
Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

GHORMLEY, E.
Oil Contaminated Beach Cleanup,
W75-05100 5G

GIFFORD, G. F.
Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

GILBERTSON, M.
Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

GILL, W. N.
Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

GILMOUR, J. T.
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

GLASGOW, J. S.
Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

GLASSER, W.
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

GLAZE, M. L.
Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

GLOERSEN, P.
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

GLOOSCHENKO, W. A.
Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

GOETZ, W.
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

GOFF, F. G.
Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

GOLDSTEIN, R. A.
Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

GOLE, C. V.
Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

GOODALE, T. L.
Recreational Uses of Green Bay: Bay/Non-Bay Users Compared,
W75-04913 6B

GORDEEV, N. A.
Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

GORDON, R. B.
Dispersion of Dredge Spoil Dumped in Near-Shore Waters,
W75-05167 5B

GORDON, R. W.
Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

GORDUS, A. A.
Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

GOULDEN, P. D.
Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

GRANT, L. O.
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

GRATZL, J. S.
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

GREEN, J. H.
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

GREEN, K. M.
Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

GREENE, R. A.
'Eutrophication'--Its Causes and Effects in Fresh Water Lakes,
W75-05038 5C

GREFRATH, B. C.
The Federal Water Pollution Control Act and Forestry,
W75-04957 5G

GRESKO, T. M
Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

GRIES, J. P.
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

GRIESER, M. D.
Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

GRIMSHAW, R.
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

GROVES, D. J.
The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

GUNTHER, T. H.
Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

GUZDAR, A. R.
Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

GYORKE, O.
Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

HANCOCK, J. A.
Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

HANDRICH, E. M.
Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

HARI, V. M.
Two Dimensional Jet Diffusion on Sloping Floors Under Finite Submergence,
W75-05193 8B

HARLAN, R. L.
Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

HARLUKOWICZ, T. J.
Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

HARRIS, W. F.
Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

HARROLD, L. L.
Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

HART, F. L.
Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

HARTWELL, J. H.
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

HARTZ, B. J.
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

HASHINO, M.
Debris Slopes Above Sand Barriers,
W75-05196 2J

HASSETT, J.
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

HASSETT, T. D.
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

HAUG, A.
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

HAWK, K. C.
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

HAYASHI, T.
On The Cause of Meandering of Rivers,
W75-05244 2J

HAYDOCK, I.
Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

HAYES, E. R.
Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

HAYNES, K.
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

HAZLETON, J. E.
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

HEATHCOTE, G. D.
The Effect of Plant Spacing, Nitrogen Fertilizer and Irrigation on the Appearance of Symptoms and Spread of Virus Yellows in Sugar Beet Crops,
W75-05020 5C

HEFNI, E.
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

HEIL, R. D.
Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

HEINEMANN, H. G.
Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

HEINLE, D. R.
Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

HELFGOTT, T.
Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

HENDERSON, G. S.
Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

HERDENDORF, C. E.
Delineation of Great Lakes Estuaries,
W75-04912 2H

HERNDON, A.
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

HERNROTH, L.
Methods for Studies of Plankton (In Swedish),
W75-05061 7B

HEWLETT, J. D.
Stormflow Production from Permeable Upland Basins,
W75-04925 2A

HILTY, J. W.
Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

HIMMELBLAU, D. M.
Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

Introduction,
W75-05316 6A

Optimal Expansion of a Water Resources System,
W75-05315 6A

A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

HIPPOLA, U. T. B.
Influence of Suspended Sediment Distribution on Settling Basin Designs,
W75-05216 8B

HODGES, L. R.
Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

HOFF, F. H.
An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

HOFFER, R. M.
Remote Sensing Potentials for Resource Management,
W75-04922 5A

HOLMAN, R. E. III.
The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

HOLMES, R. E.
Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

HOLMRICH, M.
'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

HOLTAN, H. N.
A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

HOLTON, M. C.
Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

HOMMEL, K.
System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

HOOKANO, E. JR.
Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

HOOVER, M. D.
Snow Interception and Redistribution in the Forest,
W75-04917 2C

HORTON, D.
Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

HOSHIHATA, K.
Calculations of Suspended Load in Alluvial Channel,
W75-05229 2J

HOSSAIN, M. S.
Sediment Transport Characteristics of the Teesta River,
W75-05235 2J

HOWARD, N. M.
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

HOWARD, T. E.
Effluent Toxicity Removal on the West Coast,
W75-04942 5D

HOYLAND, J. R.
Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

HRUTFIORD, B. F.
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

HUCKABEE, J. W.
Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

HUGHES, E. E.
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

HUGHES, O. L.
Geology and Permafrost in Relation to Hydrology and Geophysics,
W75-05141 2C

HULBURT, E. M.
Minimum Interference Between Plankton Species and Its Beneficial Effect,
W75-05338 5C

HURST-GAUL, E.
Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

HWANG, C. P.
Carbon and Color Distribution in Various Size Fractions of Treated Pulp Mill and Board Mill Waste Effluents,
W75-04948 5B

HYLAND, J. R.
Geohydrologic Relationships in Water Pollution,
W75-05128 5G

IL'INA, L. K.
Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

INGOLS, R. S.
Manganese Removal from Potable Water,
W75-05270 5F

IRVINE, H. M.
A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

JACKSON, D. K.
The Course and Magnitude of Water Stress in Lolium Perenne and Dactylis Glomerata,
W75-05056 3F

JACKSON, D. R.
Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

JACOBS, R. P.
Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

JAIN, K. K.
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

JELLINEK, G.
Masking Undesirable Flavors in Fish Oils,
W75-05027 8I

JENKINS, B. S.
A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

JENSEN, W.
Environmental Protection in the Finnish Pulp and Paper Industry (Umweltschutz in der Finnischen Zellstoff- und Papierindustrie),
W75-04949 5G

JESTER, W. A.
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

JIRBERG, R. J.
An Automatic Underwater Camera System,
W75-05048 5A

JOHANSON, L. N.
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

JOHNSON, D. L.
Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

JOHNSON, J. E.
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

JOKELA, A. W.
California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

JOLLEY, R. L.
Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

JONAS, R. S.
Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

JONES, B. G.
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

JONES, J. R.
Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

JORDENING, D. L.
Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

Estimating Water Quality Benefits,
W75-05068 5G

JUDD, J. H.
Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

JUNK, G. A.
Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

KAESLER, R. L.
Cluster Analysis and Diversity in Recovery of Damaged Streams,
W75-04934 5C

KAHLE, R. R.
Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

KAITARANTA, J.
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

KALININ, G. P.
Hydrological Basis for Forecasting and Calculating Runoff by Space Images of the Earth's Surface,
W75-05135 4A

KANHERE, V. N.
Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

KAY, B. D.
Specific Heats of Components of Frozen Soil,
W75-05149 2C

KAZMANN, R. G.
Management of Waste Fluids in Salaquifers,
W75-05191 5B

KEALY, C. D.
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

KEENEY, D. R.
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

The Fate of Nitrate in Lake Sediment Columns,
W75-05155 5B

Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

KEENEY, M.
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

KEITH, J. M.
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

KELLER, W.
Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

KENNEDY, J. J.
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

KEYES, C. G. JR.
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

KIDD, D.
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

KIKKAWA, H.
Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

KIMBLER, O. K.
Management of Waste Fluids in Salaquifers,
W75-05191 5B

KIRKHAM, D.
Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

KISIEL, C. C.
Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

KITE, G. W.
Flood Frequency and Risk,
W75-04876 4A

Hydrologic Forecasting in the Water Resources Branch,
W75-04881 4A

KLAUSING, O.
A Water Balance Recorder for Hydroclimatic and Agroclimatic Measurement of Precipitation and Evaporation,
W75-04914 2D

KNABEL, R.
Land Use and Zoning, Septic Effluents and the Responsibility for Adequate Control,
W75-05045 5G

KNAPP, M. R.
Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

KNUDSON, C. L.
The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

KOEPPE, D. E.
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

KOLACZKOWSKI, A.
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

KOLACZKOWSKI, A. M.
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

KOLESNIKOV, V. L.
Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

KOMURA, S.
An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

River-Bed Variations at Confluences,
W75-05253 2J

KOO, T. S. Y.
Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

KOPP, C. V. JR.
New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

KOPPLE, J. D.
Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

KOSTER, K. H.
New Developments in Effluent Legislation, Especially Laws Governing Effluent Disposal (Neuerungen auf dem Abwasserrechts-Sektor -- insbesondere Abwasserabgabengesetz),
W75-04950 5G

KOURY, B.
Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

KOUYOUMJIAN, H. H.
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

KOVBA, V. A.
Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

KRAMER, P. J.
Diurnal Cycling in Root Resistance to Water Movement,
W75-04885 3F

KRISHNAPPAN, B. M.
A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

KRUPNIK, M. YA.
Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

KRYUCHKOVA, N. M.
Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

KUB, M. E.
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

KUBOTA, M.
An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

KUGELMAN, I. J.
Physical-Chemical Processes,
W75-04984 5D

Status of Advanced Waste Treatment,
W75-04983 5D

KULKARNI, V. K.
Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

KUNG, T.
Incipient Motion of Bed Material,
W75-05203 8B

KVARNAS, H.
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

LACZAY, I.
Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

LAGER, D. L.
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

LAHMAN, H. S.
Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

LANDGREBE, D. A.
Research in Remote Sensing of Agriculture, Earth Resources, and Man's Environment,
W75-05132 7B

LASSITER, J. B.
The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

LATIES, V. G.
Behavioral Effects of Methylmercury,
W75-05288 5A

LAWRENCE, A. W.
Cost Optimization of Activated Sludge Systems,
W75-04990 5D

LAZREG, H.
Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

LE VANTINE, A. D.
Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

LEACH, J. H.
Distribution of Chlorophyll a and Related Variables in Ontario Waters of Lake St. Clair,
W75-04900 5C

LEAR, B.
Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

LEE, A. H.
Regional Characterizations of the Thermal Properties of Lake Ontario,
W75-04911 2H

LEE, G. F.
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

LEE, R. L.
Mass Media Handbook for Water Resources Research Directors,
W75-05261 6B

LEE, T. R.
Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

LEE, Y.
Numerical Models for Precipitation Scavenging,
W75-05112 5B

LENTNER, M.
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

LENTON, R. L.
On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

LETEY, J.
Volatilization Losses of Pesticides from Soils,
W75-05075 5B

LINDBERG, R.
Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

LINDELL, T.
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

LINDERSTROM-LANG, C. U.
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

LINDSAY, W. L.
Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

LINKO, R. R.
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

LOGINOVA, L. G.
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

LONG, D. T.
Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

LOPEZ, J.
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

LUMB, A. M.
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

LUNSFORD, J. V.
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

LUTZ, W.
Investigations on Treatment of Paper and Pulp Effluents by the Ruthner Rapid Clarification System (Untersuchungen zur aufbereitung von papier-und zellstoffabwaessern mittels schnellklaerer system Ruthner),
W75-04974 5D

LYTLE, R. J.
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

MACCRACKEN, M. C.
Second Annual Report, Dot-CIAP Program,
W75-05349 2B

MADDRELL, R. J.
The History of Sediment Yield and Deposition of the Jubones River, Ecuador, and Its Relation to Engineering Projects,
W75-05257 2J

MAEMATSU, R.
Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

MAGARA, K.
Aquathermal Fluid Migration,
W75-05182 4B

MAGDOFF, E. R.
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

MAHER, C. C. III
Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

MAHMOOD, K.
Bed Material Transport in Sand Bed Channels,
W75-05233 2J

Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

Sediment Equilibrium Considerations in the Design of Irrigation Canal Networks,
W75-05252 8B

MALINA, J. F.
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

MALLARD, G. E.
Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

MALONE, C.
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

MALYAREVSKAYA, A. YA.
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

MANABE, R. M.
Measurement of Residual Chlorine Levels in Cooling Water--Amperometric Method,
W75-05088 5A

MANNERING, J. V.
The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

MARLES, E.
Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

MARSHALL, A. R.
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

MARSHALL, B. E.
Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

MARSHALL, H. E.
Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

MARTIN, L. F.
Industrial Water Purification,
W75-04968 5D

MARTIN, R. J.
Treat Wastewater Like Downtown Traffic,
W75-05329 5D

MATHEWS, A. P.
Water Quality Relationships in the Great Lakes: Analysis of a Survey Questionnaire,
W75-04894 5C

MATTERN, E. K. JR.
Growth Kinetics of Nitrifying Microorganisms,
W75-05267 5D

MAULDIN, A. F.
Shrimp Canning Waste Treatment Study,
W75-05087 5A

MAVROVIC, I.
Recovery of Residual Ammonia from Weak Aqueous Solutions Thereof,
W75-05332 5D

MAZA ALVAREZ, J. A.
Contribution to the Study of General Scour,
W75-05255 2J

Flow Resistance in Sand Bed Channels,
W75-05220 8B

Stable Channels in Alluvium,
W75-05248 8B

MCBRIDE, M. D.
Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

MCCARTHY, J. L.
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

MCCAULEY, J. R.
Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

MCCOY, J. W.
The Chemical Treatment of Cooling Water,
W75-04964 5D

MCDONALD, M. M.
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

MCELROY, J. L.
Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

MCGIRR, D. J.
Interlaboratory Quality Control Study No 6: Specific Conductance, pH, Colour and Residue,
W75-04887 2K

MCINTOSH, A. W.
Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

MCKEAN, W. T. JR.
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

MCKEE, M.
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

MCLARNEY, W. O.
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

MCLAUGHLIN, D.
Investigation of Alternative Procedures for Estimating Groundwater Parameters,
W75-05263 4B

MCLEAN, R. O.
The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

MCMANUS, J.
Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

MEEK, C.
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

MEGLEN, R. R.
Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

MEHTA, A. J.
Effect of Physico-Chemical Properties of Fine Suspended Sediment on the Degree of Deposition,
W75-05230 2J

MEJIA, J. M.
Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

MELONI, E.
Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

MELSOM, S.
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

MENON, A. S.
Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

MESMER, R. E.
Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

METCALF, J. R.
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

METCALF, S. M.
Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

MEYER, L. D.
The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

MICHALSKI, M. F. P.
The 'Oligotrophication' of Little Otter Lake, Parry Sound District,
W75-05063 5C

MICHIUE, M.
Studies on Bed-Load Transport Rate in Open Channel Flows,
W75-05226 8B

MIDDLETON, A. C.
Cost Optimization of Activated Sludge Systems,
W75-04990 5D

MIELKE, P. W. JR.
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

MIHURAKY, J. A.
Benthic Animal-Sediment,
W75-05343 5A

MIL'SHTEIN, A. D.
Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

MIL'SHTEIN, E. T.
Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

MILHOUS, R. T.
Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

MILLER, R. E.
Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

MILLER, R. J.
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

MILLS, E. L.
Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

MILLS, T. R.
Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

MINARIK, F.
Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

MIRANOWSKI, J. A.
Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

MIRTSKHOULAVA, T. E.
Scour in River Basin and in its Bed Mechanism, Forecast,
W75-05199 2J

MITCHELL, D. S.
Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

MOBIUS, C. H.
Removal of Dyes from Paper Mill Effluents Through Treatment by the Flygtol Process (Farbstoff-Entfernung aus Papierfabriksabwaessern durch die Behandlung mit dem Flygtol Verfahren),
W75-04963 5D

MOLDENHAUER, W. C.
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

MOORE, B. C.
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

MOORE, J. E.
Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

MOORE, S. A. JR.
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

MORDEN, D. B.
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

MORKOVINA, E. A.
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

MOSLEY, M. P.
Experimental Study of Rill Erosion,
W75-05178 2J

Experimental Study of Rill Erosion,
W75-05178 2J

MOSONYI, E.
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

MOUGENOT, G.
Measuring Sewage Flow Using Weirs and Flumes,
W75-05326 5D

MOUNTFORD, M. K.
Benthic Animal-Sediment,
W75-05343 5A

MOZLEY, S. C.
Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

MUNROE, V. G.
Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

MURPHY, M. A.
Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

MURRAY, R. W.
Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

MUSE, G.
Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

NAWROCKI, M. A.
Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

NEBEKER, E. B.
Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

NEELY, B. S. JR.
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

NEHER, M. B.
Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

NELSON, D. E.
Techniques for Tracing Sediment Movement,
W75-04889 2J

NELSON, D. W.
Prediction of subsoil Erodibility using Chemical, Mineralogical and Physical Parameters,
W75-05308 2J

NEWBURY, R. W.
River Hydrology in Permafrost Areas,
W75-05142 2C

NEWHOUSE, M. E.
Use of Remote Sensing in Agriculture,
W75-05107 7B

NEWMAN, J. E.
Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

NIEDRINGHAUS, T. E.
Distribution of Mean Monthly Precipitation and Rainfall Intensities,
W75-05105 2B

NIGAM, R. K.
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

NIKI, H.
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

NORDBERG, W.
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

NORDIN, C. F.
Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

NORTHROP, J.
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

NORTON, J.
The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

NUTTER, W. L.
Stormflow Production from Permeable Upland Basins,
W75-04925 2A

O'LAOGHAIRE, D. T.
Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

Introduction,
W75-05316 6A

Optimal Expansion of a Water Resources System,
W75-05315 6A

A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

OGLE, J. C.
Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

OGLESBY, R. T.
Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

OLENEVA, Z. G.
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

OLIVER, B. G.
Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

OLSEN, A.
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

OLSON, T. C.
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

OMANY, S.
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

OVERTON, D. E.
Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

OWEN, R. W. JR.
Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

PAMATMAT, M. M.
Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

PARISH, R. P.
Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

PARKER, R. H.
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

PARKS, W. L.
Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

PARSONS, L. R.
Diurnal Cycling in Root Resistance to Water Movement,
W75-04885 3F

PARTHENIADES, E.
Effect of Physico-Chemical Properties of Fine Suspended Sediment on the Degree of Deposition,
W75-05230 2J

On the Concept of the Wash Load,
W75-05238 2J

PATRIC, J. H.
Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

PAYNE, A. G.
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

PAYNE, H. G.
Incipient Motion of Bed Material,
W75-05203 8B

PEARCY, W. G.
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

PEARSON, R. W.
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

PEAVY, H. S.
A Practical Approach to Water Quality Management Planning,
W75-04857 5G

PEITZ, R. I.
Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

PEPLIES, R. W.
Remote Sensor Utilization for Environmental System Studies, Volume II,
W75-05124 7B

PETERSON, A. W.
Comprehensive Graphs of Regime Data,
W75-05247 2J

PETERSON, B. J.
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

PETTRY, D. E.
Use of Remote Sensing in Agriculture,
W75-05107 7B

PEYTON, T. O.
Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

PHILLIPS, D. K.
Benthic Animal-Sediment,
W75-05343 5A

PILGRIM, D. H.
Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

PITT, W. W. JR.
Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

PIWONI, M.
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

POETZ, T.
Purification of the Pulp Industry's Bleachery Effluents with Alumina (Reinigung von Bleichereiabiwessern der Zellstoffindustrie mit Aluminiumoxid),
W75-04966 5D

POLUMB, R.
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

POLUMB, R. H.
Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

PODDUBNYI, A. G.
Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

POPOV, D. N.
Research into Unsteady Fluid Flow During Transient Processes in a Short Pipe,
W75-05171 8B

POTTER, L.
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

POWELL, N. L.
Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

Use of Remote Sensing in Agriculture,
W75-05107 7B

POWERS, C. F.
Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

POWERS, R. J.
The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

PRASHUHN, A. L.
Turbulence Measurements over Sand Beds,
W75-05219 8B

PROCHASKA, J. M.
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

PROKH, L. Z.
Microstructure of Precipitation Deposited on Horizontal Surfaces in Fog,
W75-05101 2B

PROUTY, R. H.
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

PRUITT, W. O.
Factors Affecting Potential Evapotranspiration,
W75-04916 2D

PYM, R.
Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

QUE HEE, S. S.
GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

QUIMPO, R. G.
Stochastic Models of Sediment Transport,
W75-05241 2J

RAGAN, J. G.
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

RAHN, P. H.
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

RAMOS, E.
Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

RAMSEY, R. H.
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

RANGA RAJU, K. G.
Sediment Transport Relations Using Concept of Effective Shear Stress,
W75-05232 2J

RANTAMAKI, P.
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

RAO, R. A.
Analyses of the Effect of Urbanization on Rainfall Characteristics I,
W75-05172 4C

Probabilistic Analysis and Simulation of the Short Time Increment Rainfall Process,
W75-05173 2B

RAO, R. G. SRINIVASA
Analyses of the Effect of Urbanization on Rainfall Characteristics I,
W75-05172 4C

RAPSON, B.
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

RAWLINGS, F. F.
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

RAWLS, J. L.
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

REICHLE, D. E.
Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

REMILLIEUX, M.
Chao Phya River Training Works,
W75-05213 8A

REMUS, G. A.
Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

RENNIE, J. C.
Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

RESH, V. H.
Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

REYNOLDS, L. M.
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

RHEE, S. S.
Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

RHENALS-FIGUEREDO, A. E.
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

RICE, S. A.
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

RICHARD, J. J.
Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

RICHEY, E. P.
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

RISEBROUGH, R. W.
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

RITCHIE, D. E. JR.
Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

ROBBINS, C. W.
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

RODRIGUEZ-ITURBE, I.
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

RODRIGUEZ, J.
Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

RODRIGUEZ, S. E.
Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

ROGERS, H. T.
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

ROGOVSKAYA, TS. I.
Influence of Trinitrotoluene on Microorganisms and Biochemical Self-Purification Processes in Water,
W75-05015 5C

ROLAND, P.
Indicators of Eutrophication: Visual, Chemical, Physical, Biological,
W75-05046 5C

ROMKENS, J. M.
Prediction of subsoil Erodibility using Chemical, Mineralogical and Physical Parameters,
W75-05308 2J

ROOT, R. A.
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

ROSENDAHL, P.
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

ROTH, C. B.
Prediction of subsoil Erodibility using Chemical, Mineralogical and Physical Parameters,
W75-05308 2J

ROTHSCHILD, B. J.
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

ROY, S. C.
Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

ROZELLE, LEE T.
New Membranes for Reverse Osmosis Treatment of Metal Finishing Effluents,
W75-05089 5D

RUBEL, F. N.
Incineration of Solid Wastes,
W75-04969 5E

RUEGG, R. T.
Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater,
W75-05076 5G

RUNNELLS, D. D.
Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

RZOSKA, J.
The Upper Nile Swamps, A Tropical Wetland Study,
W75-04996 2H

SABOL, G. V.
Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

SAFFIGNA, P. G.
Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation,
W75-04997 5B

SAGER, P. E.
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

SAHGAL, P. P.
Effect of Characteristics of Bed Material and Fluid on Ripple Formation,
W75-05243 8B

SAKTHIVADIVEL, R.
Sediment Transport Through a Porous Column,
W75-05231 2J

SALEEM, Z. A.
Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

SALTENBERGER, W. M.
Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

SALVO, J. M.
Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

SANDERS, H. O.
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

SANTIAGO, M. A.
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

SANVILLE, W. D.
Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

SARMA, S. V. K.
Stable Channels in Alluvial Material,
W75-05250 8I

SASAKI, E.
Debris Slopes Above Sand Barriers,
W75-05196 2

SASTRY, C. A.
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

SAVAGE, A. E.
Continuous-Flow Studies of Phosphorus as Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5

SCHAAKE, J. C. JR.
Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2

SCHACHT, R. A.
Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5

SCHAFFNER, W.
A Network to Determine Causality Between Abnormal Trace Element Levels in Congenital Defects,
W75-05286 5

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5

SCHAFFNER, W. R.
Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

SCHELSKE, C. L.
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

SCHINDLER, D. W.
Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

SCHMIDT, R. A.
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

SCHREIBER, R. K.
Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

SCHULERT, A.
A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

SCHWEITZER, G. E.
An Approach to the Control of Toxic Substances,
W75-05300 5G

SCOTT, C. D.
Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

SEAGEL, G. C.
Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

SECKEL, G. R.
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

SERGEEVA, V. V.
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

SERVIZI, J. A.
Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

SEWELL, J. I.
Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

SHANNON, E. E.
Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

SHAREFKIN, D. M.
The Economic and Environmental Benefits from Improving Electrical Rate Structures,
W75-05309 6B

SHEA, T. G.
Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

SHEN, H. W.
Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

SHI-IGAI, H.
Deformed Piers to Control the Downstream Erosion,
W75-05202 8B

SHISHKIN, A. I.
Study of Effluent Discharge (K voprosu issledovaniya rezhinov vodootvendeniya),
W75-04965 5G

SHOWN, L. M.
Sediment Yield as Related to Vegetation on Semiarid Watersheds,
W75-04927 2J

SHUMAKER, V. O.
Southern Tier East Region, Broome-Tioga Counties, New York Comprehensive Drainage Study, Report Summary,
W75-04858 4A

SIMMONS, S. R.
Proposed Indices for Estimating the Inherent Wind Erodibility of Soils,
W75-05168 2J

SIMONS, D. B.
Bed Material Transport in Sand Bed Channels,
W75-05233 2J

Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

SIMSIMAN, G. V.
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment,
W75-04906 5C

SITEK, G. M.
An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

SKAGGS, R. W.
Infiltration of Water into the Soil Profile,
W75-04918 2G

SKJEI, R. E.
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

SKOGERBOE, G. V.
Agricultural Land Use in the Poudre Valley,
W75-05260 3F

Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

SLONEKER, L. L.
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

SMILES, M. C. JR.
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

SMITH, F. M.
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

SMITH, G. E.
Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

SMITH, J. P.
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

SMITH, T. B.
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

SNIDER, R. H.
Mean Length of Runs of Ocean Waves,
W75-05160 8B

SOCHAN, P.
Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

SOGAWA, H.
Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

SOKIRKO, T. D.
Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

SOKOL'SKII, A. F.
Primary and Bacterial Production of Some Fishery Ponds of the Volga Delta, (In Russian),
W75-05334 8I

SOKOLOVA, S. A.
An Attempt at Evaluating the Stability of an Aquatic Ecosystem,
W75-05009 5C

SOLOMONS, C. C.
Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

SPAANS, A. L.
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

SPARKS, C. J. JR.
Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

SPAULDING, M. L.
Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

SPINELLI, J.
Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

SQUIRE, G. R.
Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

SREENIVASA, M. R.
The Distribution of Diatoms on the Superficial Sediments of Lake Ontario,
W75-04899 5C

STANDIFORD, D.
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

STANSBY, M. E.
Masking Undesirable Flavors in Fish Oils,
W75-05027 8I

STARKEY, R. J. JR.
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

STEFFENS, W.
Results of Crossing Between Wild and Domestic Carp (Cyprinus Carpio L.), (In German),
W75-05164 8I

STEIN, J. R.
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

STEINBERG, M. A.
A Review of Some Effects of Contaminants on Marine Organisms,
W75-05012 5C

STELCZER, K.
Statistical Regularities in the Movement of Bed Load,
W75-05239 2J

STEPHENSON, R. L.
Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

STEPKO, W. E.
Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

STERN, A. M.
Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

STEVENS, R. K.
Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

STEWART, R. J.
Analysis of Oil Spill Statistics,
W75-05034 5C

Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

STICHLING, W.
Sediment Loads in Canadian Rivers,
W75-04886 2J

Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

STILLINGS, B. R.
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

STOECKELER, E. G.
To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

STOERMER, E. F.
Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

STOVER, F. D.
Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

STRAM, B. N.
Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

STROOSNIJDER, L.
Nomographic Interpretation of Water Absorption Data in Terms of a Two-Parametric Diffusivity-Water Content Function,
W75-05180 2G

SUBRAMANYA, K.
Effect of Wash Load on Sediment Transportation,
W75-05227 2J

SUGIO, S.
Debris Slopes Above Sand Barriers,
W75-05196 2J

SUKEGAWA, N.
Condition for the Formation of Alternate Bars in Straight Alluvial Channels,
W75-05245 8B

SULKIN, S. D.
Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

SULLIVAN, D. P.
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

SUTHERLAND, A. J.
A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

SUTHERLAND, R. G.
GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

SUWAN ARPA, S.
Nitrogen Removal Obtained Through Heterotrophic Growth in Trickling Filters,
W75-05269 5D

SVITEL'SKII, V. P.
Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

SWAMEE, P. K.
Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

SWEENEY, R. A.
Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

SZABO, A. J.
Shrimp Canning Waste Treatment Study,
W75-05087 5A

SZCZESNY, B.
The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

TAKEUCHI, D. M.
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

TALMI, Y.
Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

TARA SINGH, H. D.
Wastewater Collection (Literature Review),
W75-05335 5D

TARAPORE, Z. S.
Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

TATE, D. M.
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

TAVARES, L. V.
Continuous Hydrological Time-Series Discretization,
W75-05165 2A

TAYLOR, J. H.
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

TEJASEN, J.
Chao Phya River Training Works,
W75-05213 8A

THOMAS, W. H.
Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

THOMPKINS, J.
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

THOMPSON, G. T.
An Agricultural Irrigation Model for a Watershed,
W75-05307 3F

THOMSON, J. N.
Environmental Contaminants Inventory Study No 1: Statistics on the Use of Pest Control Products in Canada,
W75-04880 5G

TODD, J. H.
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis),
W75-05007 5C

TOKARSKY, O.
Hydrogeology of the Lethbridge-Fernie Area, Alberta,
W75-05151 2F

TOMPKINS, J. A.
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

TOPP, R. W.
An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

TOPPING, R. E.
Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

TOTH, O.
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

TREDGETT, R. G.
High-Rate Filtration for Toronto's Island Waterworks,
W75-05324 5F

TRZYNA, T. C.
California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

TSAI, C.-H.
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

TSCHANTZ, B. A.
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

Remote Sensor Utilization for Environmental System Studies, Volume II,
W75-05124 7B

TSCHOOP, J.
The Effect of Sills on River Bed,
W75-05207 8B

TSUCHIYA, A.
Calculations of Suspended Load in Alluvial Channel,
W75-05229 2J

TUROBOYSKI, L.
The Indicator Organisms and their Ecological Variability,
W75-05055 5C

TYAGI, A. K.
Modeling of Local Scour Around Spur Dikes in Streams,
W75-05206 8B

TYLER, P. A.
Plankton Populations of Lake Leake and Tooms Lake: Oligotrophic Tasmanian Lakes,
W75-05183 5C

TYWONIUK, N.
Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

UGLOW, R. F.
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

ULANOWICZ, R. E.
Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

ULRIKSON, G. U.
Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

UNGER, S. G.
Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

UNHANAND, K.
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

UNZICKER, J. D.
Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

UTTORMARK, P. D.
Estimating Nutrient Loadings of Lakes from Non-Point Sources,
W75-05082 5C

VALSANGKAR, A. J.
Effect of Wash Load on Sediment Transportation,
W75-05227 2J

VAN EVERDINGEN, R. O.
Groundwater in Permafrost Regions of Canada,
W75-05150 2C

VANDEN BERG, A.
Digital Simulation of Horizontal Salt-Water Encroachment Induced by Fresh-Water Pumping,
W75-04875 2L

VANDERPOST, J. M.
Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

VANHOOK, R. I.
Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

VANLOOCKE, R.
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

VERI, A. R.
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

VERMEER, K.
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

VERSTRAETE, W.
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

VETTER, M.
GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

VILLANUEVA, C. C.
Flow Resistance in Sand Bed Channels,
W75-05220 8B

Stable Channels in Alluvium,
W75-05248 8B

VITTAL, N.
Sediment Transport Relations Using Concept of Effective Shear Stress,
W75-05232 2J

VOETS, J. P.
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

VOGH, R. P.
Physical-Chemical Treatment of Municipal Wastes by Recycled Magnesium Carbonate,
W75-05071 5D

VOLKART, P.
The Effect of Sills on River Bed,
W75-05207 8B

VOLLENWEIDER, R. A.
Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

WAHLGREN, M. A.
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

WALDEN, C. C.
Effluent Toxicity Removal on the West Coast,
W75-04942 5D

WALKER, W. R.
Agricultural Land Use in the Poudre Valley,
W75-05260 3F

Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

WALSH, D. F.
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

WARD, R. C.
Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

WARNEKE, D. D.
Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

WARREN, J.
A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

WASSERLAUF, M.
Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

WATSON, J. A.
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

WEBB, D. J.
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

WEBER, C.
Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations,
W75-05044 5G

WEIG, D.
Protein Autolysis Rates at Various pH's and Temperatures in Hake, Merluccius Productus, and Pacific Herring, Clupea Harengus Pallasi, of Fish Protein Concentrate,
W75-05029 8I

WEISS, B.
Behavioral Effects of Methylmercury,
W75-05288 5A

WELLISCH, H.
Water Resources Development, 1950-1965, An International Bibliography,
W75-05154 10B

WENZEL, J.
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

WEST, A. W.
Return Sludge Flow Control,
W75-04982 5D

WEST, D. C.
Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

WETHERILL, G. W.
Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

WHITAKER, F. D.
Losses of Fertilizers and Pesticides from Claypan Soil,
W75-05081 5B

WHITE, L. M.
A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

WHITEHEAD, W. R.
Management of Waste Fluids in Salaquifers,
W75-05191 5B

WHITEHURST, C. A.
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

WHITLEY, S. L.
A Procedure for Automated Land Use Mapping Using Remotely Sensed Multispectral Scanner Data,
W75-05096 7C

WICKSTEN, M. K.
Feeding in the Porcelain Crab, Petrolisthes Cinctipes (Randall) (Anomura: Porcellanidae),
W75-04907 2I

WIERSMA, J. H.
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River,
W75-04904 5C

WIGGERT, V.
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

WILANDER, A.
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

WILBUR, R. L.
Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

WILEY, A. J.
Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

WILHEIT, T. T.
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

WILLIAMS, G. P.
Energy Balance Considerations in Permafrost Hydrology,
W75-05147 2C

WILSON, D.
Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

WILSON, S. Y.
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

WITIAK, D.
Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

WITIAK, J. L.
Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

WOMAK, J. D.
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

WOOD, I. R.
A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

WOODLEY, W. L.
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

WOODMAN, R. G.
To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

WRIGHT, J. F.
Some Factors Affecting the Distribution of Crenobia Alpina (Dana), Polycelis Felina (Dalyell) and Phagocata Vitta (Duges) (Platyhelminthes) in Caernarvonshire, North Wales,
W75-04980 5C

WU, C. H.
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

WU, C. M.
Scour at Downstream End of Dams in Taiwan,
W75-05204 8B

Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

YALIN, M. S.
A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

YANO, M.
Instantaneous Turbulent Flow Acts on the Sand Particle to Start the Rotation on the Bed,
W75-05223 2J

YARGER, H. L.
Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

YOUNG, F. E.
The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

YOUNG, M. Y. Y.
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

YOUNGER, R.
History of Aquatic Herbicides, Biological Control, Practical Aspects of the Use of Chemicals in Water Weed Control,
W75-05041 5G

ZALDIVAR, R.
Arsenic Contamination of Drinking Water and Food-Stuffs Causing Endemic Chronic Poisoning,
W75-05177 5C

ZHDANKUS, N. T.
Scouring Capacity of Flow in Narrow Open Channels,
W75-05258 8B

ZHELEZNYAKOV, G. V.
Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

ZIEBELL, W. A.
Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations,
W75-04981 5D

ZIEMBA, J.
A Look at the National Permit Program,
W75-04995 5G

ZORICH, J.
GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

ORGANIZATIONAL INDEX

ABT ASSOCIATES, INC., CAMBRIDGE, MASS.
Crop Insurance and Information Services to Control Use of Pesticides,
W75-05070 5G

AEROJET ELECTROSYSTEMS CO., AZUSA, CALIF.
Development of a Prototype Airborne Oil Surveillance System - Volume II - Design Report.
W75-05119 5A

Development of a Prototype Airborne Oil Surveillance System - Volume III - Subsystem Specifications.
W75-05120 5A

AFRICULTURAL RESEARCH SERVICE, OXFORD, MISS. SEDIMENTATION LAB.
The Velocity Defect Law and the Sediment Transfer Coefficient in an Open Channel,
W75-05218 8B

AGRICULTURAL RESEARCH SERVICE, ATHENS, GA. SOIL AND WATER CONSERVATION RESEARCH DIV.
Mechanics of Surface Runoff on Hillslopes,
W75-04921 2E

AGRICULTURAL RESEARCH SERVICE, AUBURN, ALA.
Effect of Soil Water at Various Growth Stages on Soybean Yield,
W75-04877 3F

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. SOIL AND WATER CONSERVATION RESEARCH DIV.
A Formulation for Quantifying the Influence of Soil Porosity and Vegetation on Infiltration,
W75-04923 2G

AGRICULTURAL RESEARCH SERVICE, COSHOCTON, OHIO. SOIL AND WATER CONSERVATION RESEARCH DIV.
Effect of Vegetation on Storm Hydrographs,
W75-04926 4C

AGRICULTURAL RESEARCH SERVICE, KIMBERLY, IDAHO. SNAKE RIVER CONSERVATION RESEARCH CENTER.
Phosphorous Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho,
W75-04999 5B

AGRICULTURAL RESEARCH SERVICE, LOGAN, UTAH.
Crested Wheatgrass Yields as Influenced by Water Conservation Practices,
W75-04873 3F

AGRICULTURAL RESEARCH SERVICE, MORRIS, MINN. NORTH-CENTRAL SOIL CONSERVATION RESEARCH CENTER.
Soil-Water Pressure During Intermittent Simulated Rain Application Measured with a New Rapid-Response Tensiometric Technique,
W75-05181 2G

AGRICULTURAL RESEARCH SERVICE, WATER CONSERVATION LAB. PHOENIX, ARIZ.
Air Pressures Over Surfaces Exposed to Wind - I. Water Harvesting Catchments,
W75-05179 3B

AGRICULTURAL RESEARCH SERVICES, BELTSVILLE, MD. HYDROGRAPH LAB.
Extension of Hydrologic Process Modeling to Total Watershed Modeling,
W75-04924 2A

AGRICULTURAL UNIV., WAGENINGEN (NETHERLANDS). DEPT. OF SOILS AND FERTILIZERS.
Nomographic Interpretation of Water Absorption Data in Terms of a Two-Parametric Diffusivity-Water Content Function,
W75-05180 2G

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT BIOLOGII VNUTRENNYKH VOD.
Evaluation of the Potential Fish Productivity of a Reservoir, (In Russian),
W75-05094 2H

AKADEMIYA NAUK URSR, KIEV. INSTYTUT HIDROBIOLOGII.
Etiology of the Haff (Yuksov-Sartlan) Disease,
W75-05011 5C

ALASKA UNIV., COLLEGE. INST. OF WATER RESOURCES.
Permafrost Hydrology: An Alaskan's Experience,
W75-05145 2C

ALBERTA DEPT. OF ENVIRONMENT, EDMONTON. WATER RESOURCES DIV.
Two Dimensional Jet Diffusion on Sloping Floors Under Finite Submergence,
W75-05193 8B

ALBERTA RESEARCH, EDMONTON.
Hydrogeology of the Lethbridge-Fernie Area, Alberta,
W75-05151 2F

Regional Chemistry and Water Level Distribution of the Near-Surface Groundwaters of the Edmonton Area (Northwest Segment), Alberta,
W75-05152 2F

ALBERTA UNIV., EDMONTON.
Comprehensive Graphs of Regime Data,
W75-05247 2J

AMAX LEAD AND ZINC, INC., ST. LOUIS, MO.
National Need - An Industry View of Research,
W75-05299 5G

AMES LAB., IOWA.
Use of Macroreticular Resins in the Analysis of Water for Trace Organic Contaminants,
W75-05340 5A

ARGONNE NATIONAL LAB., ILL.
Trace Element Determinations on Lake Michigan Tributary Water Samples Using Spark Source Mass Spectrometry.
W75-04910 5C

ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES.
Modeling of Local Scour Around Spur Dikes in Streams,
W75-05206 8B

ARIZONA UNIV., TUCSON. DEPT. OF WATERSHED MANAGEMENT.
Modeling the Hydrologic Effects Resulting from Land Modification,
W75-05189 2A

A Bibliographic Information System for Water Yield Improvement Practices,
W75-05303 10A

ARIZONA UNOV., TUSCON. DEPT. OF WATERSHED MANAGEMENT.
Wamis--A Bibliographic Information System for Water Yield Improvement,
W75-05302 10A

ARMY ENGINEER DISTRICT, GALVESTON, TEX.
Flood Plain Information -- Greens and Halls Bayous, Harris County, Texas,
W75-04853 4A

Flood Plain Information: Chocolate Bayou, Brazoria County, Texas,
W75-04854 4A

ARMY ENGINEER DISTRICT, KANSAS CITY, MO.
Flood Plain Information: Kansas and Wakarusa Rivers, Lawrence, Kansas,
W75-04852 4A

ARMY ENGINEER DISTRICT, PHILADELPHIA, PA.
Flood Plain Information: Brandywine Creek, New Castle County, Delaware,
W75-04855 4A

ARMY ENGINEER TOPOGRAPHIC LAB., FORT BELVOIR VA. GEOGRAPHIC SCIENCES LAB.
Distribution of Mean Monthly Precipitation and Rainfall Intensities,
W75-05105 2B

ATLANTIC RICHFIELD HANFORD CO., RICHLAND, WASH. RESEARCH DEPT.
Waste Management and Transportation Technology Development, Quarterly Report, July 1974 through September 1974.
W75-05348 5D

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL (ENGLAND).
Amorphous Solid Water: A Neutron Diffraction Study,
W75-05169 1B

AUBURN UNIV., ALA. DEPT. OF CIVIL ENGINEERING.
Temperature Induced Variations of Kinetic Coefficients for Textile-Domestic Waste Mixtures,
W75-05264 5D

AUBURN UNIV., ALA. DEPT. OF FISHERIES AND ALLIED AQUACULTURES.
The Utilization of Nitrogen from the Decomposition of Matter in Cultures of Scenedesmus Dimorphus,
W75-05054 5C

B.C. RESEARCH LTD., VANCOUVER.
Effluent Toxicity Removal on the West Coast,
W75-04942 5D

BACARDI CORP., SAN JUAN, PUERTO RICO.
Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

Rum Distillery Slops Treatment by Anaerobic Contact Process,
W75-05086 5D

BALL STATE UNIV., MUNCIE, IND. DEPT. OF BIOLOGY.
Water Quality Monitoring and Aquatic Organisms: The Importance of Species Indentification,
W75-05157 5A

BANGLADESH UNIV. OF ENGINEERING AND TECHNOLOGY, DACCA. DEPT. OF CIVIL ENGINEERING.
Sediment Transport Characteristics of the Teesta River,
W75-05235 2J

BATTELLE COLUMBUS LABS., LONG BEACH, CALIF. LONG BEACH RESEARCH FACILITY.
Waterborne Debris in Marine Pollution Incidents,
W75-05114 5B

BATTELLE COLUMBUS LABS., OHIO.
Implementation of a Computer-Based Information System for Mass Spectral Identification,
W75-05085 5A

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH. NUCLEAR WASTE TECHNOLOGY DEPT.
Quarterly Progress Report, Research and Development Activities, Waste Fixation Program, July Through September 1974,
W75-05347 5D

BEAK (T.W.) CONSULTANTS LTD., MONTREAL (QUEBEC).
Activated Carbon Proves to be Effective in Removing Toxicity,
W75-04953 5D

BEET SUGAR DEVELOPMENT FOUNDATION, FORT COLLINS, COLO.
Biological Treatment of Concentrated Sugar Beet Wastes,
W75-05078 5D

BELORUSSIAN STATE UNIV., MINSK(USSR).
Effect of Temperature and Trophic Conditions on the Duration of Cladocera Development,
W75-05010 5C

BELORUSSKII TEKHOLOGICHESKII INSTITUT, MINSK (USSR).
Water Recycling in the Manufacture of Sized Papers (Ispol'zovanie oborotnykh vod v proizvodstve kleenykh vidov bumagi),
W75-04960 5D

BETZ LAB., INC., TREVOSE, PA.
Chelant Treatments Provide Maximum Return to the Pulp and Paper Industry,
W75-04940 5F

BETZ LABS., INC., TREVOSE, PA.
Degradation of Lignin by Combined Chemical and Biological Treatment,
W75-04992 5D

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF CHEMICAL ENGINEERING.
Recovery of Trace Metals from Aqueous Solution - Review Article,
W75-04991 5D

BLUME (JOHN A.) AND ASSOCIATES, ENGINEERS, SAN FRANCISCO, CALIF.
Engineering and Ecological Evaluation of Artificial-Island Design, Rincon Island, Punta Gorda, California,
W75-05117 8D

BOLTER PARISH TRIMBLE LTD., EDMONTON (ALBERTA).
Permafrost-Runoff: The Consulting Engineer's Experience,
W75-05146 2C

BOWDOIN COLL., BRUNSWICK, MAINE.
Evaluation of Adjustment Assistance Programs with Application for Pollution Control,
W75-05074 5G

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF BIOLOGY.
Surface Nitrogen and Plankton in Skaha Lake, British Columbia (Canada),
W75-05053 5C

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF GEOGRAPHY.
Hydrology and Permafrost With Reference to North America,
W75-05140 2C

BRITISH STEEL CORP., SHEFFIELD (ENGLAND). INFORMATION SERVICES.
A Review of the Literature Concerning the Steel Industry and Pollution. Part 1. The Background to Pollution,
W75-05093 5G

BROOKLYN BOTANIC GARDEN, OSSINING, N.Y. TEATOWN LAKE RESERVATION.
'Human-Accelerated Eutrophication of Fresh-Water Lakes,' Proceedings of a Conference,
W75-05037 5C

BROOM'S BARN EXPERIMENT STATION, BURY ST. EDMONDS (ENGLAND).
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: I. Yields and Nutrient Composition,
W75-05265 2I

BUREAU OF MINES, SPOKANE, WASH. SPOKANE MINING RESEARCH CENTER.
Seepage-Environmental Analysis of the Slime Zone of a Tailing Pond,
W75-05115 5B

BUREAU OF SPORT FISHERIES AND WILDLIFE, LAUREL, MD. PATUXENT WILDLIFE RESEARCH CENTER.
Organochlorine Residues in Brown Pelican Eggs: Relation to Reproductive Success,
W75-05006 5C

BUREAU OF SPORT FISHERIES AND WILDLIFE, WARM SPRINGS, GA. SOUTHEASTERN FISH CONTROL LAB.
An Improved Chemical Delivery Apparatus for Use in Intermittent-Flow Bioassays,
W75-04994 5A

CALCUTTA PORT COMMISSIONERS (INDIA).
Stability of Tidal Rivers and Methods for Determination of the Corrective Works,
W75-05214 8B

CALIFORNIA STATE DEPT. OF FISH AND GAME, SACRAMENTO. INLAND FISHERIES BRANCH.
Laboratory Rearing of the Desert Pupfish, Cyprinodon Macularius,
W75-05024 8I

Gonad Maturation and Hormone-Induced Spawning of the Gulf Croaker, Bairdiella Icistia,
W75-05025 8I

CALIFORNIA STATE UNIV., SACRAMENTO. DEPT. OF CIVIL ENGINEERING.
Turbulence Measurements over Sand Beds,
W75-05219 8B

CALIFORNIA UNIV., DAVIS. DEPT. OF FOOD SCIENCE AND TECHNOLOGY.
Masking Undesirable Flavors in Fish Oils,
W75-05027 8I

CALIFORNIA UNIV., DAVIS. DEPT. OF NEMATOLOGY.
Effect of Time of Irrigation on the Distribution of 1,2-Dibromo-3-Chloropropane in Soil After Shallow Injection,
W75-05065 5B

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING.
Factors Affecting Potential Evapotranspiration,
W75-04916 2D

CALIFORNIA UNIV., DAVIS. WATER RESOURCES CENTER.
Water Resources Center Annual Report, July 1, 1973-June 30, 1974.
W75-05266 9D

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Three-Dimensional Subsurface Delineation Via a Novel Method for Determining the Subsurface Electrical Profile,
W75-05116 2F

Second Annual Report, Dot-CIAP Program,
W75-05349 2B

CALIFORNIA UNIV., LOS ANGELES.
Stable Isotope Studies of Human Lead Metabolism,
W75-05285 5A

CALIFORNIA UNIV., RIVERSIDE.
Volatilization Losses of Pesticides from Soils,
W75-05075 5B

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA. INST. OF MARINE RESOURCES.
Estimating Phytoplankton Production from Ammonium and Chlorophyll Concentrations in Nutrient-Poor Water of the Eastern Tropical Pacific Ocean,
W75-05019 5C

CANADA CENTRE FOR INLAND WATERS, BURLINGTON (ONTARIO).
Environmental Contaminants Inventory Study No 1: Statistics on the Use of Pest Control Products in Canada,
W75-04880 5G

Interlaboratory Quality Control Study No 6: Specific Conductance, pH, Colour and Residue,
W75-04887 2K

Techniques for Tracing Sediment Movement,
W75-04889 2J

Chlorophyll a Distribution in Lake Huron and Its Relationship to Primary Productivity,
W75-04892 5C

Microbiological Examination of Lake Ontario Sediments: I. Distribution of Aerobic and Anaerobic Heterotrophs in Several Lake Ontario Sediments,
W75-04896 5C

Microbiological Examination of Lake Ontario Sediments: II. Heterotroph Methodology Comparison.
W75-04897 5C

Bacteria-Phytoplankton Relationships in Lake Erie,
W75-04902 5C

Bacterial and Physical Characteristics of Lake Ontario Sediment During Several Months,
W75-04908 5C

CANADIAN WILDLIFE SERVICE, EDMONTON (ALBERTA).
Pesticide Effects of Fishes and Birds in Rice Fields of Surinam, South America,
W75-05003 5C

CANADIAN WILDLIFE SERVICE, OTTAWA (ONTARIO).
Phosphorus and Hypolimnial Dissolved Oxygen in Lake Erie,
W75-05050 5C

CANTERBURY UNIV., CHRISTCHURCH (NEW ZEALAND). DEPT. OF CIVIL ENGINEERING.
A Probabilistic Approach to the Initiation of Movement of Noncohesive Sediments,
W75-05224 2J

A Numerical Study of the Suspension of a Non-Buoyant Particle Within a Turbulent Flow,
W75-05228 2J

CELLULOSE ATTISHOLZ A.G., LUTERBACH (SWITZERLAND).
Introduction of the Attisholz Process into Paper Mills and Some Resulting Experiences (Einsatz des Verfahrens Attisholz in Papierofabriken und daraus resultierende Erfahrungen),
W75-04951 5D

CENTER FOR CALIFORNIA PUBLIC AFFAIRS, CLAREMENT.
California Environmental Quality Act: Innovation in State and Local Decisionmaking,
W75-05314 6G

CENTER OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION, TEL AVIV (ISRAEL). LIBRARY SERVICES.
Water Resources Development, 1950-1965, An International Bibliography,
W75-05154 10B

CENTRAL PUBLIC HEALTH ENGINEERING RESEARCH INST., MADRAS (INDIA). ZONAL CENTRE.
Control of Aquatic Weeds from Water Bodies using Grass Carp,
W75-05058 4A

CENTRAL WATER AND POWER RESEARCH STATION, POONA (INDIA).
Settling Cum Flushing Tank on Trisuli Power Channel,
W75-05215 8B

Sediment Discharge Formulae - A Comparative Analysis,
W75-05236 2J

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, GRENOBLE (FRANCE). LABORATOIRE DE MAGNETISME.
Continuous Random Network Model for Amorphous Solid Water,
W75-05161 1B

CH2M/HILL, BELLEVUE, WASH.
Plan of Study, Yakima River Basin, Task III Report for the Yakima Basin Water Quality Management Plan,
W75-04865 6G

Framework for the Plan of Study, Yakima River Basin, Task I Report for the Yakima Basin Water Quality Management Plan,
W75-04866 6G

CHICAGO BRIDGE AND IRON CO., PLANFIELD, ILL. MARINE RESEARCH AND DEVELOPMENT.
Mean Length of Runs of Ocean Waves,
W75-05160 8B

CHUO UNIV., TOKYO (JAPAN). HYDRAULIC LAB.
On The Cause of Meandering of Rivers,
W75-05244 2J

CIBA-GEIGY CORP., GREENSBORO, N.C.
The Registration Status of Simazine for Submerged Vascular Weeds and Algae Control in Ponds,
W75-05040 5G

CIVIL ENGINEERING LAB. (NAVY), PORT HUENEME, CALIF.
Oil Contaminated Beach Cleanup,
W75-05100 5G

CLARK COUNTY BOARD OF COUNTY COMMISSIONERS, NEV.
Report to the Governor and the Legislative Commission Final Alternate Plan, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04868 5D

CLARKSON COLL. OF TECHNOLOGY, POTSDAM, N.Y.
Mechanisms of Brine-Side Mass Transfer in a Horizontal Reverse Osmosis Tubular Membrane,
W75-04989 3A

COLORADO STATE UNIV., FORT COLLINS. COLL. OF ENGINEERING.
Bed Material Transport in Sand Bed Channels,
W75-05233 2J

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRICULTURAL ENGINEERING.
Evaluation of Drainage for Salinity Control in Grand Valley,
W75-05090 5G

Agricultural Land Use in the Poudre Valley,
W75-05260 3F

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05322 5D

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRONOMY.
Proposed Indices for Estimating the Inherent Wind Erodibility of Soils,
W75-05168 2J

Accumulation of Available Molybdenum in Agricultural Soils Irrigated With High-Molybdenum Waters,
W75-05297 5B

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF ATMOSPHERIC SCIENCE.
A Pilot Project of Weather Modification for the San Juan Mountains of the Colorado River Basin,
W75-05127 3B

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Behavior of Sediment Mixtures in Rivers,
W75-05225 2J

Spectral Properties of Alluvial Bed Forms in Rivers and Flumes,
W75-05242 8B

Sediment Equilibrium Considerations in the Design of Irrigation Canal Networks,
W75-05252 8B

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF GEOLOGY.
Experimental Study of Rill Erosion,
W75-05178 2J

Experimental Study of Rill Erosion,
W75-05178 2J

COLORADO STATE UNIV., FORT COLLINS. ENGINEERING RESEARCH CENTER.
Flow and Resistance Characteristics of Sand Bed Channels,
W75-05221 8B

COLORADO STATE UNIV., FORT COLLINS. NATURAL RESOURCE ECOLOGY LAB.
Weather Modification-Relate Uncertainties in Ecological and Agricultural Systems in the High Plains: Scientific Appraisal and Recommended Research,
W75-05118 3B

COLORADO UNIV., BOULDER. DEPT. OF GEOLOGICAL SCIENCE.
Investigation of Enrichment of Molybdenum in the Environment Through Comparative Study of Stream Drainages, Central Colorado,
W75-05293 5B

COLORADO UNIV., BOULDER. DEPT. OF PHYSICS AND ASTROPHYSICS.
Problems and Opportunities in Interdisciplinary Research: The Molybdenum Project,
W75-05298 5G

COLORADO UNIV., BOULDER. MOLYBDENUM PROJECT.
Special Analytical Problems in the Analysis of Molybdenum by Atomic Absorption Spectrophotometry and Colorimetric Methods,
W75-05281 5A

COLORADO UNIV., DENVER. DEPT. OF MEDICINE AND PEDIATRICS.
Biology of Molybdenum: Platelet Biochemistry and Function - Possible use in Evaluating Trace Metal Effects,
W75-05287 5A

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CANBERRA(AUSTRALIA). DIV. OF PLANT INDUSTRY.
Relative Significance of Soil and Plant Evaporation in Estimating Evpotranspiration,
W75-04915 2D

CONNECTICUT UNIV., STORRS. DEPT. OF CIVIL ENGINEERING.
Quick-Time Instrumental Measurements of Waste-Water Organic Characteristics,
W75-05304 5A

CORNELL UNIV., ITHACA, N.Y. DEPT. OF ENVIRONMENTAL ENGINEERING.
Cost Optimization of Activated Sludge Systems,
W75-04990 5D

CORNELL UNIV., ITHACA, N.Y. SECTION OF ECOLOGY AND SYSTEMATICS.
Continuous-Flow Studies of Phosphorus as a Limiting Nutrient for Cayuga Lake Phytoplankton.
W75-04891 5C

CORNELL UNIV., ITHACA, N.Y. WATER RESOURCES AND MARINE SCIENCES CENTER.
Nitrogen, Phosphorus and Eutrophication in the Finger Lakes,
W75-04936 5C

CURTIS-LE VANTINE AND ASSOCIATES, TARZANA, CALIF.
Development of a Fixed Site Surface Film Oil Sampler,
W75-05099 5A

DEPARTMENT OF THE ENVIRONMENT, CALGARY (ALBERTA). WATER RESOURCES BRANCH.
Groundwater in Permafrost Regions of Canada,
W75-05150 2C

DEPARTMENT OF THE ENVIRONMENT, OTTAWA, (ONTARIO). INLAND WATER DIRECTORATE.
Research Projects in Glaciology - 1974,
W75-04884 2C

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). INLAND WATERS DIRECTORATE.
Economic and Financial Aspects of Wastewater Treatment in the St. Francois River Basin, Quebec - A Preliminary Analysis,
W75-04872 5D

Stream Programmer's Manual.
W75-04874 7C

Digital Simulation of Horizontal Salt-Water Encroachment Induced by Fresh-Water Pumping,
W75-04875 2L

Flood Frequency and Risk,
W75-04876 4A

Hydrological Data Bank - Present Status,
W75-04882 7C

Reconnaissance Resistivity Survey Around a Brine Pond, Esterhazy, Saskatchewan,
W75-04883 4B

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). WATER QUALITY BRANCH.
Analytical Methods Manual - Manuel Des Methodes Analytiques,
W75-04870 5A

Further Studies on the Heavy Metal Levels in Ottawa and Rideau River Sediments,
W75-04890 5A

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). WATER RESOURCES BRANCH.
Hydrologic Forecasting in the Water Resources Branch,
W75-04881 4A

Sediment Loads in Canadian Rivers,
W75-04886 2J

Permafrost-Hydrology Studies at Boot Creek and Peter Lake Watersheds, N.W.T.,
W75-05143 2C

Dynamics of Water Movement in Permafrost: A Review,
W75-05148 2C

DEVELOPMENT PLANNING AND RESEARCH ASSOCIATES, INC., MANHATTAN, KANS.
Estimating Water Quality Benefits,
W75-05068 5G

Bibliography of Water Pollution Control Benefits and Costs,
W75-05077 5G

DOMINGUE, SZABO AND ASSOCIATES, INC., LAFAYETTE, LA.
Shrimp Canning Waste Treatment Study,
W75-05087 5A

DUKE UNIV., DURHAM, N.C. DEPT. OF BOTANY.
Diurnal Cycling in Root Resistance to Water Movement,
W75-04885 3F

DUNDEE UNIV., NEWPORT-ON-TAY (SCOTLAND). TAY ESTUARY RESEARCH CENTER.
Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

Channel Stability in Relation to Buried Unconsolidated Sediments,
W75-05249 8B

EAST CENTRAL STATE COLL., ADA, OKLA. SCHOOL OF ENVIRONMENTAL SCIENCE.
Livestock and the Environment, A Bibliography with Abstracts,
W75-05084 10B

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND). VERSUCHSANSTALT FUER WASSERBAU, HYDROLOGIE UND GLAZIOLOGIE.
The Effect of Sills on River Bed,
W75-05207 8B

ELECTRICITY GENERATING AUTHORITY OF THAILAND, NONTHABURI.
Bhumibol Reservoir-Sediment Status After Eight Years of Operation,
W75-05195 2J

ENVIREX, INC., MILWAUKEE, WIS. ENVIRONMENTAL SCIENCES DIV.
Effect of Carbon to Nitrogen Ratio on Activated Sludge Subsidence and Dewatering Characteristics,
W75-04987 5D

ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, ILL.
Pesticides in the Illinois Waters of Lake Michigan,
W75-05083 5B

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO. OFFICE OF WATER PROGRAM OPERATIONS.
Geohydrologic Relationships in Water Pollution,
W75-05128 5G

ENVIRONMENTAL PROTECTION AGENCY, FAIRVIEW PARK, OHIO. OHIO DISTRICT BASIN OFFICE.
A Submersible Automatic Dissolved Oxygen-Temperature Monitoring System,
W75-05049 5A

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF ENFORCEMENT AND GENERAL COUNSEL.
Return Sludge Flow Control,
W75-04982 5D

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF TOXIC SUBSTANCES.
An Approach to the Control of Toxic Substances,
W75-05300 5G

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Survey of Needs for Municipal Waste Treatment Facilities.
W75-04978 5D

ENVIRONMENTAL PROTECTION SERVICE, BURLINGTON (ONTARIO). WASTE WATER TECHNOLOGY CENTRE.
Full Scale Phosphorus Removal Studies at C.F.B. Petawawa,
W75-04879 5D

ENVIRONMENTAL PROTECTION SERVICE, OTTAWA (ONTARIO).
Phosphorus Removal Demonstration Studied at C.F.B. Trenton,
W75-04878 5D

ENVIRONMENTAL PROTECTION SERVICE, OTTAWA (ONTARIO). ECOLOGICAL PROTECTION BRANCH.
Sedimentation Phenomenon of the Fraser River,
W75-05256 2J

ENVIRONMENTAL PROTECTION SERVICE, OTTAWA. (ONTARIO). WATER POLLUTION CONTROL DIRECTORATE.
Modified Procedure for the Determination of Phosphorus in Detergents,
W75-04888 5A

ESSO RESEARCH AND ENGINEERING CO., LINDEN, N.J. GOVERNMENT RESEARCH DIV.
Weathering of Oil at Sea,
W75-05106 5B

FAUCETT (JACK) ASSOCIATES, INC., CHEVY CHASE, MD.
The Economic and Environmental Benefits from Improving Electrical Rate Structures,
W75-05309 6B

FINNISH PULP AND PAPER RESEARCH INST., HELSINKI.
Environmental Protection in the Finnish Pulp and Paper Industry (Umweltschutz in der Finnischen Zellstoff- und Papierindustrie),
W75-04949 5G

Chemical Treatment of Pulp Mill Effluents. Use of Ash from Combustion of Bisulfate Liquor (Traitement chimique d'effluents d'usiness de pate. Utilisation des cendres de combustion de liqueur bisulfitique),
W75-04973 5D

FISHERIES RESEARCH BOARD OF CANADA, WINNIPEG (MANITOBA). FRESHWATER INST.
Experimental Lakes Area: Whole-Lake Experiments in Eutrophication,
W75-05057 5C

FLORIDA DEPT. OF NATURAL RESOURCES, ST. PETERSBURG. MARINE RESEARCH LAB.
An Adult Bluefin Tuna, Thunnus Thynuss, from a Florida West Coast Urban Waterway,
W75-05031 8I

FLORIDA STATE GAME AND FRESH WATER FISH COMMISSION, EUSTIS. EUSTIS FISHERIES RESEARCH LAB.
Experimental Dredging to Convert Lake Bottom from Abiotic Muck to Productive Sand,
W75-05060 5G

FLORIDA STATE UNIV., TALLAHASSEE.
Impact of Pesticides on Phytoplankton in Everglades Estuaries,
W75-05005 5C

FLORIDA UNIV., GAINESVILLE. DEPT. OF CIVIL AND COASTAL ENGINEERING.
On the Concept of the Wash Load,
W75-05238 2J

Design of Scour-Free Channels on Mild Slopes,
W75-05251 8B

FLORIDA UNIV., GAINESVILLE. DEPT. OF COASTAL AND OCEANOGRAPHIC ENGINEERING.
Effect of Physico-Chemical Properties of Fine Suspended Sediment on the Degree of Deposition,
W75-05230 2J

FOLSOM MARINE SERVICE CORP., PLYMOUTH, N.H.
Lake Dredging Options and Mechanical Water Weed Harvesters,
W75-05042 5G

FORD MOTOR CO., DEARBORN, MICH. SCIENTIFIC RESEARCH STAFF.
Methods for Measuring NO2 Photodissociation Rate, Application to Smog Chamber Studies,
W75-05190 5A

FOREST SERVICE(USDA), FORT COLLINS, COLO., ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENTAL STATION.
Snow Interception and Redistribution in the Forest,
W75-04917 2C

FOREST SERVICE (USDA), LOGAN, UTAH. FOREST SCIENCES LAB.
Water Quality of Three Small Watersheds in Northern Utah,
W75-04943 5B

FOREST SERVICE (USDA), PARSONS, W. VA. TIMBER AND WATERSHED LAB.
Water Quality After Clearcutting a Small Watershed in West Virginia,
W75-04998 4C

FOSTER-MILLER ASSOCIATES, INC., WALTHAM, MASS.
Feasibility of Hydraulic Transport and Treatment of Ground Household Through Sewers,
W75-04985 5D

FRACTIONATOR, STOCKHOLM (SWEDEN). AKTIEBOLAGET.
'Float Wash' -- A Closing-Up System for the Pulp and Paper Industry,
W75-04955 5D

GENERAL AMERICAN TRANSPORTATION CORP., NILES, ILL. GENERAL AMERICAN RESEARCH DIV.
Development of Classification Scale for Characterizing Bilgewaters Used in Evaluating Oil Removal Techniques,
W75-05091 5G

GENERAL ELECTRIC CO., PHILADELPHIA, PA. RE-ENTRY AND ENVIRONMENTAL SYSTEMS DIV.
An Investigation of Ion Removal from Water and Wastewater,
W75-05080 5D

GENERAL ELECTRIC CO., PHILADELPHIA, PA. SPACE DIV.
Domestic Water and Waste Treatment Subsystem, Operation and Maintenance Manual,
W75-04986 5D

GEOLOGICAL SURVEY, DENVER, COLO.
Sediment Yield as Related to Vegetation on Semiarid Watersheds,
W75-04927 2J

GEOLOGICAL SURVEY, FORT COLLINS, COLO.
Estimating Average Sediment Yields From Annual Streamflow and Sediment Records,
W75-05200 4A

GEOLOGICAL SURVEY OF CANADA, CALGARY(ALBERTA).
Geology and Permafrost in Relation to Hydrology and Geophysics,
W75-05141 2C

GEORGIA INST. OF TECH., ATLANTA. ENGINEERING EXPERIMENT STATION.
Manganese Removal from Potable Water,
W75-05270 5F

GEORGIA INST. OF TECH., ATLANTA. SCHOOL OF CIVIL ENGINEERING.
Growth Kinetics of Nitrifying Microorganisms,
W75-05267 5D

Determination of the Effect of Carbonaceous Substrate Concentration on the Rate of Nitrification,
W75-05268 5D

Nitrogen Removal Obtained Through Heterotrophic Growth in Trickling Filters,
W75-05269 5D

GTWS: Georgia Tech Watershed Simulation Model,
W75-05271 2A

GEORGIA UNIV., ATHENS. SCHOOL OF FOREST RESOURCES.
Stormflow Production from Permeable Upland Basins,
W75-04925 2A

GHENT RIJKSUNIVERSITEIT (BELGIUM). DEPT. OF GENERAL AND INDUSTRIAL MICROBIOLOGY.
Three-Step Measurement by the Sapromat to Evaluate the BOD5, The Mineral Imbalance and the Toxicity of Water Samples,
W75-05162 5A

GIFU UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.
An Approach to the Sediment Yield Estimation by Spectral Analysis of Mountain Relief,
W75-05197 2J

River-Bed Variations at Confluences,
W75-05253 2J

GRUZINSKII NAUCHNO-ISSLEDOVATELSKII INSTITUT GIDROTEKHNIKI I MELIORATSII, TIFLIS (USSR).
Scour in River Basin and in its Bed Mechanism, Forecast,
W75-05199 2J

GUELPH UNIV., (ONTARIO). DEPT. OF LAND RESOURCE SCIENCE.
Specific Heats of Components of Frozen Soil,
W75-05149 2C

HARZER PAPIERFABRIK SIEVERS G.M.B.H. AND CO. KG, RHUMSPRINGE (WEST GERMANY).
System Closure in Rhemspringe (Kreislaufschliessung in Rhumspringe),
W75-04947 5D

HEBREW UNIV., JERUSALEM (ISRAEL). INST. OF CHEMISTRY.
Water and Aqueous Solutions: Introduction to a Molecular Theory,
W75-04970 1B

HITTMAN ASSOCIATES, INC., COLUMBIA, MD.
An Executive Summary of Three EPA Demonstration Programs in Erosion and Sediment Control,
W75-05310 5G

Demonstration of The Separation and Disposal of Concentrated Sediments,
W75-05312 5G

HITTMAN ASSOCIATES, INC., COLUMBIA, MD. ENVIRONMENTAL AND GEOSCIENCES DEPT.
Programmed Demonstration for Erosion and Sediment Control Specialists,
W75-05311 5G

HULL UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
Some Aspects of the Toxicity of P,P'-DDT, P,P'-DDE and P,P'-DDD to the Freshwater Planaria, Polycelis Felina (Tricladida),
W75-05004 5C

IBM FEDERAL SYSTEMS DIV., HUNTSVILLE, ALA.
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A Study of Remote Sensing as Applied to Regional and Small Watersheds. Volume II: Supporting Technical Details.
W75-05109 2A

Application of Remote Sensing to Hydrology.
W75-05131 2A

ILLINOIS UNIV., CHICAGO. DEPT. OF GEOLOGICAL SCIENCES.
Hydrogeochemistry of Carbonate Groundwaters of an Urban Area,
W75-05163 2F

ILLINOIS UNIV., URBANA. DEPT. OF AGROMONY.
The Uptake and Some Physiological Effects of Cadmium on Corn,
W75-05290 5C

ILLINOIS UNIV., URBANA. DEPT. OF NUCLEAR ENGINEERING.
Transport Processes of Particles in Dilute Suspensions in Turbulent Water Flow--Phase III,
W75-04933 5B

ILLINOIS UNIV., URBANA. ENVIRONMENTAL ENGINEERING PROGRAM.
Evaluation of New Reverse Osmosis Membranes for the Separation of Toxic Compounds from Wastewater,
W75-04988 5D

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, (ENGLAND). DEPT. OF PUBLIC HEALTH ENGINEERING.
Design of a Multilayer Filter for Use in the Water Treatment Industries,
W75-04979 5F

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF BOTANY.
The Course and Magnitude of Water Stress in Lolium Perenne and Dactylis Glomerata,
W75-05056 3F

IMPERIAL OIL LTD., CALGARY (ALBERTA).
Aquathermal Fluid Migration,
W75-05182 4B

INDIAN INST. OF TECH., KANPUR. DEPT. OF CIVIL ENGINEERING.
Effect of Wash Load on Sediment Transportation,
W75-05227 2J

Virus Removal by Diatomaceous Earth Filtration,
W75-05330 5F

INDUSTRIE-WASSER-UMWELTSCHUTZ E.V., DUEREN (WEST GERMANY).
New Developments in Effluent Legislation, Especially Laws Governing Effluent Disposal (Neuerungen auf dem Abwasserrechts-Sektor – insbesondere Abwasserabgabengesetz),
W75-04950 5G

INSTITUT FUER BINNENFISCHEREI, BERLIN (EAST GERMANY).
Results of Crossing Between Wild and Domestic Carp (Cyprinus Carpio L.), (In German),
W75-05164 8I

INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS.
Water Treatment with Activated Carbon Made from Sludge and Waste Paper,
W75-04941 5D

Fractionation of Spent Sulfite Liquors Using Ultrafiltration Cellulose Acetate Membranes,
W75-04975 5D

INSTITUTE OF TROPICAL METEOROLOGY, POONA (INDIA).
A Study of Rainfalls Recorded at the Cherrapunji Observatory,
W75-05158 2B

INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, DELFT (NETHERLANDS).
Sediment Transportation, Volume I.
W75-05192 2J

INTERNATIONAL HYDROLOGICAL DECADE, OTTAWA (ONTARIO). CANADIAN NATIONAL COMMITTEE.
Discharge of Selected Rivers of Canada.
W75-05136 2E

Discharge of Selected Rivers of Canada, Supplement 1.
W75-05137 2E

Permafrost Hydrology.
W75-05138 2C

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION, NEW WESTIMINSTER (BRITISH COLUMBIA).
Accute Toxicity and Detoxification of Kraft Pulp Mill Effluent,
W75-05014 5C

IONICS, INC., WATERTOWN, MASS. (ASSIGNEE)
Total Mercury Monitor,
W75-05333 5A

IOWA STATE UNIV., AMES. DEPT. OF ZOOLOGY AND ENTOMOLOGY.
Phosphorus Inputs and Algal Blooms in Lakes,
W75-05337 5C

IRAPA, PRAGUE (CZECHOSLOVAKIA).
Calculation of Concentration of Impurities in the Recycling System of Process Water in Kraft Pulp Manufacture (Berechnung der Verunreinigungskonzentration im Rezirkulations system der Betriebswaesser bei der Sulfatzellstoffherstellung),
W75-04959 5D

KANNER (LEO), ASSOCIATES, REDWOOD CITY, CALIF.
Hydrological Basis for Forecasting and Calculating Runoff by Space Images of the Earth's Surface,
W75-05135 4A

KANSAS UNIV./CENTER FOR RESEARCH, INC., LAWRENCE.
Kansas Environmental and Resource Study: A Great Plains Model,
W75-05110 7B

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Cluster Analysis and Diversity in Recovery of Damaged Streams,
W75-04934 5C

KARLSRUHE UNIV., (WEST GERMANY). THEODOR-REHBOCK-LAB. FOR RIVER IMPROVEMENT.
Secondary Currents in Subsequent Model Bends,
W75-05209 8B

KARSHINSKII GOSUDARSTVENNYI PEDAGOGICHESKII INSTITUT (USSR).
Ecology of the Bucharan Roach Rutilus Rutilus Bucharensis G. Nikolskij of the Uchkyzyl Reservoir of the Surkhan-Darya River Basin, (In Russian),
W75-05102 2H

KASPIISKII NAUCHNO-ISSLEDOVATELSKII INSTITUT RYBNOGO KHOZYAISTVA, ASTRAKHAN (USSR).
Primary and Bacterial Production of Some Fishery Ponds of the Volga Delta, (In Russian),
W75-05334 8I

KOBE UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.
Instantaneous Turbulent Flow Acts on the Sand Particle to Start the Rotation on the Bed,
W75-05223 2J

KROFTA APPARATEBAU (GESELLSCHAFT) (WEST GERMANY).
Expectations for the Closed Water System and Cost Comparison with Effluent Purification (Die Erwartungen and den geschlossenen Wasserkreislauf im Kostenvergleich zur Abwasserreinigung),
W75-04944 5D

KYOTO UNIV. (JAPAN). DISASTERS PREVENTION RESEARCH INST.
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W75-05226 8B

LAKE ERIE FISHERIES RESEARCH STATION, WHEATLEY (ONTARIO).
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W75-04900 5C

LAKEHEAD UNIV., THUNDER BAY (ONTARIO).
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W75-04871 5D

LIMNOLOGY INFORMATION AND FRESHWATER ECOLOGY, INC., CARMEL, N.Y.
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W75-05046 5C

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF CIVIL ENGINEERING.
Management of Waste Fluids in Salaquifers,
W75-05191 5B

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF ENVIRONMENTAL ENGINEERING.
Remote Sensing as an Aid for Marsh Management - Lafourche Parish, Louisiana,
W75-05095 4A

MADRAS UNIV., GUINDY (INDIA). COLL. OF ENGINEERING.
Sediment Transport Through a Porous Column,
W75-05231 2J

MAHAWELI DEVELOPMENT BOARD, COLOMBO (SRI LANKA).
Influence of Suspended Sediment Distribution on Settling Basin Designs,
W75-05216 8B

MAINE DEPT. OF TRANSPORTATION, AUGUSTA. BUREAU OF HIGHWAYS.
To Develop a Land Use-Peak Runoff Classification System for Highway Engineering Purposes,
W75-05130 4A

MALAYA UNIV., KUALA LUMPUR (MALAYSIA). SCHOOL OF BIOLOGICAL SCIENCES.
Observations of the Vertical Distribution of the Benthos in a Malaysian Stream,
W75-05066 5C

MANITOBA UNIV., WINNIPEG. DEPT. OF CIVIL ENGINEERING.
River Hydrology in Permafrost Areas,
W75-05142 2C

MARYLAND UNIV., COLLEGE PARK. BUREAU OF BUSINESS AND ECONOMIC RESEARCH.
Effects of Economic Development Upon Water Resources (An Interindustry Approach to Modeling Economic-Environmental Systems),
W75-05174 6G

MARYLAND UNIV., COLLEGE PARK. DEPT. OF CHEMISTRY.
Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish,
W75-04935 5C

MARYLAND UNIV., PRINCE FREDERICK. CENTER FOR ENVIRONMENTAL AND ESTUARINE STUDIES.
Survival Time and Lethal Exposure Time for the Blacknose Dace Exposed to Free Chlorine and Chloramine Solutions,
W75-05272 5C

MARYLAND UNIV., PRINCE FREDERICK. NATURAL RESOURCES INST.
Ecological Effects of Nuclear Steam Electric Station Operations on Estuarine Systems, Vol. 2.
W75-05342 5C

Benthic Animal-Sediment,
W75-05343 5A

Blue Crab Survey in the Waters Adjacent to the Calvert Cliffs Nuclear Steam Electric Station and the Chesapeake Bay Region,
W75-05344 5C

Fish Survey: Other Trawl Collections Offshore of the Calvert Cliffs Nuclear Powerplant Site,
W75-05345 5C

Ecosystem Modeling: Effects of Temperature on Estuarine Microcosms,
W75-05346 5C

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF CIVIL ENGINEERING.
Multidimensional Characterization of the Rainfall Process, Part I: Synthetic Generation of Hydrologic Spatial Processes, Part II: On The transformation of Point Rainfall to Areal Rainfall,
W75-04930 2B

On the Collection, the Analysis and the Synthesis of Spatial Rainfall Data,
W75-04931 2B

Bidimensional Spectral Analysis of Rainfall Events,
W75-04932 2B

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF OCEAN ENGINEERING.
Primary, Physical Impacts of Offshore Petroleum Developments.
W75-05032 5C

Simulation of Hypothetical Offshore Petroleum Developments,
W75-05033 3E

Analysis of Oil Spill Statistics,
W75-05034 5C

Oil Spill Trajectory Studies for Atlantic Coast and Gulf of Alaska,
W75-05035 5B

The Role of Mass Transport in Oil Slick Weathering,
W75-05036 5B

MELBOURNE UNIV., PARKVILLE (AUSTRALIA).
Internal Gravity Waves in a Slowly Varying, Dissapative Medium,
W75-05188 2E

METEOROLOGY RESEARCH, INC., ALTADENA, CALIF.
Precipitation Mechanisms in Summertime Convective Clouds,
W75-05111 3B

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, ILL. RESEARCH AND DEVELOPMENT DEPT.
Preliminary Determinations of Trace Metals in Hi-Vol Pads and Soils Around the South End of Lake Michigan,
W75-05291 5A

MIAMI UNIV., FLA. CENTER FOR URBAN STUDIES.
Rookery Bay Land Use Studies, The Resource Buffer Plan: A Conceptual Land Use Study,
W75-04929 4A

MICHIGAN UNIV., ANN ARBOR. DEPT. OF ATMOSPHERIC AND OCEANIC SCIENCE.
Numerical Models for Precipitation Scavenging,
W75-05112 5B

MICHIGAN UNIV., ANN ARBOR. DEPT. OF CHEMISTRY.
Human Hair as an Indicator of Trace Metal Environmental Exposure,
W75-05283 5A

MICHIGAN UNIV., ANN ARBOR. GREAT LAKES RESEARCH DIV.
Benthic Macrofauna in the Coastal Zone of Southeastern Lake Michigan,
W75-04903 5C

Nutrient Enrichment and its Effect on Phytoplankton Production and Species Composition in Lake Superior,
W75-04905 5C

Occurrence of Morphologically Abnormal Synedra Populations in Lake Superior Phytoplankton,
W75-05062 5C

MICHIGAN UNIV., ANN ARBOR. SCHOOL OF NATURAL RESOURCES.
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W75-04894 5C

MINISTRY OF ENVIRONMENT, REXDALE (ONTARIO). LIMNOLOGY AND TOXICITY BRANCH.
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W75-05063 5C

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W75-05211 4D

MINNESOTA POLLUTION CONTROL AGENCY, MINNEAPOLIS.
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W75-05089 5D

MINNESOTA UNIV., MINNE. DIV. OF ENVIRONMENTAL HEALTH.
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W75-04945 5D

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W75-05261 6B

MISSOURI UNIV., COLUMBIA. DEPT. OF AGRONOMY.
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W75-05081 5B

MISSOURI UNIV., ROLLA. DEPT. OF GEOLOGICAL ENGINEERING.
The Geology and Hydrogeology of the New Lead Belg, Missouri,
W75-05175 2F

MOSCOW STATE UNIV. (USSR).
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W75-05009 5C

MOSKOVSKII INSTITUT INZHENEROV ZHELEZNODOROZHNOGO TRANSPORTA (USSR).
Investigation and Computation of Sediment Transport with Regard to Their Density,
W75-05234 8B

NANSEI REGIONAL FISHERIES RESEARCH LAB., MARUISHI (JAPAN).
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W75-05013 5C

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CLEVELAND, OHIO. LEWIS RESEARCH CENTER.
An Automatic Underwater Camera System,
W75-05048 5A

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, GREENBELT, MD. GODDARD SPACE FLIGHT CENTER.
Microwave Maps of the Polar Ice of the Earth,
W75-05170 2C

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, HOUSTON, TES. LYNDON B. JOHNSON SPACE CENTER.
Development of a Computer-Aided Procedure for the National Program of Inspection of Dam.,
W75-05134 7C

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A Procedure for Automated Land Use Mapping Using Remotely Sensed Multispectral Scanner Data,
W75-05096 7C

Development of a Two-Channel Linear Discriminant Function for Detecting and Identifying Surface Water Using ERTS-1 Data.
W75-05103 7C

Evaluation of Computer-Aided Procedure for Detecting Surface Water.
W75-05104 7C

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W75-05076 5G

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Status of Advanced Waste Treatment,
W75-04983 5D

Physical-Chemical Processes,
W75-04984 5D

NATIONAL FOREST PRODUCTS ASSOCIATION, WASHINGTON, D.C.
The Federal Water Pollution Control Act and Forestry,
W75-04957 5G

NATIONAL MARINE FISHERIES SERVICE, COLLEGE PARK, MD. NATIONAL CENTER FOR FISH PROTEIN CONCENTRATE.
Chemical and Nutritional Characteristics of Fish Protein Concentrate Processed from Heated Whole Red Hake, Urophycis Chuss,
W75-05022 3E

Effect of Ice Storage on the Chemical and Nutritive Properties of Solvent-Extracted Whole Fish--Red Hake, Urophycis Chuss,
W75-05023 3E

NATIONAL MARINE FISHERIES SERVICE, GALVESTON, TEX. BIOLOGICAL LAB.
Early Developmental Stages of the Brown Shrimp, Penaeus Aztecus Ives, Reared in the Laboratory,
W75-05028 8I

Equipment for Holding and Releasing Penaeid Shrimp During Marking Experiments,
W75-05030 8I

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Kind and Abundance of Fish Larvae in the Eastern Tropical Pacific, Based on Collections Made on Eastropac I,
W75-05017 8I

NATIONAL MARINE FISHERIES SERVICE, MONTEREY, CALIF. ENVIRONMENTAL AND FISHERY FORECASTING CENTER.
Harmonic Functions for Sea-Surface Temperatures and Salinities, Koko Head, Oahu, 1956-69, and Sea-Surface Temperatures, Christmas Island, 1954-69,
W75-05026 2L

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W75-05016 8I

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W75-05029 8I

NATIONAL OCEAN SURVEY, DETROIT, MICH. LAKE SURVEY CENTER.
Variations in the Physico-Chemical Properties of Lake Superior,
W75-04909 5C

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO. WEATHER MODIFICATION PROGRAM OFFICE.
Optimizing the Measurement of Convective Rainfall in Florida,
W75-05097 2B

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA (ONTARIO). DIV. OF BUILDING RESEARCH.
Distribution and Environmental Relationships of Permafrost,
W75-05139 2C

Energy Balance Considerations in Permafrost Hydrology,
W75-05147 2C

NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD, UPPSALA.
A Modified Fluorometric Method for Measurement of Lignin Sulfonates and its in situ Application in Natural Waters,
W75-04972 5A

NATIONAL TAIWAN UNIV., TAIPEI. DEPT. OF CIVIL ENGINEERING.
Scour at Downstream End of Dams in Taiwan,
W75-05204 8B

NAVAL ORDNANCE LAB., WHITE OAK, MD.
A Method for the Separation of Oil from an Aqueous Oil-Detergent Solution Prior to IR Analysis,
W75-05098 5A

NAVAL RESEARCH LAB., WASHINGTON, D.C.
Artificial Sea Slicks: Their Practical Applications and Role in Fundamental Research,
W75-05092 5B

NAVAL UNDERSEA CENTER, SAN DIEGO, CALIF.
Sofar Channel Axial Sound Speed and Depth in the Atlantic Ocean,
W75-05156 8B

NEVADA AGRICULTURAL EXPERIMENT STATION, RENO.
Infiltration Role of Large Soil Pores: A Channel System Concept,
W75-04919 2G

NEVADA ENVIRONMENTAL CONSULTANTS, LAS VEGAS.
Facilities Plan, Annex A, Las Vegas/Bay Pollution Abatement Project,
W75-04867 6A

NEW HAMPSHIRE UNIV., DURHAM. WATER RESOURCES RESEARCH CENTER.
The Effect of Park Use on Surface Water Quality,
W75-05306 5B

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Jemez Atmospheric Water Resources Research Project, Volume I: Summary and Accomplishments,
W75-05121 3B

Jemez Atmospheric Water Resources Research Project, Volume II: Special Aspects of the Program,
W75-05122 3B

NEW MEXICO UNIV., ALBUQUERQUE.
Mercury Levels in Lake Powell: Bioamplification of Mercury in Man-Made Desert Reservoir,
W75-05185 5A

NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA). SCHOOL OF CIVIL ENGINEERING.
Rainfall Temporal Patterns for Design Floods,
W75-05166 2B

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, NEW PALTZ.
'Eutrophication'--Its Causes and Effects in Fresh Water Lakes,
W75-05038 5C

NEW YORK STATE DEPT. OF HEALTH, ALBANY.
Identification of Petroleum Products in Natural Water by Gas Chromatography,
W75-04967 5A

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF BIOLOGICAL AND AGRICULTURAL ENGINEERING; AND NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF SOIL SCIENCE.
Infiltration of Water into the Soil Profile,
W75-04918 2G

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF WOOD AND PAPER SCIENCE.
Indigester Black Liquor Oxidation for Odor Control in Kraft Pulping,
W75-04952 5G

NORTH CAROLINA WATER RESOURCES RESEARCH INST., RALEIGH.
Annual Report, Fy 1974, Water Resources Research Institute of the University of North Carolina.
W75-04937 9D

NORTH DAKOTA UNIV., GRAND FORKS.
The Differentiation of Submicrogram Amounts of Inorganic and Organomercury in Water by Flameless Atomic Absorption Spectrometry,
W75-05341 5A

NOTTINGHAM (H.D.) AND ASSOCIATES, MCLEAN, VA.
Wastewater Collection (Literature Review),
W75-05335 5D

NOVA SCOTIA RESEARCH FOUNDATION, DARTMOUTH.
How to Clarify Kraft Effluent with Seawater and Lime,
W75-04958 5D

OAK RIDGE NATIONAL LAB., TENN.
Geoecology Information System, Part I. Biogeographic Mapping of Species Ranges: Documentation of Input and Data Checking Procedure for Computer Storage and Retrieval of Information,
W75-05129 7C

Proceedings of the First Annual NSF Trace Contaminants Conference.
W75-05277 5B

Gas Chromatography/Microwave Emission Spectroscopy for Measuring Volatile Organometallics,
W75-05279 5A

Determination of Trace Organic Contaminants in Natural Waters by High-Resolution Liquid Chromatography,
W75-05280 5A

Quantitative Trace Elements Analysis with X-Ray Fluorescence,
W75-05282 5A

Dynamic Redistribution of Methylmercury in a Pond Ecosystem,
W75-05295 5B

Patterns of Trace-Element Distribution in a Forested Watershed,
W75-05296 5B

Information Systems in Environmental Research and Decision-Making,
W75-05301 6B

OHIO RIVER VALLEY SANITATION COMMISSION, CINCINNATI.
Delineation of Great Lakes Estuaries,
W75-04912 2H

OHIO STATE UNIV., COLUMBUS. DEPT. OF MICROBIOLOGY.
Methane Production in Lake Erie Sediments: Temperature and Substrate Effects,
W75-04901 5C

OKLAHOMA UNIV., NORMAN.
A Practical Approach to Water Quality Management Planning,
W75-04857 5G

OLD DOMINION UNIV., NORFOLK, VA. DEPT. OF BIOLOGY.
The Use of Color Infrared Aerial Photography in Determining Salt Marsh Vegetation and Delimiting Man-Made Structures of Lynnhaven Bay, Virginia,
W75-05126 2L

ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO. PROJECT OPERATIONS BRANCH.
Measuring Sewage Flow Using Weirs and Flumes,
W75-05326 5D

OREGON STATE UNIV., CORVALLIS. DEPT. OF OCEANOGRAPHY.
Size Structure and Growth Rate of Euphausia Pacifica Off the Oregon Coast,
W75-05018 8I

OSMANIA UNIV., WARANGAL (INDIA). REGIONAL ENGINEERING COLL.
Scouring Capacity of Flow in Narrow Open Channels,
W75-05258 8B

OWENS-ILLINOIS, INC., CINCINNATI, OHIO. (ASSIGNEE)
Carbonation System for Recovery of Sodium Base Pulping Liquor,
W75-05331 5D

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, OREG.
Sediments and Sediment-Water Nutrient Interchange in Upper Klamath Lake, Oregon,
W75-05079 5C

Measurement of Residual Chlorine Levels in Cooling Water--Amperometric Method,
W75-05088 5A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF NUCLEAR ENGINEERING.
Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05274 5A

Activation Analysis of Heavy Metals in Surface Waters Using Ion Exchange Filter Papers and Cyanide Complexing,
W75-05275 5A

PITTSBURGH UNIV., PA. DEPT. OF CIVIL ENGINEERING.
Stochastic Models of Sediment Transport,
W75-05241 2J

POLISH ACADEMY OF SCIENCES, KRAKOW. ZAKLAD OCHRONY PRZYRODY.
The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

The Effect of Sewage from the Town of Krynica on the Benthic Invertebrates Communities of the Kryniczanka Stream,
W75-05051 5C

PROCTER AND GAMBLE CO., CINCINNATI, OHIO. ENVIRONMENTAL WATER QUALITY RESEARCH DEPT.
Environmental Testing of Citrate: Bioassays for Algal Stimulation,
W75-04893 5C

PUBLIC WORKS RESEARCH INST., TOKYO (JAPAN). RIVER HYDRAULIC SECTION.
Calculations of Suspended Load in Alluvial Channel,
W75-05229 2J

PUERTO RICO UNIV., SAN JUAN.
Puerto Rico Nuclear Center, Annual Report, 1973.
W75-05350 5A

PURDUE RESEARCH FOUNDATION, LAFAYETTE, IND.
Prediction of subsoil Erodibility using Chemical, Mineralogical and Physical Parameters,
W75-05308 2J

PURDUE UNIV., LAFAYETTE, IND., AGRICULTURAL EXPERIMENT STATION.
The Overland Flow Process Under Natural Conditions,
W75-04920 4A

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRICULTURAL ENGINEERING.
The Influence of Vegetation and Vegetative Mulches on Soil Erosion,
W75-04928 4C

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRONOMY.
Root Development and Nutrient Uptake by Corn Grown in Solution Culture,
W75-05305 3F

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF BIONUCLEONICS.
Distrubution of Heavy Metals in a Borrow Pit,
W75-05292 5B

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF FORESTRY AND CONSERVATION.
Remote Sensing Potentials for Resource Management,
W75-04922 5A

PURDUE UNIV., LAFAYETTE, IND. LAB. FOR APPLICATIONS OF REMOTE SENSING.
Research in Remote Sensing of Agriculture, Earth Resources, and Man's Environment,
W75-05132 7B

PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF CIVIL ENGINEERING.
Analyses of the Effect of Urbanization on Rainfall Characteristics I,
W75-05172 4C

Probabilistic Analysis and Simulation of the Short Time Increment Rainfall Process,
W75-05173 2B

QUEENS UNIV., KINGSTON (ONTARIO).
A Probabilistic Method for Determining the Distribution of Suspended Solids in Open Channels,
W75-05240 8B

READING UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
Some Factors Affecting the Distribution of Crenobia Alpina (Dana), Polycelis Felina (Dalyell) and Phagocata Vitta (Duges) (Platyhelminthes) in Caernarvonshire, North Wales,
W75-04980 5C

REGIONAL ENGINEERING COLL., ROURKELA (INDIA). DEPT. OF APPLIED MECHANICS AND HYDRAULICS.
Sediment Transport Relations Using Concept of Effective Shear Stress,
W75-05232 2J

REGIONAL INST. OF TECH., JAMSHEDPUR (INDIA). DEPT. OF APPLIED MECHANICS.
Stable Channels in Alluvial Material,
W75-05250 8B

RESEARCH INST. FOR WATER RESOURCES DEVELOPMENT, BUDAPEST (HUNGARY).
Statistical Regularities in the Movement of Bed Load,
W75-05239 2J

Gravel Bar Migration in Streams of Middle-Reach Character,
W75-05246 2J

Bed-Change Processes in a Sand-Bearing River,
W75-05259 2J

RESEARCH TRIANGLE PARK, N.C. NATIONAL ENVIRONMENTAL RESEARCH CENTER, CHEMISTRY AND PHYSICS DIV.
Comparison of Instrumental Methods to Measure Nitrogen Dioxide,
W75-05184 5A

RESOURCE MANAGEMENT, INC., FREEHOLD, N.J.
History of Aquatic Herbicides, Biological Control, Practical Aspects of the Use of Chemicals in Water Weed Control,
W75-05041 5G

RHODE ISLAND UNIV., KINGSTON. DEPT. OF OCEANOGRAPHY.
Laterally Integrated Numerical Water Quality Model for an Estuary,
W75-05323 5B

RHODESIA UNIV., SALISBURY. DIV. OF BIOLOGICAL SCIENCES.
Hydrobiological Observations on Three Rhodesian Reservoirs,
W75-05059 5C

ROCHESTER UNIV., N.Y. DEPT. OF MICROBIOLOGY.
The Effect of Mercurials on DNA-Mediated Transformation in Bacillus Subtilis,
W75-05289 5A

ROCHESTER UNIV., N. Y. DEPT. OF RADIATION BIOLOGY AND BIOPHYSICS.
Behavioral Effects of Methylmercury,
W75-05288 5A

ROORKEE UNIV. (INDIA). DEPT. OF CIVIL ENGINEERING.
Effect of Characteristics of Bed Material and Fluid on Ripple Formation,
W75-05243 8B

ROORKEE UNIV. (INDIA). DEPT. OF HYDRAULIC ENGINEERING.
Analysis of Aggradation Upstream of a Dam,
W75-05194 8B

ROYAL IRRIGATION DEPT., BANGKOK (THAILAND).
Chao Phya River Training Works,
W75-05213 8A

RUTGERS - THE STATE UNIV., NEW BURNSWICK, N.J. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Seepage Flows - Groundwater Pollution Investigations,
W75-05273 5B

SAINT CATHARINES (ONTARIO).
A Model to Study the Effects of Time-Variable Pollutant Loads on Stream Quality,
W75-05187 5B

SAINT MARY'S UNIV., HALIFAX (NOVA SCOTIA).
Kraft Effluent Color Removal by Dispersed Air Flotation,
W75-04954 5D

SASKATCHEWAN UNIV., DEPT. OF CIVIL ENGINEERING. SASKATOON.
Carbon and Color Distribution in Various Size Fractions of Treated Pulp Mill and Board Mill Waste Effluents,
W75-04948 5B

SASKATCHEWAN UNIV., SASKATOON. DEPT. OF CHEMISTRY AND CHEMICAL ENGINEERING.
GLC Analysis of 2,4-D Concentrations in Air Samples from Central Saskatchewan in 1972,
W75-05176 5A

SCIENTIFIC ASSOCIATES, INC., SANTA MONICA, CALIF.
Concept Development of a Free Vortex Oil Recovery System,
W75-04977 5G

SIR GEORGE WILLIAMS UNIV., MONTREAL (QUEBEC). DEPT. OF ECONOMICS.
Sources and Trends in Waste Water Loadings to the San Francisco Bay Region,
W75-05186 5B

SNOWY MOUNTAINS ENGINEERING CORP., COOMA (AUSTRALIA). HYDROLOGY BRANCH.
Flood Estimation for Urban and Rural Catchments,
W75-04856 4A

SOIL CONSERVATION SERVICE, NEW CITY, N.Y.
Lake Formation, Sedimentation, Control of Algae, Questions,
W75-05039 5C

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, RAPID CITY. DEPT. OF GEOLOGY AND GEOLOGICAL ENGINEERING.
The Geochemistry of Certain Mine and Spring Waters, Western South Dakota,
W75-04938 5B

SPINK CORP., RENO, NEV.
City of Sparks, Nevada, Feasibility Study for Spanish Springs Interceptor,
W75-04863 5D

STANDARD OIL CO. OF CALIFORNIA, SAN FRANCISCO.
The Chemical Treatment of Cooling Water,
W75-04964 5D

STANFORD RESEARCH INST., MENLO PARK, CALIF.
Control of Environmental Impacts from Advanced Energy Sources,
W75-05313 6G

STATE HYDRAULIC WORKS, ANKARA (TURKEY). DEPT. OF RESEARCH.
Economic Revetments for Protecting the Banks of Meric and Ergene Rivers Flood Canals Against Wave Erosion,
W75-05210 8B

The Influence of the Relative Depth on Threshold of Grain Motion,
W75-05222 2J

STATE UNIV., COLL., OSWEGO, N.Y. LAKE ONTARIO ENVIRONMENTAL LAB.
Effect of Paper Plant Pollution and Subsequent Abatement on a Littoral Macroinvertebrate Community in Lake Ontario: Preliminary Survey,
W75-04898 5C

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF CIVIL ENGINEERING.
Sediment Diffusion Over a Wavy, Mobile Bed,
W75-05237 8B

STATE UNIVERSITY COLL., BUFFALO, N.Y. GREAT LAKES LAB.
Impact of Detergent Phosphate Reductions on Water Quality,
W75-04895 5C

TAIWAN WATER RESOURCES PLANNING COMMISSION, TAIPEI. HYDRAULIC LAB.
Sedimentation Damage of Hydraulic Structures in Taiwan,
W75-05205 8B

TASMANIA UNIV., HOBART (AUSTRALIA). DEPT. OF BOTANY.
Plankton Populations of Lake Leake and Tooms Lake: Oligotrophic Tasmanian Lakes,
W75-05183 5C

TECHNICAL UNIV., OF ISTANBUL (TURKEY). DEPT. OF HYDRAULICS AND WATER POWER.
Water Intake Problems in Torrents,
W75-05217 8B

TECHNICAL UNIV. OF LISBON (PORTUGAL). INSTITUTO SUPERIOR TECNICO.
Continuous Hydrological Time-Series Discretization,
W75-05165 2A

TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS). LAB. OF FLUID MECHANICS.
Theory of Viscous Flow in Wide Curved Open Channels,
W75-05208 8B

TENNESSEE UNIV., KNOXVILLE.
Remote Sensor Utilization for Environmental System Studies, Volume I,
W75-05123 7B

Remote Sensor Utilization for Environmental System Studies, Volume II,
W75-05124 7B

TENNESSEE UNIV., KNOXVILLE. DEPT. OF GEOLOGY.
Remote Sensor Utilization for Environmental Systems Studies, Volume III,
W75-05125 7B

TENNESSEE UNIV., KNOXVILLE. DEPT. OF PLANT AND SOIL SCIENCE.
Utilizing ERTS Imagery to Detect Plant Diseases and Nutrient Deficiencies, Soil Types and Soil Moisture Levels,
W75-05133 3F

TEXAS INSTRUMENTS, INC., DALLAS.
Biological Assessment of Diesel Spill in the Vicinity of Anacortes, Washington, May 1971,
W75-05001 5C

TEXAS UNIV. AT AUSTIN.
Establishment of Operational Guidelines for Texas Coastal Zone Management: Interim Report on Resource Capability,
W75-04851 2L

TEXAS UNIV. AT AUSTIN. CENTER FOR RESEARCH IN WATER RESOURCES.
Flood Flow Frequency Techniques,
W75-05262 2E

TEXAS UNIV. AT DALLAS, RICHARDSON. INST. FOR ENVIRONMENTAL SCIENCES.
Comments on US EPA Proposed Criteria for Water Quality,
W75-05052 5G

TEXAS UNIV. AT DALLAS, RICHARDSON. INST. OF ENVIRONMENTAL SCIENCES.
Phosphate, Algae and Taconite Tailings in the Western Arm of Lake Superior,
W75-05067 5C

THAMES BOARD MILLS LTD., PURFLEET (ENGLAND).
Water Conservation and Fiber Economy,
W75-04956 3E

TOKUSHIMA UNIV. (JAPAN). DEPT. OF HYDRAULIC ENGINEERING.
Debris Slopes Above Sand Barriers,
W75-05196 2J

TOKYO INST. OF TECH. (JAPAN). DEPT. OF CIVIL ENGINEERING.
Study on Localised Scour Around A Bridge Pier and Its Prevention,
W75-05201 8B

Deformed Piers to Control the Downstream Erosion,
W75-05202 8B

TORONTO DEPT. OF PUBLIC WORKS (ONTARIO).
City of Toronto Sewer System,
W75-04864 8A

TORONTO UNIV. (ONTARIO). INST. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
Regional Characterizations of the Thermal Properties of Lake Ontario,
W75-04911 2H

TRONDHEIM UNIV. (NORWAY). INST. OF MARINE BIOCHEMISTRY.
Estimation of Heavy Metal Pollution in Two Norwegian Fjord Areas by Analysis of the Brown Alga Ascophyllum Nodosum,
W75-05002 5A

TSENTRALNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT BUMAGI, MOSCOW (USSR).
Disinfection of White Water With Ozone (Obrezzarazhivanie oborotnoi vody ozonom),
W75-04962 5D

TURKU UNIV. (FINLAND). INST. OF BIOCHEMISTRY.
Occurrence of DDT and PCB Compounds in Baltic Herring and Pike from the Turku Archipelago,
W75-05008 5C

UKRAINSKII NAUCHNO-ISSLEDOVATELSKII INSTITUT BUMAGI, KIEV (USSR).
Reduction of Freshwater Consumption at a Board Mill (Opyt l'vovskoi kartonnoi fabriki po snizhennyu raskhoda svezhei vody),
W75-04961 5D

UNION CARBIDE CORP., TARRYTOWN, N.Y. AQUATIC ENVIRONMENTAL SCIENCES.
Restoration of Eutrophic Lakes by Artificial Hypolimnetic Oxygenation,
W75-05043 5C

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION, PARIS(FRANCE).
A Guide to the Measurement of Marine Primary Production Under Some Special Conditions,
W75-05047 5A

UNIVERSIDAD DE ORIENTE, CUMANA (VENEZUELA). INST. OF OCEANOGRAPHY.
Possibilities of Converting Part of the Piritu Lagoon (State of Anzoategui) into an Artificial Salt Pit, (In Spanish),
W75-05276 3E

UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, MEXICO CITY. DEPT. OF CIVIL ENGINEERING.
Flow Resistance in Sand Bed Channels,
W75-05220 8B

Stable Channels in Alluvium,
W75-05248 8B

Contribution to the Study of General Scour,
W75-05255 2J

UNIVERSIDAD SIMON BOLIVAR, CARACAS (VENEZUELA). DEPARTAMENTO DE MATEMATICAS Y CIENCIA DE LA COMPUTACION.
Optimal Expansion of a Water Resources System,
W75-05315 6A

Introduction,
W75-05316 6A

Formulating the Problem of the Optimal Expansion of an Existing Water Resources System,
W75-05317 6A

A Procedure for Solving the Optimal Expansion Problem,
W75-05318 6A

Application of the Optimization Algorithm to a Water Resources System,
W75-05319 6A

The Sensitivity of Planning Decisions in River Basin Management,
W75-05320 6A

How to Incorporate Water Quality and Pollution Considerations into the Model of the Water Resources System,
W75-05321 6A

UNIVERSITY COLL. OF WALES, ABERYSTWYTH. DEPT. OF BOTANY AND MICROBIOLOGY.
The Tolerance of Stigeoclonium Tenue Kutz. to Heavy Metals in South Wales,
W75-05336 5C

UNIVERSITY OF AGRICULTURE, DEBRECEN (HUNGARY). DEPT. OF AGRONOMY.
Effect of Fertilizer Rates and Irrigation on Fusarium Infection of Winter Wheat,
W75-05073 3F

UNIVERSITY OF SOUTH FLORIDA, TAMPA. DEPT. OF CHEMISTRY.
Analytical Studies of the Speciation of Mercury, Arsenic and Antimony,
W75-05278 5A

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. ALLAN HANCOCK FOUNDATION.
Feeding in the Porcelain Crab, Petrolisthes Cinctipes (Randall) (Anomura: Porcellanidae),
W75-04907 2I

URS FORREST AND COTTON, INC., DALLAS, TEX.
Interior Drainage Study, Pumping Plant B Area, Dallas Floodway Project,
W75-04859 8B

Interior Drainage Study, West Levee, Dallas Floodway Project,
W75-04860 8B

UTAH COOPERATIVE FOREST RECREATION RESEARCH UNIT, LOGAN.
Multiple Uses of Utah Irrigation Canals: Cache Country as a Case Study,
W75-04939 4A

UTAH STATE UNIV., LOGAN.
Carrying Capacity in Regional Environmental Management,
W75-05069 6B

UTAH STATE UNIV., LOGAN. DEPT. OF RANGE SCIENCE.
Bibliographies Pertinent to Wildland Hydrology,
W75-05153 10C

VANDERBILT UNIV., NASHVILLE, TENN.
Utility of Placental Tissue as an Indicator of Environmental Exposure,
W75-05284 5A

A Network to Determine Causality Between Abnormal Trace Element Levels in Cogenital Defects,
W75-05286 5A

VICTORIA STATE RIVERS AND WATER SUPPLY COMMISSION, MELBOURNE (AUSTRALIA).
Techniques of Measurement of Silt Deposition in Victorian Reservoirs,
W75-05198 2J

Lang Lang River, Victoria Attempts to Control Sediment, Erosion and Floods,
W75-05212 4D

VICTORIA UNIV. (BRITISH COLUMBIA). DEPT. OF BIOLOGY.
Monitoring Marine Outfalls by Using Ultraviolet Absorbance,
W75-05159 5A

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF AGRONOMY.
Use of Remote Sensing in Agriculture,
W75-05107 7B

Flow Patterns of Steady Rainfall Seeping Through Bedded Land or a Hillside with a Barrier at Great Depth,
W75-05339 2F

VTN NEVADA, LAS VEGAS.
Addendum to the Environmental Assessment, Annex B, Las Vegas Wash/Bay Pollution Abatement Project,
W75-04869 5E

WASEDA UNIV., TOKYO (JAPAN). DEPT. OF SCIENCE AND ENGINEERING.
Condition for the Formation of Alternate Bars in Straight Alluvial Channels,
W75-05245 8B

WASHINGTON STATE DEPT. OF ECOLOGY, OLYMPIA.
A Review of Fisheries Minimum Flow Methodologies From the Viewpoint of Water Availability,
W75-04861 3B

Hydrologic Aspects of a Low Flow Water Management Program,
W75-04862 4A

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF AGRICULTURAL ENGINEERING.
An Agricultural Irrigation Model for a Watershed,
W75-05307 3F

WASHINGTON UNIV., SEATTLE.
Studies of Low Molecular Weight Lignin Sulfonates,
W75-05072 5A

WASHINGTON UNIV., SEATTLE. CENTER FOR QUANTITATIVE SCIENCE; AND WASHINGTON UNIV., SEATTLE. FISHERIES RESEARCH INST.
A Linear-Programming Solution to Salmon Management,
W75-05021 8I

WASHINGTON UNIV., SEATTLE. DEPT. OF CIVIL ENGINEERING.
Attenuation of Random Deep Water Waves by a Porous Walled Breakwater,
W75-05113 8B

WASHINGTON UNIV., SEATTLE, DEPT. OF OCEANOGRAPHY.
Anaerobic Metabolism in Lake Washington Sediments,
W75-05064 5C

Arsenic Distribution in Waters and Sediments of the Puget Sound Region,
W75-05294 5B

WATER ECONOMICS RESEARCH INST., KRAKOW (POLAND). DEPT. FOR WATER PROTECTION.
The Indicator Organisms and their Ecological Variability,
W75-05055 5C

WATER RESOURCES ENGINEERS, INC., WALNUT CREEK, CALIF.
Investigation of Alternative Procedures for Estimating Groundwater Parameters, W75-05263 4B

WATER SURVEY OF CANADA, HALIFAX (NOVA SCOTIA).
Runoff from a Small Arctic Watershed, W75-05144 2C

WATERLOO UNIV. (ONTARIO). DEPT. OF BIOLOGY.
The Distribution of Diatoms on the Superficial Sediments of Lake Ontario, W75-04899 5C

WESTCHESTER COUNTY DEPT. OF HEALTH, WHITE PLAINS, N.Y. DIV. OF ENVIRONMENTAL HEALTH SERVICES.
Public Health Requirements, Sewage Disposal Systems, Permits Required for Chemical Treatment of Aquatic Vegetation, Authorized Chemicals, Dredging Permits, Sources of Lake Enrichment, Building Regulations, W75-05044 5G

WINDSOR UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Incipient Motion of Bed Material, W75-05203 8B

Bed Slopes of Aggraded Channels with Two Degrees of Freedom, W75-05254 8B

WISCONSIN UNIV., GREEN BAY. COLL. OF ENVIRONMENTAL SCIENCES.
Nutrient Discharges to Green Bay, Lake Michigan from the Lower Fox River, W75-04904 5C

WISCONSIN UNIV., GREEN BAY. LEISURE SCIENCES COLLATERAL.
Recreational Uses of Green Bay: Bay/Non-Bay Users Compared, W75-04913 6B

WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.
Chemical Control of Aquatic Weeds and its Effect on the Nutrient and Redox Status of Water and Sediment, W75-04906 5C

Columns Representing Mound-Type Disposal Systems for Septic Tank Effluent: II. Nutrient Transformations and Bacterial Populations, W75-04981 5D

Nitrate and Chloride Movement in the Plainfield Loamy Sand under Intensive Irrigation, W75-04997 5B

The Fate of Nitrate in Lake Sediment Columns, W75-05155 5B

WISCONSIN UNIV., MADISON. WATER RESOURCES CENTER.
Estimating Nutrient Loadings of Lakes from Non-Point Sources, W75-05082 5C

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Effects of Increasing Temperature on Social Behaviour in Groups of Yellow Bullheads (Ictalurus Natalis), W75-05007 5C

Minimum Interference Between Plankton Species and Its Beneficial Effect, W75-05338 5C

YALE UNIV., NEW HAVEN, CONN. DEPT. OF GEOLOGY AND GEOPHYSICS.
Dispersion of Dredge Spoil Dumped in Near-Shore Waters, W75-05167 5B

YORKTOWN SCHOOL SYSTEM, YORKTOWN HEIGHTS, N.Y.
Land Use and Zoning, Septic Effluents and the Responsibility for Adequate Control, W75-05045 5G

ACCESSION NUMBER INDEX

W75-04851 2L
W75-04852 4A
W75-04853 4A
W75-04854 4A
W75-04855 4A
W75-04856 4A
W75-04857 5G
W75-04858 4A
W75-04859 8B
W75-04860 8B
W75-04861 3B
W75-04862 4A
W75-04863 5D
W75-04864 8A
W75-04865 6G
W75-04866 6G
W75-04867 6A
W75-04868 5D
W75-04869 5E
W75-04870 5A
W75-04871 5D
W75-04872 5D
W75-04873 3F
W75-04874 7C
W75-04875 2L
W75-04876 4A
W75-04877 3F
W75-04878 5D
W75-04879 5D
W75-04880 5G
W75-04881 4A
W75-04882 7C
W75-04883 4B
W75-04884 2C
W75-04885 3F
W75-04886 2J
W75-04887 2K
W75-04888 5A
W75-04889 2J
W75-04890 5A
W75-04891 5C
W75-04892 5C
W75-04893 5C
W75-04894 5C
W75-04895 5C
W75-04896 5C
W75-04897 5C
W75-04898 5C
W75-04899 5C
W75-04900 5C
W75-04901 5C
W75-04902 5C
W75-04903 5C
W75-04904 5C
W75-04905 5C
W75-04906 5C
W75-04907 2I
W75-04908 5C
W75-04909 5C
W75-04910 5C
W75-04911 2H
W75-04912 2H
W75-04913 6B
W75-04914 2D
W75-04915 2D
W75-04916 2D
W75-04917 2C
W75-04918 2G
W75-04919 2G
W75-04920 4A
W75-04921 2E
W75-04922 5A
W75-04923 2G
W75-04924 2A
W75-04925 2A
W75-04926 4C
W75-04927 2J
W75-04928 4C
W75-04929 4A
W75-04930 2B
W75-04931 2B
W75-04932 2B
W75-04933 5B
W75-04934 5C
W75-04935 5C
W75-04936 5C
W75-04937 9D
W75-04938 5B
W75-04939 4A
W75-04940 5F
W75-04941 5D
W75-04942 5D
W75-04943 5B
W75-04944 5D
W75-04945 5D
W75-04946 6G
W75-04947 5D
W75-04948 5B
W75-04949 5G
W75-04950 5G
W75-04951 5D
W75-04952 5G
W75-04953 5D
W75-04954 5D
W75-04955 5D
W75-04956 3E
W75-04957 5G
W75-04958 5D
W75-04959 5D
W75-04960 5D
W75-04961 5D
W75-04962 5D
W75-04963 5D
W75-04964 5D
W75-04965 5G
W75-04966 5D
W75-04967 5A
W75-04968 5D
W75-04969 5E
W75-04970 1B
W75-04971 10D
W75-04972 5A
W75-04973 5D
W75-04974 5D
W75-04975 5D
W75-04976 5D
W75-04977 5G
W75-04978 5D
W75-04979 5F
W75-04980 5C
W75-04981 5D
W75-04982 5D
W75-04983 5D
W75-04984 5D
W75-04985 5D
W75-04986 5D
W75-04987 5D
W75-04988 5D
W75-04989 3A
W75-04990 5D
W75-04991 5D
W75-04992 5D
W75-04993 5D
W75-04994 5A
W75-04995 5G
W75-04996 2H
W75-04997 5B
W75-04998 4C
W75-04999 5B
W75-05000 5D
W75-05001 5C
W75-05002 5A
W75-05003 5C
W75-05004 5C
W75-05005 5C
W75-05006 5C
W75-05007 5C
W75-05008 5C
W75-05009 5C
W75-05010 5C
W75-05011 5C
W75-05012 5C
W75-05013 5C
W75-05014 5C
W75-05015 5C
W75-05016 8I
W75-05017 8I
W75-05018 8I
W75-05019 5C
W75-05020 5C
W75-05021 8I
W75-05022 3E
W75-05023 3E
W75-05024 8I
W75-05025 8I
W75-05026 2L
W75-05027 8I
W75-05028 8I
W75-05029 8I
W75-05030 8I
W75-05031 8I
W75-05032 5C
W75-05033 3E
W75-05034 5C
W75-05035 5B
W75-05036 5B
W75-05037 5C
W75-05038 5C
W75-05039 5C
W75-05040 5G
W75-05041 5G
W75-05042 5G
W75-05043 5C
W75-05044 5G
W75-05045 5G
W75-05046 5C
W75-05047 5A
W75-05048 5A
W75-05049 5A
W75-05050 5C
W75-05051 5C
W75-05051 5C
W75-05052 5G
W75-05053 5C
W75-05054 5C
W75-05055 5C
W75-05056 3F
W75-05057 5C
W75-05058 4A
W75-05059 5C
W75-05060 5G
W75-05061 7B
W75-05062 5C
W75-05063 5C
W75-05064 5C
W75-05065 5B
W75-05066 5C
W75-05067 5C
W75-05068 5G
W75-05069 6B
W75-05070 5G
W75-05071 5D
W75-05072 5A
W75-05073 3F
W75-05074 5G
W75-05075 5B
W75-05076 5G
W75-05077 5G
W75-05078 5D
W75-05079 5C
W75-05080 5D
W75-05081 5B
W75-05082 5C
W75-05083 5B
W75-05084 10B
W75-05085 5A
W75-05086 5D
W75-05086 5D
W75-05087 5A
W75-05088 5A
W75-05089 5D
W75-05090 5G
W75-05091 5G
W75-05092 5B
W75-05093 5G
W75-05094 2H
W75-05095 4A
W75-05096 7C
W75-05097 2B
W75-05098 5A
W75-05099 5A
W75-05100 5G
W75-05101 2B
W75-05102 2H
W75-05103 7C
W75-05104 7C
W75-05105 2B
W75-05106 5B
W75-05107 7B
W75-05108 2A
W75-05109 2A
W75-05110 7B
W75-05111 3B
W75-05112 5B
W75-05113 8B
W75-05114 5B
W75-05115 5B
W75-05116 2F
W75-05117 8D
W75-05118 3B
W75-05119 5A
W75-05120 5A
W75-05121 3B
W75-05122 3B
W75-05123 7B
W75-05124 7B
W75-05125 7B
W75-05126 2L
W75-05127 3B
W75-05128 5G
W75-05129 7C
W75-05130 4A
W75-05131 2A
W75-05132 7B
W75-05133 3F
W75-05134 7C
W75-05135 4A
W75-05136 2E
W75-05137 2E
W75-05138 2C
W75-05139 2C
W75-05140 2C
W75-05141 2C
W75-05142 2C
W75-05143 2C
W75-05144 2C
W75-05145 2C
W75-05146 2C
W75-05147 2C
W75-05148 2C
W75-05149 2C
W75-05150 2C
W75-05151 2F
W75-05152 2F
W75-05153 10C
W75-05154 10B
W75-05155 5B
W75-05156 8B
W75-05157 5A
W75-05158 2B
W75-05159 5A
W75-05160 8B

W75-05161 1B
W75-05162 5A
W75-05163 2F
W75-05164 8I
W75-05165 2A
W75-05166 2B
W75-05167 5B
W75-05168 2J
W75-05169 1B
W75-05170 2C
W75-05171 8B
W75-05172 4C
W75-05173 2B
W75-05174 6G
W75-05175 2F
W75-05176 5A
W75-05177 5C
W75-05178 2J
W75-05178 2J
W75-05179 3B
W75-05180 2G
W75-05181 2G
W75-05182 4B
W75-05183 5C
W75-05184 5A
W75-05185 5A
W75-05186 5B
W75-05187 5B
W75-05188 2E
W75-05189 2A
W75-05190 5A
W75-05191 5B
W75-05192 2J
W75-05193 8B
W75-05194 8B
W75-05195 2J
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W75-05198 2J
W75-05199 2J
W75-05200 4A
W75-05201 8B
W75-05202 8B
W75-05203 8B
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W75-05206 8B
W75-05207 8B
W75-05208 8B
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W75-05210 8B
W75-05211 4D
W75-05212 4D
W75-05213 8A
W75-05214 8B
W75-05215 8B
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W75-05219 8B
W75-05220 8B
W75-05221 8B
W75-05222 2J
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W75-05252 8B
W75-05253 2J
W75-05254 8B
W75-05255 2J
W75-05256 2J
W75-05257 2J
W75-05258 8B
W75-05259 2J
W75-05260 3F
W75-05261 6B
W75-05262 2E
W75-05263 4B
W75-05264 5D
W75-05265 2I
W75-05266 9D
W75-05267 5D
W75-05268 5D
W75-05269 5D
W75-05270 5F
W75-05271 2A
W75-05272 5C
W75-05273 5B
W75-05274 5A
W75-05275 5A
W75-05276 3E
W75-05277 5B
W75-05278 5A
W75-05279 5A
W75-05280 5A
W75-05281 5A
W75-05282 5A
W75-05283 5A
W75-05284 5A
W75-05285 5A
W75-05286 5A
W75-05287 5A
W75-05288 5A
W75-05289 5A
W75-05290 5C
W75-05291 5A
W75-05292 5B
W75-05293 5B
W75-05294 5B
W75-05295 5B
W75-05296 5B
W75-05297 5B
W75-05298 5G
W75-05299 5G
W75-05300 5G
W75-05301 6B
W75-05302 10A
W75-05303 10A
W75-05304 5A
W75-05305 3F
W75-05306 5B
W75-05307 3F
W75-05308 2J
W75-05309 6B
W75-05310 5G
W75-05311 5G
W75-05312 5G
W75-05313 6G
W75-05314 6G
W75-05315 6A
W75-05316 6A
W75-05317 6A
W75-05318 6A
W75-05319 6A
W75-05320 6A
W75-05321 6A
W75-05322 5D
W75-05323 5B
W75-05324 5F
W75-05325 5D
W75-05326 5D
W75-05327 5D
W75-05328 5D
W75-05329 5D
W75-05330 5F
W75-05331 5D
W75-05332 5D
W75-05333 5A
W75-05334 8I
W75-05335 5D
W75-05336 5C
W75-05337 5C
W75-05338 5C
W75-05339 2F
W75-05340 5A
W75-05341 5A
W75-05342 5C
W75-05343 5A
W75-05344 5C
W75-05345 5C
W75-05346 5C
W75-05347 5D
W75-05348 5D
W75-05349 2B
W75-05350 5A

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-05342--05350	9
Cornell University, Policy Models for Water Resources Systems	W75-05315--05322	8
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-04856 04977--04979 04981--04995 04997--05000 05323--05333 05335	35
Illinois State Water Survey, Hydrology	W75-04914--04928 05091--05093 05095--05101 05103--05163 05165--05171 05176--05182 05184--05259 05339	177
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-04940--04976 05340--05341	39
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-04851--04855	5
University of Wisconsin, Eutrophication	W75-04891--04906 04908--04913 05016--05019 05021--05055 05057--05058 05060 05062--05064 05066--05067 05337--05338	71

SOURCE	ACCESSION NUMBER	TOTAL
B. STATE WATER RESOURCES RESEARCH INSTITUTES		
Alabama Water Resources Research Institute	W75-05264--05265	2
Arizona Water Resources Research Center	W75-05302--05303	2
California Water Resources Center	W75-05266	1
Colorado Environmental Resources Center	W75-05260	1
Connecticut Institute of Water Resources	W75-05304	1
Georgia Environmental Resources Center	W75-05267--05271	5
Illinois Water Resources Center	W75-04933	1
Indiana Water Resources Research Center	W75-05172--05173 05305	3
Kansas Water Resources Research Institute	W75-04934	
Maryland Water Resources Research Center	W75-04935, 05174 05272	
Missouri Water Resources Research Center	W75-05175	
New Hampshire Water Resources Research Center	W75-05306	
New Jersey Water Resources Research Institute	W75-05273	
New York Water Resources and Marine Sciences Center	W75-04936	

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
B. STATE WATER RESOURCES RESEARCH INSTITUTE (Continued)		
North Carolina Water Resources Research Institute	W75-04937	1
Pennsylvania Institute for Research on Land and Water Resources	W75-05274--05275	2
South Dakota Water Resources Institute	W75-04938	1
Utah Center for Water Resources Research	W75-04939	1
Washington Water Research Center	W75-05307	1
C. OTHER		
BioSciences Information Service	W75-04857, 04873 04877, 04885 04907, 04980 04996, 05020 05056, 05059 05061, 05065 05073, 05094 05102 05164, 05183 05276, 05334 05336	20
Effects of Pollutants on Aquatic Life (Katz)	W75-05001--05015	15
Engineering Aspects of Urban Water Resources (Poertner)	W75-04858--04869	12
Environmental Protection Agency	W75-05068--05072 05074--05090 05308--05314	29

SOURCE	ACCESSION NUMBER	TOTAL
C. OTHER (Continued)		
Environment Canada	W75-04870--04872 04874--04876 04878--04884 04886--04890	18
Office of Water Research and Technology	W75-04929--04932 05261--05263	7
Vanderbilt University, Metals Pollution	W75-05277--05301	25

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

8 ENGINEERING WORKS

9 MANPOWER, GRANTS, AND FACILITIES

10 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 11
JUNE 1, 1975

W75-05351 -- W75-05850

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

THERMODYNAMIC STUDIES OF THE EFFECTS OF SOLVENTS ON MOLECULAR COMPLEX FORMATION EQUILIBRIA; ORIENTATION OF WATER AROUND NONPOLAR SOLUTES IN AQUEOUS SOLUTIONS,
Oklahoma Univ., Norman. Graduate Coll.
K. O. Yeo.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 157, $5.75 in paper copy, $2.25 in microfiche. Ph. D. Dissertation, 1973. 117 p, 15 fig, 9 tab, 154 ref, 2 append. OWRT A-046-OKLA(1), 14-31-0001-3836.

Descriptors: *Thermodynamics, Solutes, Nonpolarity, *Solvents, Reactions, *Molecular structure, *Analog models, *Aqueous solutions, Free energy.
Identifiers: Prigogine cell model theory, *Nonpolar analog models.

The effect of solvents on electron-donor-acceptor complex formation reactions has been studied thermodynamically. The nonpolar analog model (NPA) is examined theoretically and methods are developed for using it to predict thermodynamic properties of the transfer of donor, acceptor, complex molecules from the gas phase into dilute solutions in nonpolar solvents. Thermodynamic results calculated by using the NPA model, in conjunction with solubility parameter theory and the Prigogine refined average-potential cell model theory, are compared with experimental results for polar components involved in several molecular complex formation equilibria. For individual solutes, including complexes, calculated and experimental free energies of transfer into hexadecane, diphenylmethane, heptane, cyclohexane, carbontetrachloride, and benzene generally agree to within 0.1 to 0.7 Kcal/mole. Application of the nonpolar analog model has been made for the prediction of solvent effects on molecular complex formation constants.
W75-05447

2. WATER CYCLE

2A. General

THE ANALYSIS OF MONTHLY HYDROLOGIC TIME SERIES,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-05436

MODELING INFLOWS INTO STRATIFIED LAKES WITH VERTICAL SCALE DISTORTION,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 2H.
W75-05448

INVESTIGATION OF ARTIFICIAL LAKE DESTRATIFICATION -- A HYDRAULIC MODEL STUDY,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 2H.
W75-05449

INVESTIGATION AND VERIFICATION OF A MODEL FOR THE DISPERSION COEFFICIENT TENSOR IN FLOW THROUGH ANISOTROPIC, HOMOGENEOUS, POROUS MEDIA WITH APPLICATION TO FLOW FROM A RECHARGE WELL THROUGH A CONFINED AQUIFER,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 2F.
W75-05458

AN EVALUATION OF THE THEORY OF GROUND-WATER AND RIVER-WATER INTERCHANGE, WINNEMUCCA REACH OF THE HUMBOLDT RIVER, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
R. L. Cooley, and J. A. Westphal.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 172, $4.75 in paper copy, $2.25 in microfiche. Technical Report Series H-W, Hydrology and Water Resources Publication No. 19, April 1974. 74 p, 45 fig, 9 tab, 43 ref. OWRT B-065-NEV(1). 14-31-0001-3911.

Descriptors: *Model studies, Tritium, *Nevada, Evaluation, *Surface-groundwater relationships, Simulation analysis, *Water transfer, Water level fluctuations, Flow, Equations.
Identifiers: *Humboldt River(Nev), Boussinesq equation, *Groundwater-river water interchange.

The objective was to determine whether or not the available data and basic theory are adequate for description of the interrelationships between ground water and surface water in a selected real system. The study was divided into three stages: (1) review of the literature to determine the processes involved; (2) comparison of models which could simulate the water transfer process; and (3) application of a selected model to a real system. The results of the first two stages indicate that good accuracy could be achieved through use of the generalized Boussinesq equation in conjunction with a flow equation which applies for flow under the channel and which incorporates a term accounting for water transfer. The theoretical effects of unsaturated flow were negligible. To simulate the interrelationships between the Humboldt River and ground-water flow in contiguous sediments, the fluctuations of river stage from its fall and early winter 1962 level was routed empirically along the study reach using data from February 1962 through October 1962. The conclusion of this phase of the study is that the model reproduced most of the essential characteristics of the water-level fluctuations in wells in the study area. Constant permeability and constant evapotranspiration of the flood plain were adequate for the simulation, although allowing them to vary would have improved the results. Use of environmental tritium aided in establishment of the transfer process but could not be used quantitatively. (Fallon-Nevada)
W75-05529

PROBABILISTIC MODEL OF RARE HYDROLOGIC EVENTS,
Arizona Univ., Tucson. Dept. of Watershed Management.
M. M. Fogel, J. L. Thames, and L. Duckstein.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 290, $3.25 in paper copy; $2.25 in microfiche. Paper presented at Annual Meeting, American Society of Agricultural Engineers, Stillwater, Oklahoma, June 23-26, 1974. 13 p, 5 fig, 17 ref. OWRT B-032-ARIZ(8). 14-31-0001-3858.

Descriptors: *Watershed management, *Decision making, Optimization, Mathematical models, Stochastic processes, Simulation analysis, Systems analysis, *Model studies, Probability, Methodology, *Frequency analysis, *Distribution patterns, *Arizona, Peak discharges, Storms, *Rainfall-runoff relationships.
Identifiers: *Probability models.

A methodology is presented for analyzing the frequency of rare hydrologic events. Two cases illustrate the procedure in which a previously developed event-based probability model is used. In the first instance, a frequency distribution was derived for the seldom-occurring tropical storms that pass through Arizona. Occurring on the average less than once every two years, these storms have produced record rainfall amounts. A technique for defining such storms from readily available National Weather Service climatological data was used to obtain a parameter value for the Poisson distribution describing the number of events per time interval. The maximal distribution of storm rainfall amount, from which the return periods are readily calculated, was obtained from the Poisson distribution and a gamma distribution fitted to the data of storm rainfall depths from 10 National Weather Service Stations. The selected stations were sufficiently far apart from each other that independence was assumed. For the second example, a distribution for peak discharges was derived with the assumption that storm depths and storm durations for the air mass (non-frontal) type of thunderstorm were unrelated random variables. The distribution was obtained by using the Soil Conservation Service method for estimating runoff from rainfall in a probabilistic formulation.
W75-05766

THE MICROCLIMATES OF THE ARCTIC TUNDRA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W75-05830

2B. Precipitation

A PROPOSED RAINOUT HAZARD MODEL FOR SYSTEMS ANALYSIS STUDIES,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W75-05388

OPTIMUM DESIGN OF MOUNTAINOUS RAINGAGE NETWORKS USING BAYESIAN DECISION THEORY,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. R. Davis, C. C. Kisiel, and L. Duckstein.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol), Geneva, Switzerland, p 416-420, 1973. 10 ref. OWRT C-3259 (No 3708) (4).

Descriptors: *Computer models, *Algorithms, *Network design, Precipitation(Atmospheric), Watershed management, Thunderstorms, Mountains, Rainfall, Rain gages, Management.
Identifiers: Bayesian decision theory.

The problem of spacing raingages along the slope of a mountain for managerial uses of the data was examined. As altitude increases, precipitation amount and the costs associated with raingages increase; on the other hand, the catchment area may decrease. These factors along with a loss function supplied by the managerial problem were incorporated into a Bayesian Decision Theory framework in order to study the following problems: 1) the effect of uncertainty in the parameters of the rainfall model, due to limited data, on the raingage network design; and 2) the value of adding or removing one gage from a set. This conceptual framework was described. (Sims-ISWS)
W75-05524

A FORTRAN IV COMPUTER PROGRAM TO TABULATE AND GRAPH MICRO-CLIMATIC DATA,
Illinois Univ., Urbana. Dept. of Forestry.
For primary bibliographic entry see Field 7C.
W75-05671

A CLIMATIC MODEL OF URBAN ENERGY BUDGETS,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 4C.
W75-05683

TABLES AND CONVERSIONS FOR MICROCLIMATOLOGY,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 7C.
W75-05717

TECHNIQUES FOR DETERMINING AMOUNTS AND DISTRIBUTION OF PRECIPITATION IN MOUNTAIN VALLEYS OF IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
E. W. Trihey.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 479, $3.75 in paper copy, $2.25 in microfiche. Termination Report, Open File Series, No. 203, June 1974. 39 p, 16 fig, 4 tab, 13 ref, 2 append. OWRR A-034-IDA(2). 14-01-001-3512.

Descriptors: Instrumentation, *Precipitation gages, *Idaho, Mountains, Valleys, River basins, *Distribution patterns, Measurement, Precipitation(Atmospheric).
Identifiers: Semi-arid mountain valleys, *Raft River Basin(Ida), *Precipitation distribution.

The Raft River Basin in southcentral Idaho was studied to develop techniques for determining precipitation distribution in semi-arid mountain valleys. Due to the frequency of gage malfunctions early in the study, a credible data base could not be obtained, and many of the analytical methods, envisioned as providing for a better utilization of precipitation data, were not tested. However, several techniques are presented which possess considerable utility to those interested in establishing reconnaissance type precipitation networks. The low-profile, ground-level gages developed are considered reliable and capable of measuring annual true-ground precipitation.
W75-05783

THE MICROCLIMATES OF THE ARCTIC TUNDRA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W75-05830

COMBINED USE OF SATELLITE, RADAR, AND AEROSYNOPTIC INFORMATION FOR FORECASTING HEAVY PRECIPITATION, TAKING THE SNOWFALL OF OCTOBER 14-16, 1971, IN THE CENTRAL REGION OF THE EUROPEAN USSR AS AN EXAMPLE,
N. I. Glushkova, G. G. Gromova, and V. F. Lapcheva.
Soviet Hydrology, Selected Papers No 4, p 317-322, 1973, 3 fig, 1 tab, 4 ref. Translated from Transactions of the Hydrometeorological Scientific Center of the USSR (Trudy GMTs), No 116, p 53-60, 1973.

Descriptors: *Probable maximum precipitation, *Forecasting, Snowfall, Radar, Satellites(Artificial), Precipitation gages, *Synoptic analysis, Clouds, Remote sensing, Aerial photography.
Identifiers: Vertical motions, *European USSR.

A study of satellite photographs, radar echo distribution, and synoptic weather was made of the heavy precipitation on October 14-16, 1971. The following preliminary conclusions were made: (1)The occurrence of particularly dangerous precipitation is associated with upper frontal zones and the thermodynamic instability of the air mass in the frontal system. (2)If thick and intense (according to radar data) cumulus clouds, large horizontal temperature gradients (3-4C/150 km at the 850-mb level), and ascending vertical motions are observed in a deformed cloud system 200-400 km wide (according to satellite photographs), a further intensification of the process must be expected. The maximum intensity of the process is observed near the top of the warm sector of a cyclone, where instability and humidity are maximal and the condensation level is low. (3)The appearance of descending motions must indicate that the process is weakening. (4)The maximum probable precipitation can be computed. (5)Radar data on clouds and phenomena should be entered on satellite photographs to determine the intensity of the process. (Jones-ISWS)
W75-05841

RADIOMETRIC MEASUREMENTS OF STRATOSPHERIC WATER VAPOR IN THE SOUTHERN HEMISPHERE,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
P. Hyson, and C. M. R. Platt.
Journal of Geophysical Research, Vol 79, No 33, p 5001-5005, November 20, 1974. 8 fig, 11 ref.

Descriptors: *Water vapor, *Balloons, Instrumentation, Humidity, *Australia, Measurement, Precipitation(Atmospheric), Infrared radiation.
Identifiers: *Radiometry, *Southern hemisphere(Aust), Stratosphere, Humidity mixing ratio, Golay cell.

An infrared radiometer was developed for measurement of water vapor content in the stratosphere. The instrument observes atmospheric emission in the strong water vapor rotational lines beyond 40-micrometers wavelength and at two zenith angles of 45 and 70 degrees. The method automatically compensates for instrumental gain change. A Golay cell was used as detector, and the instrument was flown on balloons to a maximum altitude of 27 km. Results obtained over Australia indicated a dry lower stratosphere with water vapor values in the 1-3 ppm range and a mean value of 2.1 ppm at 20 km, but on one occasion a wet layer (Approximately 6 ppm) was observed near 20-km altitude. (Jones-ISWS)
W75-05844

RANDOM AND SYSTEMATIC ERRORS IN PRECIPITATION AT AN EXPOSED SITE,
Waikato Valley Authority, Hamilton (New Zealand).
K. R. Dreaver, and P. Hutchinson.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 54-63, 1974. 3 fig, 4 tab, 13 ref, append.

Descriptors: *Precipitation(Atmospheric), *Rain gages, Winds, Fog, Statistical methods, Measurement, Meteorological data.
Identifiers: *Systematic errors, *Random errors, Standard deviation, Catch deficiency, *New Zealand(Otago).

The result of an experiment to determine the random and systematic errors in precipitation measurement at an exposed site in coastal Otago was recorded. Random errors of up to + or -10 percent can occur with standard gages, but these are reduced to + or -4 percent if ground-level gages are used. The most important factors affecting the systematic errors are wind speed and the height of the gage rim above ground. An exposed rainfall station should consist of a ground-level gage, a standard gage, a gage at a suitable height above ground, fitted with an Alter shield and a cup-counter anemometer. (Jones-ISWS)
W75-05845

2C. Snow, Ice, and Frost

TRACE METAL ASSOCIATIONS IN SUB-ARCTIC FJORD ENVIRONMENTS, PROGRESS REPORT MAY 1972-MARCH 1974,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W75-05403

THERMAL CONDUCTIVITY OF A FROZEN HUBBARD LOAMY SANDY,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2G.
W75-05442

RECURRENT GEOTHERMALLY INDUCED DEBRIS AVALANCHES ON BOULDER GLACIER, MOUNT BAKER, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2J.
W75-05624

THE MEASUREMENT OF VERTICAL STRAIN IN GLACIER BORE HOLES,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 7B.
W75-05674

FROUDE CRITERION FOR ICE-BLOCK STABILITY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
G. D. Ashton.
Journal of Glaciology, Vol 13, No 68, p 307-313, 1974. 4 fig, 8 ref.

Descriptors: *Ice, *Ice cover, *Stability, *Mathematical studies, Floating, Rivers, Streams, Froude number, Dimensional analysis, Ice jams, Analytical techniques.
Identifiers: *Ice-block stability.

The conditions under which a floating fragment of ice is either entrained under the up-stream edge of a down-stream ice cover or accumulated up-stream were examined by means of dimensional analysis and a simplified analysis of the moments acting on an idealized ice fragment. The significant parameter descriptive of the critical conditions were found to be a Froude number based on block thickness. The influence of the ratio of thickness to flow depth was shown to be due to the effect of the block constricting the flow cross-section, thus amplifying the velocity in accordance with simple continuity. Under-turning instability occurs at a lower critical velocity than required for vertical submergence. Comparison of experimental data with the theoretical results showed good agreement and demonstrated the vital dependence on fragment thickness as well as providing a criterion readily applicable to special flow conditions where a Froude number based on flow depth is illogical. (Humphreys-ISWS)
W75-05677

GLACIAL HISTORY OF KOLAHOI GLACIER, KASHMIR, INDIA,
Aligarh Muslim Univ., (India). Dept. of Geology.
N. Ahmad, and N. H. Hashimi.
Journal of Glaciology, Vol 13, No 68, p 279-283, 1974. 3 fig, 6 ref.

Descriptors: *Glaciers, *Glacial drift, *Glaciology, Glaciation, Ablation, Movement, Geomorphology, Pleistocene epoch, History.
Identifiers: *India(Kashmir), *Kolahoi Glacier(India).

Kolahoi Glacier is one of the longest glaciers in Kashmir and in the past it extended for at least 35 km. In the Pleistocene there were three advances of Kolahoi Glacier and the last one of them was a major advance when the glacier extended as far as Pahalgam. (Humphreys-ISWS)
W75-05678

SUSPENDED-SEDIMENT TRANSPORT RELATIONSHIPS FOR FOUR ALASKAN GLACIER STREAMS,
Alaska Univ., College. Dept. of Geohydrology.
For primary bibliographic entry see Field 2J.
W75-05762

A TIME-SPACE TECHNIQUE TO ANALYZE SNOWPACKS IN AND ADJACENT TO OPENINGS IN THE FOREST,
Arizona Univ., Tucson, Dept. of Watershed Management.
For primary bibliographic entry see Field 4A.
W75-05764

THE MICROCLIMATES OF THE ARCTIC TUNDRA,
Alaska Univ., College. Geophysical Inst.
G. Weller, and B. Holmgren.
Journal of Applied Meteorology, Vol 13, No 8, p 854-862, December 1974. 7 fig, 5 tab, 16 ref. NSF Grant GV-29342.

Descriptors: *Microclimatology, *Alaska, *Arctic, *Tundra, Radiation, Precipitation(Atmospheric), Instrumentation, Snow cover, Albedo, Solar radiation, Heat flow, Clouds, Turbulence, Eddies, Heat balance, Moisture, Melting, Evaporation, Thermal properties, Air temperature, Profiles, Winds.
Identifiers: Inversions, Atmospheric stability, Insolation.

The microclimates of the arctic tundar at Barrow, Alaska, were described for the near-surface terrestrial layers in which most biological activities take place. Temperature profiles were constructed from detailed measurements in the air, vegetation, and soil, from 16 m above to 6 m below the tundra surface. Wind and radiation measurements supplement these data. Considering the tundra as a two-dimensional heat exchange surface, daily components of the heat balance were computed and summarized for a number of periods throughout the year, which are characterized by changes of the physical nature of the tundra surface such as appearance and disappearance of snow, meltwater and precipitation, and growth and decay of vegetation. Through changes in surface terrain parameters such as albedo and roughness length, and availability of water for phase changes, the thermal and moisture regimes of the near-surface layer change markedly during these periods as reflected by the heat balance. (Jones-ISWS)
W75-05830

CHARACTERISTICS OF THE WINTER HYDROMETEOROLOGICAL REGIME OF DRAINED MINERAL SOILS,
For primary bibliographic entry see Field 2G.
W75-05833

USE OF TIME-LAPSE PHOTOGRAPHY TO ASSESS POTENTIAL INTERCEPTION IN ARIZONA PONDEROSA PINE,
Arizona Univ., Tucson. Dept. of Watershed Management.
L. C. Tennyson, P. F. Ffolliott, and D. B. Thorud.
Water Resources Bulletin, Vol 10, No 6, p 1246-1254, December 1974. 3 fig, 16 ref.

Descriptors: *Ponderosa pine trees, *Time series analysis, *Snowfall, Canopy, *Interception, Snow, Cameras, *Photography, *Arizona, Water yield.
Identifiers: Snow accumulation, *Time-laysse photography.

The behavior of intercepted snow on a stand of uneven-aged ponderosa pine in eastcentral Arizona was evaluated with the use of a super 8-mm time lapse movie camera to determine the relative significance of snowfall interception in the water yield of this type forest. A snow load index (Ratio of forest canopy area covered with snow to total canopy area) was developed to estimate interception storage for two trees in the field of view for discrete time periods. The snow load index, photographs, and climatic data were combined to describe accumulation and to identify and rank according to relative magnitudes the basic processes of canopy snow removal. The rate of snow accumulation was nonlinear with initial storage being rapid, then slowing with time. Most of the intercepted snow eventually reached stemflow and dripping of meltwater, and was therefore not considered a significant loss to the water budget on site. Some water was apparently disposed of by the evaporation of meltwater and sublimation of canopy snow, but these losses appeared to be comparatively minor. (Roberts-ISWS)
W75-05834

EFFECT OF THE ICE CONTENT, TEMPERATURE, CEMENTATION, AND FREEZING DEPTH OF THE SOIL ON MELTWATER INFILTRATION IN A BASIN,
For primary bibliographic entry see Field 2G.
W75-05836

2D. Evaporation and Transpiration

TRANSPIRATION DRYING OF SANITARY LANDFILLS,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W75-05523

ENVIRONMENTAL CONTROLS ON GROUNDWATER CHEMISTRY IN NEW MEXICO. I. THE EFFECT OF PHREATOPHYTES,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
R. L. Naff, A. A. Baker, and G. W. Gross.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 190, $5.25 in paper copy, $2.25 in microfiche. New Mexico Water Resources Research Institute, Las Couces, Report 052, February 1975, 10 p, 17 fig, 1 tab, 18 ref, 4 append. OWRT A-030-NMEX(1).

Descriptors: *Phreatophytes, *Evapotranspiration, *Salinity, *Consumptive use, *Rio Grande River, Pizometers, Groundwater, Chemical analysis, Water quality, *New Mexico, Flood plains.
Identifiers: Time-variant behavior, Populus wesl-izeni.

The relationships between phreatophyte-induced evapotranspiration, water level fluctuations, and changes in groundwater quality were investigated with arrays of nested piexometers installed on the Rio Grande flood plain. Consumptive use was computed from continuous water level records. The best correlation was found between consumptive use and averaged maximum daily temperature, while a lack of direct recharge from precipitation at the site was indicated. The absence of a dominant salinity stratification in either space or time was the salient feature of the specific-conductance data. A strong seasonal cyclic variation was observed which showed a strong inverse correlation with water table fluctuations caused by evapotranspiration. This is in agreement with a salinity mechanism of temporary 'deposition' of salts in and above the capillary fringe during the growing season, ascribed to the transpiring phreatophytes, and 'dissolution' of these salts in the fall and early winter as the phreatic surface rises. It is postulated that evapotranspiration causes fluctuations of the vertical hydraulic gradient which are responsible for the mixing and a weak diurnal cycle of specific groundwater conductance. (Hain-New Mexico State)
W75-05531

EVAPORATIVE WATER LOSS FROM LARGE LAND AREAS IN THE FINGER LAKES,
Cornell Univ., Ithaca, N.Y. Dept. of Structural Engineering.
W. H. Brutsaert.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 170, $3.25 in paper copy, $2.25 in microfiche. Technical Report No 86, Cornell University Water Resources and Marine Sciences Center, Ithaca, New York, September 1974. 5 p, 1 fig, 1 ref. OWRT A-036-NY(2).

Descriptors: *Evapotranspiration, Methodology, Meteorological data, Research, Projects, Regions, Monthly, *New York, Mass transfer, Evaporation pans.
Identifiers: *Finger Lakes(NY), Land areas, *Geostrophic drag, Rawinsonde data.

A method has been developed to calculate evapotranspiration on the basis of published Rawinsonde data. The theory is based on the application of the geostrophic drag concept to derive an analogous 'mass transfer' formula. The method was applied to the Finger Lakes Region; the results were found to be hightly correlated with pan evaporation data at Ithaca, New York.
W75-05532

EFFECT OF POTASSIUM CHLORIDE AND PHENYLMERCURIC ACETATE ON THE REGULATION OF STOMATAL OPENING AND WATER ECONOMY IN TEPHROSIA PURPUREA PERS,
Jodhpur Univ., (India). Dept. of Botany.
T. Mathur, and D. N. Sen.
Flora (Jena). Vol 162, No 3, p 180-190, 1973. Illus.
Identifiers: Leaves, Phenylmercuric acetate, Potassium chloride, *Stomatal opening, *Tephrosia-purpurea, *Transpiration, Water conservation(Plants), Spray treatment.

Investigations were carried out after the spray treatment with KC1, phenyl mercuric acetate (PMA) and water on the plants of T. purpurea with regard to the stomatal regulation and consequent water loss and total water content in leaves. They were examined at different durations after the above treatments. The KC1-treated plants lost much water as their stomata remained widely open. Less was lost in PMA and water-treated ones. The percentage of total moisture remained more in PMA-treated plants, when compared with water and KC1-treated ones, as these transpired far more water than the former.--Copyright 1974, Biological Abstracts, Inc.
W75-05538

DROUGHT ADAPTATION IN OPUNTIA BASILARIS: SIGNIFICANCE OF RECYCLING CARBON THROUGH CRASSULACEAN ACID METABOLISM,
California Univ., Riverside. Dept. of Biology.
For primary bibliographic entry see Field 2I.
W75-05547

A MODEL STUDY OF TRANSPIRATION FROM PLANT LEAVES,
Colorado Univ., Boulder. Dept. of Chemical Engineering.
F. Kreith, J. N. Cannon, and D. Naot.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 444, $3.25 in paper copy, $2.25 in microfiche. AIAA Paper No. 74-733/ASME Paper No. 74-HT-40.

Presented at Thermophysics and Heat Transfer Conference, Boston. July 1974. 18 p, 14 fig, 11 tab, 26 ref. OWRT B-099-COLO(1). NSF GK17184.

Descriptors: *Evapotranspiration, *Transpiration, Stomata, Mass transfer, Antitranspirants, Water consumption, Ecosystems, *Leaves, Heat transfer, *Model studies, Reynolds number.
Identifiers: *Turbulent penetration theory.

An analytical method is presented for determining the rate of evapotranspiration from broad leaves of plants from physical data such as relative humidity, solar insolation, size, number, and density of stomates, size of leaves, and external wind conditions. The analytical results are verified by experimental data obtained in an ecological wind tunnel with models of plant leaves shaped from flat, perforated plates. Some anamolies in the data at higher Reynolds number are explained by a novel turbulent penetration theory.
W75-05779

THE ESTIMATION OF SOIL MOISTURE DEFICITS BY PENMAN'S AND THORNTHWAITE'S METHOD IN MID CANTERBURY,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
P. D. Fitzgerald.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 32-40, 1974. 3 tab, 14 ref.

Descriptors: *Soil moisture, *Moisture deficit, *Evapotranspiration, Rainfall, Irrigation, Water requirements, *Estimating, Measurement, Methodology, Instrumentation, Computer programs, Evaporation.
Identifiers: *Penman method, *Thronthwaite method, *New Zealand, Fortran programs.

A comparison was made between soil moisture deficits measured gravimetrically and soil moisture deficits obtained by estimating daily losses by evapotranspiration combined with daily rainfall to determine estimated soil moisture deficits. The methods used to estimate evapotranspiration were Thornthwaite's method and a number of modifications of Penman's method. Comparisons were based on estimates of irrigation water requirements, and use of the methods for irrigation timing. A Fortran program as written for a digital computer to calculate 12 modifications of Penman's method. The Thornthwaite estimates were available from an earlier program. The climatic data were recorded at the Winchmore meteorological station. The results showed that the original Penman method, based on the calculation of open-water evaporation, was the best of the Penman modifications, and that the Thornthwaite method was slightly superior to this. (Roberts-ISWS)
W75-05831

AMOUNT OF WATER LOST BY TRANSPIRATION BY PLANT COMMUNITIES OF THE EASTERN PAMIR. (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Botanicheskii Institut.
N. N. Izmailova.
Ekologiya. Vol 5 No 1, p 95-97. 1974.

Descriptors: *Transpiration, Plant physiology.
Identifiers: Artemisia rhodantha, Eurotia ceratoides, Oxytropis immersa, Pamir, Sibbaldia tetrandra, Stipa glareosa, Stipa orientalis.

The seasonal dynamics of the amount of water lost by transpiration by plant communities of Eastern Pamir (USSR) usually reflects the picture of the dynamics of accumulation of the overground mass. The maximum water losses are observed in the flowering phase which occurs in the warmest part of the vegetation period. At this time, an intense increment of the annotinous parts of the plants is observed, and the transpiration rate increases. In the European winterfat (Eurotia ceratoides) and feather grass (Stipa glareosa, S. orientalis) communities, and also in the majority of cushion plant communities (Sibbal-dia tetrandra, Oxytropis immersa, etc.) this occurs in the 2nd half of July and in the wormwood (Artemisia rhodantha) communities in Aug. At the end of the vegetation season, the amount of water transpired by the communities decreases considerably (to 20-30% of the total water loss), which is related with a decrease of the transpiration rate and with fall of the green parts of the plants.–Copyright 1974, Biological Abstracts, Inc.
W75-05847

2E. Streamflow and Runoff

THE ANALYSIS OF MONTHLY HYDROLOGIC TIME SERIES,
Illinois Univ., Urbana. Dept. of Civil Engineering.
L. Torelli.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 179, $5.25 in paper copy, $2.25 in microfiche. Ph D. Thesis, 1973. 106 p, 18 fig, 7 tab, 8 ref. OWRT B-038-ILL(9).

Descriptors: *Time series analysis, *Streamflow, *Precipitation(Atmospheric), *Temperature, Statistical methods, Stochastic processes, Methodology, Model studies, Mathematical studies, Hydrologic data, Correlation analysis, Forecasting.

The following monthly hydrologic time series, were analyzed monthly average temperatures, monthly precipitations, and monthly streamflows. The processes are commonly used as a model because a vast body of theoretical knowledge concerning both the probability structure of such processes (e.g., spectral analysis, Wold theorem) and their statistics (e.g., correlogram, spectral estimates and relative distributions and properties) are available to the analyst. However, it is conceivable that a more general class of stochastic processes may be needed in order to provide a suitable model for monthly hydrologic time series. The methods are described. (Woodard-USGS)
W75-05436

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN NORTHERN NEVADA IN RELATION TO DAM SAFETY,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 8B.
W75-05468

SIMULATION OF STORM VELOCITY EFFECTS ON FLOW FROM DISTRIBUTED CHANNEL NETWORKS,
Nebraska Univ., Lincoln. Dept. of Computer Science.
A. J. Surkan.
Water Resources Research, Vol 10, No 6, p 1149-1160, December 1974. 15 fig, 1 tab, 6 ref. OWRT B-016-NEB (3).

Descriptors: *Simulation analysis, *Storm runoff, *Channels, *Velocity, Simulated rainfall, Computer models, Channel morphology, Networks, Flow system, Flood routing.
Identifiers: *Flow simulation, Binary tree model.

Programs were designed to perform computer simulation experiments on the effects of storms traveling over drainage networks. The system of programs makes it possible to simulate the response of any channel network to storms with boundaries that are numerically specified by line segments. The excess runoff response function of discrete approximations of spatially distributed networks may be simulated for storms with any velocity and initial position. Storms were modeled as polygons surrounding areas of uniform intensity. An average flow velocity for each segment of the network could be specified independently by an input vector of transit times associated with network nodes. The computer time taken for each simulation of storm travel depended on the number of calculations performed in determining which network segments were overlapped by the storm. Results included hydrographs simulated for both actual fixed storms and for moving test storms that travel with specified speeds and directions over a binary tree model of a natural watershed with an assumed constant average internal flow rate. (Terstriep-ISWS)
W75-05518

FORM AND FLUVIAL PROCESSES IN ALLUVIAL STREAM CHANNELS. STUDIES IN FLUVIAL GEOMORPHOLOGY NO. 2,
Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
E. A. Keller, and W. N. Melhorn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 189, $5.75 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center, Technical Report No. 47, December 1974. 124 p, 55 fig, 2 tab, 67 ref. OWRT A-022-IND(5).

Descriptors: *Channel morphology, *Meanders, *Streambeds, *Alluvial channels, Geomorphology, Rivers, Shape, Drainage patterns, Channels, Shoals, Dunes, Sand bars.
Identifiers: *Riffles, *Pools, Point bars, Bifurcation ratio, Drainage network.

Selected aspects of form and fluvial processes for alluvial channels are defined quantitatively and qualitatively. The fluvial system includes the drainage network, geology, and hydrology. In the evolution of the drainage basin network these become mutually adjusted. As the drainage network develops from the simple to the complex, the range of bifurcation ratios fluctuates until a nearly constant value is reached. In the formation process of pools and riffles in a stream, there appears to be a balance of the time rate of energy expenditure through the pool-riffle sequence, which allows channel length to increase until a minimum value of energy expenditure is reached. A five-stage model is proposed to explain the development of alluvial channels. The model is based upon channel morphology, channel morphometry, and qualitative conclusions from numerous field observations. Bed forms are classified to arrange the forms in a way tenable with known ideas, concepts, and processes which define and control alluvial stream channels. A tentative generic classification is suggested which permits hierarchical ranking of common bed forms in straight, sinuous and meandering alluvial channels.
W75-05526

DRAINAGE BASIN RESPONSE: DOCUMENTED HISTORICAL CHANGE AND THEORETICAL CONSIDERATIONS. STUDIES IN FLUVIAL GEOMORPHOLOGY. NO. 3,
Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
D. E. Edgar, and W. N. Melhorn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 188, $7.25 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center Technical Report No. 52, December 1974. 196 p, 33 fig, 19 tab, 92 ref. OWRT A-022-IND(6).

Descriptors: *Watersheds(Basins), *Geomorphology, Documentation, *Drainage Density, Sediment yield, Classification, Stream Channel morphology, *Indiana.
Identifiers: *Stream order, *Drainage net, Bifurcation ratio, River network, Indian Creek Watershed(Ind).

Archival materials dating from 1838 were examined in an attempt to document the historical

development of small drainage basins representative of Central Indiana. Owing to limitations in the available data sources, the study was confined to a comparison of five drainage basins in the Indian Creek Watershed, located approximately 6 miles west of West Lafayette, as mapped from 1938 and 1968 aerial photography. By using the Strahler ordering system in combination with other, more recently proposed classification schemes and quantitative parameters, morphometric adjustments in the study basin were determined. In general, fourth-order basins experienced small losses in the number of stream segments and decreased in textural complexity while maintaining approximately the same total length of channels within the basin. Fifth-order basins underwent significant increases in the number of segments and textural complexity, and a small average increase in total channel length. All basins showed only minor changes in length, bifurcation, and division ratios with most of the drainage adjustments occurring in the 'lost' or nonintegrated portions of the networks. Observed drainage changes were interpreted as resulting from fluctuations of climatic input, threshhold conditions, areal distribution of soil type and human activity through land use changes.
W75-05527

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tuscon. Graduate Committe on Hydrology.
W. L. Werrell.
M Sc thesis 1967. 85 p, 11 fig, 1 tab, 11 ref.

Descriptors: *Surface water, *Gaging stations, *Fluorescent dye, *Tracers, Tracking techniques, Dye dispersion, Southwest U.S., Arid climate, Stream gages.
Identifiers: Brilliant Pontecyl Pink B, Continuous injection.

The extremely short periods of flow, the scour-on-rise and fill-on-recession characteristics of sand-channel streams, the difficulty of making current-meter measurements, and the inaccessibility of stations that have no flood-warning system present serious difficulties in collecting surface water data in the Southwest U.S. and other arid or semi-arid regions. Stream gauging by fluorescent-dye (Brilliant Pontacyl Pink-B) tracer element injection and monitoring promises to overcome many of these difficulties. Although this approach is not new in principle, recent development in fluorometry and the development of new and less expensive fluorescent dyes warrant reappraisal of the method. Properties of the dye were examined by laboratory tests, and four field tests were conducted. Three of the tests allowed direct comparison between discharge computed by the dye-dilution method and discharge measured by a current meter; the maximum variation between the results of these tests was 11 per cent. The dye-dilution method may be used on streams in the Southwest U.S. for high-water measurements of flow above wading stage where no cableway is present or where no adjacent current-meter measurement section can be found. (Campbell-NWWA)
W75-05619

COMBINING ESTIMATES OF LOW-FLOW CHARACTERISTICS OF STREAMS IN MASSACHUSETTS AND RHODE ISLAND,
Geological Survey, Boston, Mass.
G. D. Tasker.
Available from the Superintendent of Documents, GPO, Washington, DC 20402, $3.15. Journal of Research of the US Geological Survey, Vol 3, No 1, p 107-112, January-February 1975. 3 fig, 1 tab, 5 ref.

Descriptors: *Base flow, *Low flow, *Massachusetts, *Rhode Island, Regression analysis, Average flow, Low-flow frequency.

The number of base-flow measurements needed to meet specified accuracy goals for estimating low-flow characteristics at ungaged sites can be reduced by combining an estimate based on a regression of base-flow measurements on discharges from a nearby continuous long-term gaging station with an estimate based on a regional relationship developed from regressing the low-flow characteristics on basin characteristics. The estimates should be combined by weighting each inversely with its variance from the true value. Empirically estimated values of variance of the estimated 7-day, 10-year low flow from its true value indicate that more than six or eight base-flow measurements add little to the confidence with which such an estimate is made. (Knapp-USGS)
W75-05629

ADJUSTMENT OF LOGARITHMIC FLOOD-FREQUENCY STATISTICS FOR GAGED CALIFORNIA STREAMS TO MINIMIZE THE TIME SAMPLING ERROR,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W75-05630

SUMMARY OF MULTISPECTRAL FLOOD INUNDATION MAPPING IN IOWA,
Iowa State Geological Survey, Iowa City.
For primary bibliographic entry see Field 7C.
W75-05639

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
For primary bibliographic entry see Field 4A.
W75-05640

DERIVATION OF HOMOGENEOUS STREAMFLOW RECORDS IN THE UPPER KENTUCKY RIVER BASIN, SOUTHEASTERN KENTUCKY,
Geological Survey, Louisville, Ky.
J. O. Shearman, and R. V. Swisshelm, Jr.
Open-file report, December 1973. 34 p, 17 fig, 2 tab, 4 ref.

Descriptors: *Streamflow forecasting, *Simulation analysis, *Mathematical models, *Kentucky, Low flow, Reservoirs, Routing, Reservoir operation.
Identifiers: *Kentucky River.

To provide increased knowledge of Kentucky River low-flow characteristics, digital computer programs were developed to route streamflow through reservoir and stream reach components of a stream system. Using these programs as submodels, with available observed data, a digital model of the Upper Kentucky River basin was developed. This model was used to simulate streamflow data for use in determining the low-flow characteristics at Lock 10 on the Kentucky River near Winchester, Kentucky, for 31 years of regulated conditions. Model inputs consisted of (1) reservoir operation criteria for an existing reservoir; and (2) observed streamflow data for 21 years of natural and 10 years of regulated conditions. These modeling techniques are also suitable for studying alternative streamflow regulation schemes and expanding networks of homogeneous streamflow data for regional analysis. (Knapp-USGS)
W75-05644

A MANUAL FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS ON UNGAGED STREAMS IN INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 4A.
W75-05645

LAKES MARION-MOULTRIE STREAM SYSTEM INVESTIGATION: PART I--MODEL SELECTION, CALIBRATION, AND ERROR ANALYSIS,
Geological Survey, Columbia, S.C.
H. H. Jeffcoat, M. E. Jennings, and J. B. Peterson.
Available from NTIS Springfield Va 22151 as PB-239 724, $3.75 in paper copy, $2.25 in microfiche. Water-Resources Investigations 25-74, October 1974. 54 p, 4 fig, 6 tab, 3 ref.

Descriptors: *Mathematical models, *Reservoirs, *South Carolina, Flood routing, Streamflow forecasting, Water level fluctuations, Hydroelectric power, Water yield.
Identifiers: *Lake Marion(S.C.), *Lake Moultrie(S.C.), *Santee River(S.C.).

A daily stream-reservoir model was applied to the Lakes Marion-Moultrie system located in the lower Santee River basin, South Carolina. Twelve hydrologic events, representing a range of streamflow magnitudes, were used to calibrate the model. The model is useful as a real-time forecasting tool for predicting Lakes Marion-Moultrie inflows and stages. An error-prediction method, based on probability concepts, was used to construct volume and elevation (Stage) error-frequency relations for both reservoirs. The relations allow rapid assessment of prediction errors. The model may be used for further studies associated with hydrologic simulation of the Lakes Marion-Moultrie system, particularly for hydropower studies. (Knapp-USGS)
W75-05646

FLOOD OF AUGUST 2, 1972, IN THE LITTEL MAQUOKETA RIVER BASIN, DUBUQUE COUNTY, IOWA,
Geological Survey, Iowa City, Iowa.
A. J. Heinitz.
Open-file report, September 1973. 28 p, 4 fig, 1 tab, 4 ref, append.

Descriptors: *Historic floods, *Iowa, Peak discharge, Rainfall-runoff relationships, Water levels, Basic data collections, Hydrologic data.
Identifiers: *Little Maquoketa River basin(Iowa).

Flood peaks with magnitudes from 2 to 3 times the 50-year flood occurred on streams in the Little Maquoketa River basin, Iowa, August 2, 1972. Up to nine inches of rain fell in the headwater of the Middle Fork tributary, with 6 to 7 inches over most of the Little Maquoketa River basin. The flood peak elevationnat the gaging station near Durango exceeded the 1925 flood of record by 1.7 feet. Flood damages were extensive to homes, crops, and roads, and bridges. Flood damages were estimated to be over one million dollars. No loss of life or personal injuries were sustained. Flood-peak discharges at 12 sites, basin rainfall, a description of the 1972 flood, brief accounts of other major floods in the basin, maximum flood peaks in northeastern Iowa, selected flood-frequency data, and annual floods of record at 5 sites are given. (Knapp-USGS)
W75-05648

FLOOD-FLOW CHARACTERISTICS OF THE CHENANGO RIVER AT PROPOSED INTERSTATE HIGHWAY IN TOWNS OF FENTON AND CHENANGO, BROOME COUNTY, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 4A.
W75-05655

TRANSVERSE MIXING OF HEATED EFFLUENTS IN OPEN-CHANNEL FLOW,
State Univ. of Iowa, Iowa City. Dept. of Mechanics and Hydraulics.
For primary bibliographic entry see Field 5B.
W75-05657

STOCHASTIC MODELING OF THE PASSAIC RIVER FLOW,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Chemical Engineering; and Rutgers - the State Univ., New Brunswick, N.J. Dept. of Biochemical Engineering.
K. M. Iyer.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 293, $5.25 in paper copy, $2.25 in microfiche. Master's Thesis, October 19,2. 92 p, 25 fig, 21 tab, 29 ref, 5 append. OWRT A-035-NJ (1). 14-31-0001-3530.

Descriptors: Streamflow, *Streamflow forecasting, Statistical methods, Statistical models, *Stochastic processes, *Time series analysis, Mathematical models, Synthetic hydrology, *Regression analysis, Computer models, Markov processes, *Model studies, *New Jersey.
Identifiers: Sequential generation, *Passaic River(NJ), *Autoregressive models.

Time-series models of the moving-average and autoregressive type, proposed by Box and Jenkins, have been applied to daily flow rates of the Passaic River. This technique is effective, even at small discharges, corresponding to the upper reaches of that river. The method applied worked successfully when it included the subtraction of the first Fourier harmonic, natural logarithmic transformation and one-day differencing. Autoregressive models are of comparable adequacy to moving-average models, but are substantially more economical in computer time required. Both chi-square statistics and skewness tests were applied to residuals. Second-order differencing of adjusted data is not helpful. Second-order autoregressive models are superior to first-order cases. The latter have superior Q- or chi-square statistics. Model parameters exhibit a marked similarity for a five-year sequence of data from the Chatham gaging station. Data from the Millington station exhibit comparable similarity. The data train from the Bernardsville station departs from the above pattern. Flow here is the least in magnitude and does present the greatest modeling difficulty. In general, however, the overall concept is applicable to relatively low discharge stations. It would be improved substantially by taking rainfall-runoff into account, since these small discharges are more sensitive and more quickly responsive to precipitation. (Ahlert-Rutgers)
W75-05660

THE DISTRIBUTION OF THE BOTTOM FAUNA IN SEVERAL STREAMS OF THE MIDDLE BALKAN IN THE SUMMER PERIOD,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
A. Kownacki, and M. Kownacka.
Acta Hydrobiol. Vol 15, No 3, p 295-310. 1973, Illus.

Descriptors: *Benthic fauna, Bulgaria, Larvae.
Identifiers: Chironomidae, Ephemeroptera, Oligochaeta, Plecoptera, Trichoptera.

In the streams of the Middle Balkan (Bulgaria) the main component of the bottom fauna were the larvae of insects represented mainly by Ephemeroptera, Plectoptera, Trichoptera and Chironomidae. In the springs Oligochaeta occurred in masses. In these streams 6 communities of fauna were found which differed in their qualitative composition and in the structure of domination. On this basis, 2 types of streams were determined. The stream Ribarica is a typical stream of 'middle mountains' which may be classified, according to Illies, Botoseneanu; while the short upper parts of streams on the slopes of the Botev are of montane type.--Copyright 1974, Biological Abstracts, Inc.
W75-05666

REVERSE FLOW ROUTING BY THE IMPLICIT METHOD,
State Univ. of Iowa, Iowa City. Dept. of Mechanics and Hydraulics.
R. N. Eli, II, J. M. Wiggert, and D. N. Contractor.
Water Resources Research, Vol 10, No 3, p 597-600, June 1974. 6 fig, 4 ref.

Descriptors: *Flow profiles, *Open channel flow, *Hydrographs, *River forecasting, Equations, Flow, Routing, Upstream, Downstream, Streamflow, Continuity equation, Momentum equation, Discharge(Water), Rivers, Hydrograph analysis.
Identifiers: *Implicit method, Reverse routing.

The concept of reverse flow routing in rivers was described. In this approach, upstream flow hydrographs were specified from a downstream flow requirement. An example of reverse flow routing by the implicit method of solution of the momentum and continuity equations was presented. Reverse flow routing was discussed in the x-t plane context. Of the possible directions of computation, solutions were obtained only when proceeding in the directions of increasing time or decreasing distance. (Adams-ISWS)
W75-05675

MAYFLY LARVAE IN CURRENT HABITATS OF BELA CREEK (THE NORTHWESTERN PART OF MORAVIA, CZECHOSLOVAKIA).
Vlastivedny Ustav Sumperku, (Czechoslovakia).
I. Tusa.
Acta Hydrobiol. Vol 15, No 3, p 311-320. 1973 Illus.

Descriptors: *Mayflies, Czechoslovakia, Biomass.
Identifiers: Baetis Alpinus, Baetis Rhodani, Bela Creek.

Vertical and seasonal distribution of the specific composition number and biomass of mayfly larvae in Bela Creek was studies in the period between May, 1969 and March, 1970. The specific composition gives the degree of pollution in individual habitats. The greater pollution under Jesenik has a negatve influence upon the specific composition and individual abundance of mayfly larvae. The slight pollution from individual houses scattered along the banks increases the number of larvae. Seasonal distribution of these larvae produced by the fluctuating occurrence of the most frequent species (Baetis alpinus and B rhodani) shows 2 peaks: in Dec.-March and in July. --Copyright 1974, Biological Abstracts, Inc.
W75-05687

FLOOD FREQUENCIES AND BRIDGE AND CULVERT SIZES FOR FORESTED MOUNTAINS OF NORTH CAROLINA,
Forest Service (USDA), Franklin, N.C. Coweeta Hydrologic Lab.
J. E. Douglass.
General Technical Report SE-4, August 1974. 21 p, 6 fig, 5 tab, 11 ref.

Descriptors: *Design flood, *Flood discharge, *Peak discharge, Culverts, Storm runoff, *North Carolina, *Flood frequency, Bridges, Watersheds(Basins), Forests, *Estimating.
Identifiers: *Blue Ridge Province(NC).

Accurate estimates of flood discharges from forested lands are needed for design of bridges and culverts. Equations incorporating watershed area and maximum elevation were developed for discharges at recurrence intervals of 2.33, 5, 10, 20, 30, 40, 50 years from forested land in the Blue Ridge Province of North Carolina. These equations accounted for 98 percent of the variation in discharge. Capacity tables for several types and sizes of culverts are presented to simplify problems in culvert design. (Forest Service)
W75-05715

RIVER FLOW INCREASES IN CENTRAL NEW ENGLAND AFTER THE HURRICANE OF 1938,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. H. Patric.
Journal of Forestry, Vol 72, No 1, p 21-25, January, 1974. 5 fig, 2 tab, 20 ref.

Descriptors: Streamflow increases, Water yield, Deforestation, *New England, Evapotranspiration, Hydrologic data, Large watersheds, *River flow, *Connecticut River, *Hurricanes.
Identifiers: *Merrimack River.

The New England hurricane of 1938 uprooted or broke off vast numbers of trees in watersheds of the Connecticut and Merrimack Rivers. Annual flow in both rivers increased about 5 inches during the first year after the hurricane. Another 5 inches of increased flow ran off at diminishing rates during the next two or three years. At least half of these flow increases occurred in July, August, and September when streams normally are at the lowest levels of the year. There was no evidence of increased flow five years after the hurricane when forest regrowth was well underway. (Forest Service)
W75-05720

A SYSTEMS APPROACH TO THE OPERATION OF FLOOD CONTROL RESERVOIRS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05784

TRANSIENT THREE DIMENSIONAL MODELING OF TEMPERATURE DISTRIBUTIONS IN RIVERS WITH AND WITHOUT THERMAL DISCHARGES,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W75-05786

TRANSPORT OF SUSPENDED SOLIDS ALONG THE VISTULA RIVER,
Panstwowy Instytut Hydrologiczno-Meteorologiczny, Warsaw (Poland).
For primary bibliographic entry see Field 2J.
W75-05828

2F. Groundwater

INVESTIGATION AND VERIFICATION OF A MODEL FOR THE DISPERSION COEFFICIENT TENSOR IN FLOW THROUGH ANISOTROPIC HOMOGENEOUS, POROUS MEDIA WITH AP PLICATION TO FLOW FROM A RECHARG WELL THROUGH A CONFINED AQUIFER,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
Q. N. Fattah.
Available from the National Technical Informa tion Service, Springfield, Va 22161 as PB-240 00 $10.00 in paper copy; $2.25 in microfiche. Ph Thesis, 1974. 340 p, 54 fig, 10 tab, 60 ref, 6 appen OWRT A-043-WIS(2). 14-31-0001-3850.

Descriptors: Physical properties, *Isotropy *Porosity, *Fluid movement, Wells, *Distributio patterns, *Diffusion, *Model studies, *Dispersio Porous media, *Recharge wells, Aquifer Hydraulic conductivity.

Relationships for the dependence of the dispersio coefficients on flow, flow direction, media, a fluid properties in anisotropic, homogeneou porous media were determined from one-dime sional flow experiments on an anisotropic med model, constructed with thin, alternating layers sand, having different mean sizes. These te showed that: (1) the hydraulic conductivity and t longitudinal disperion coefficient are second-ra

tensors with equal, constant eccentricities, and with major and minor principal axes oriented parallel and perpendicular to the sand layers, respectively; (2) the lateral dispersion coefficient is a second-rank tensor whose principal axes are orthogonal to the longitudinal dispersion coefficient tensor and whose eccentricity increases with velocity; and (3) the off-principal dispersivities are equal to each other but opposite in sign. These relations were applied to well recharge in a confined, homogeneous, anisotropic aquifer. A numerical solution for the flow field from a partially-penetrating well was developed using a central-difference, alternating-direction, implicit scheme. A similar scheme was used to solve the mass conservation equation for a tracer added to this flow. This solution, however, developed unstable oscillations. Variations in the parameters of the scheme did not eliminate the instability. An apparatus simulating this well recharge problem was constructed; some testing of the flow field has been completed. (Hoopes-Wisconsin)
W75-05458

POROSITY AND HYDROLOGY OF JOINTED MIDDLE ORDOVICIAN LIMESTONES IN THE J. PERCY PRIEST DAM AREA OF CENTRAL TENNESSEE,
Vanderbilt Univ., Nashville, Tenn. Dept. of Geology.
R. G. Stearns.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 994, $4.75 in paper copy, $2.25 in microfiche. Tennessee Water Resources Research Center, Report No 33, Oct 1974. 86 p, 36 fig, 7 tab, 8 ref, 3 append. OWRT A-024-TENN(1).

Descriptors: *Porosity, *Limestone, *Water table, Joints(Geologic), Groundwater movement, *Tennessee, *Measurement, Excavation, Water storage, Infiltration, Recharge, Beds(Stratigraphic).
Identifiers: J. Percy Priest Dam(Tenn), Nashville(Tenn), Bedding planes, Geologic folds.

Porosity was measured by three independent means (1) examination of surface excavations, (2) core records, and (3) water table rise from calculated rainfall recharge. Openings are a boxwork of planar solution openings (joints and bedding). In the upper 10 feet (generally above the water table) voids (partly dirt-filled) make up 15% of the rock volume. Voids have no soil and diminish in volume to about 1.5% at 30 feet and about .002% at 100 feet. Water levels reflect the land surface like an unconfined water table. A minimum average lateral flow velocity is calculated to be .06 foot per minute; direction is down the topographic (peizometric) slope. Most water (.90 of .95 inches) is depleted from storage each year when surface streams reach their average low flow. This study has verified the estimates of Moore, Burchett and Bingham (1969) and Burchett and Moore (1970) of water in storage, infiltration rates by month, and depletion proportions. They used surface water recession curves whereas this investigation used direct measurements of porosity.
W75-05470

GROUND WATER ACTIVITIES IN THE USGS,
Geological Survey, Washington, D.C. Ground Water Branch.
For primary bibliographic entry see Field 4B.
W75-05503

GROUNDWATER MODELS FOR TEXAS,
Texas Water Development Board, Austin.
L. B. Seward, T. R. Knowles, and W. B. Klemt.
Presented at Water for Texas Conference, Texas A and M University, College Station September 19, 1974, 29 p, 16 fig, 6 ref.

Descriptors: *Computer models, *Simulation analysis, Groundwater management, *Model studies, *Texas, Groundwater movement.
Identifiers: Groundwater models, *Edwards Aquifer(Tex), *Carrizo Aquifer(Tex).

Sound groundwater management decisions must be based on the geohydrology of the aquifer, water demands, and the aquifer response to many alternative plans of operation. The high-speed electronic digital computer is able to store voluminous complex hydrologic data and rapidly analyze many alternative management plans at a reasonable cost. The comparison by managers, hydrologists, and others of the aquifer's response in terms of water level change results in the selection of a management plan which is consistent with overall objectives at minimum cost. The construction of two digital groundwater models, one on the Edwards Aquifer in central Texas (Balcones Fault Zone) and one on the Carrizo Aquifer of south Texas, is described. Several model applications such as (1) simulation of future water levels using projected recharge and pumpage rates, (2) determination of optimum pumpage in specific regions and those suited to artificial recharge, (3) prediction of future spring flow under projected conditions, and (4) studies of movement of water quality parameters are presented as illustrations of how such models can be used as tools in a water planning operation. (Bradbeer-NWWA)
W75-05508

GEOLOGY AND GROUND WATER RESOURCES OF SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA,
New Jersey Dept. of Environmental Protection, Trenton. Div. of Water Resources.
For primary bibliographic entry see Field 4B.
W75-05513

GEOHYDROLOGY OF PLEISTOCENE DEPOSITS AND SUSTAINED YIELD OF PRINCIPAL PLEISTOCENE AQUIFER, LAKE COUNTY, INDIANA,
Illinois Univ., Urbana. Dept. of Geology.
J. S. Rosenshein.
PhD Dissertation 1966. 89 p, 26 fig, 9 tab, 37 ref.

Descriptors: *Analog models, *Plesitocene, *Groundwater, *Aquifers, Glacial aquifers, Hydrogeology, Aquifer testing, Drawdown, Reservoirs, Discharge(Water), *Indiana.
Identifiers: Kankakee confining layer, Kankakee aquifer, Valparaiso confining layer, *Lake Michigan aquifer, Aquifer response, Hydrostratigraphy, Lake County(Ind).

The Pleistocene deposits underlying Lake County, Indiana, are composed of four lithologic units. These units are (in ascending order): the Kankakee confining layer (a silt-clay till); the Kankakee aquifer (chiefly a glaciofluvial sand); the Valparaiso confining layer (a silt-clay till); and the Lake Michigan aquifer (chiefly a glaciolaucustrine sand). The hydrologic properties of these units are given. Electric analog computer analysis of the hydrologic properties of the Kankakee aquifer and its leaky confining layer indicates that under equilibrium conditions the theoretical specific capacity of the artesian part of the aquifer ranges from 9.5 to 43.5 gallons per minute per foot of drawdown and in the watertable part from 7.9 to 33.5 gallons per minute per foot of drawdown. Computer estimates using a hypothetical pumping pattern demonstrates that the aquifer can readily sustain a yield of at least 20 million gallons per day. These computations show that, with the pattern of pumpage used, the aquifer head loss due to well interference can account for as much as 83 percent of the drawdown recorded at a pumping node. Further computations with the computer show that the aquifer in the vicinity of Crown Point, Indiana, can sustain a yield of about 1.5 million gallons per day or about twice the current withdrawal. (Bradbeer-NWWA)
W75-05514

THEIS EQUATION ANALYSIS OF RESIDUAL DRAWDOWN DATA,
Nevada Univ., Reno. Desert Research Inst.
C. M. Case, W. W. Pidcoe, and P. R. Fenske.
Water Resources Research, Vol 10, No 6, p 1253-1256, December 1974. 1 fig, 2 tab, 11 ref, 2 append. OWRT A-059-NEV (1).

Descriptors: *Groundwater, *Aquifer characteristics, *Theis equation, *Aquifer testing, *Mathematical studies, Permeability, Transmissivity, Unsteady flow, Water level fluctuations, *Drawdown, Equations, Artesian aquifers, Diffusivity, Water wells, Storage coefficient, Observation wells.
Identifiers: Residual drawdown, Recovery data, Reversion series, Power series.

Equations were developed that allowed the transmissivity and storage coefficient of an aquifer to be determined from recovery data taken from an observation well located at an arbitrary distance from the pumped well without the use of antecedent drawdown data. The fundamental result was in the form of a series based on the Theis recovery equation and, up to the number of terms given, was exact. The assumptions of radial flow in a confined aquifer that is homogeneous, isotropic, and semi-infinite, which are implicit in the Theis development, were also made. Two numerical examples with actual field data were given. (Prickett-ISWS)
W75-05519

AN EVALUATION OF THE THEORY OF GROUND-WATER AND RIVER-WATER INTERCHANGE, WINNEMUCCA REACH OF THE HUMBOLDT RIVER, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 2A.
W75-05529

ANALYSIS OF GROUND-WATER REGIMES BY USE OF NATURAL URANIUM ISOTOPE VARIATIONS,
Florida State Univ., Tallahassee. Dept. of Geology.
J. K. Osmond, L. I. Briel, J. B. Cowart, and M. I. Kaufman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 267, $5.75 in paper copy, $2.25 in microfiche. Completion Report, (1974), 123 p, 17 tab, 39 fig, 95 ref. OWRT C-3264(No 3710)(1), 14-31-0001-3710.

Descriptors: *Radiochemical analysis, *Uranium radioisotopes, *Groundwater movement, Radioactivity, Water sources, Aquifers, Effluent streams, Karst, Surface-groundwater relationships, *Florida, *Texas, Mixing, *Tracers, *Indication.
Identifiers: *Floridan aquifer(Fla), *Carrizo aquifer(Tex), Santa Fe River(Florida), Radioactive disequilibrium.

The concentrations in natural waters of U-238 and U-234 vary greatly both in absolute terms and relative to each other. This isotopic phenomenon, which is due to processes related to the radiogenic origin of U-234 by way of intermediate daughters from U-238, can be used to study ground-water regimes in two ways: (1) as isotopic fingerprints of water masses, so that mixing volumes of diverse sources can be computed, and (2) as indicators of water-aquifer interactions through time, whereby the isotopic parameters are changed. Examples of the first kind of study include mixing volumes and sources of major Florida springs, and groundwater contributions to a Florida karstic river. Examples of the second kind of study include analysis of circulation patterns of the Carrizo aquifer of Texas and of the Floridan aquifer of south Florida. The analytical techniques are designed for low concentration-large volume samples, and include the use of an artificial yield tracer, U-232, and simple procedures for co-precipitation, ion exchange, electrodeposition, and alpha energy pulse height analysis.

W75-05535

STUDY OF FLUID MOVEMENTS THROUGH CAUSEWAY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
R. T. Cheng, and M-H. Hu.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Paper 11076, p 155-165, January 1975. 5 fig, 10 ref, append. OWRT C-4025(9006)(2).

Descriptors: *Brines, *Groundwater movement, *Mathematical models, Finite element analysis, Saline water-freshwater interfaces, Hydraulic models, Porous media, Seepage, Embankments, Great Salt Lake, *Utah.
Identifiers: *Causeways.

The movements of fluid through the fills of a causeway separating fluids of different densities were examined by a numerical model. In the mathematical formulation, a two-fluid system through an inhomogeneous and anisotropic porous medium is assumed. Governing equations are solved iteratively by the finite element method using quadratic isoparametric elements. The porous medium is considered to be isotropic and homogeneous so that the positions of numerically calculated phreatic surface and the interface can be compared with those of the Hele-Shaw experiment. Both the calculations and the Hele-Shaw model show the existence of a counter-flowing fluids system, and their results are in good agreement. Ratios of the total discharges in each direction are also computed. The model should be useful in studying the effects of causeways like the one in Great Salt Lake, Utah. (Knapp-USGS)
W75-05610

A NUMERICAL TECHNIQUE FOR AQUIFER EVALUATION,
Illinois Univ., Urbana. Dept. of Geology.
G. F. Pinder.
Ph D Dissertation 1968. 74 p, 19 fig, 52 ref.

Descriptors: *Numerical analysis, *Computer programs, Hydrology, *Aquifer characteristics, Electric analogs, Computer models, Water supply, Glacial aquifers, Mathematical models, *Canada, Evaluation, Model studies.
Identifiers: *Musquodoboit Harbour(Nova Scotia).

A digital model capable of describing the response of an aquifer system to a wide range of hydraulic stresses was developed and applied to the investigation of a complex aquifer at Musquodoboit Harbour, Nova Scotia, Canada. The model was designed to handle (1) non-homogeneous anisotropic porous media, (2) irregular boundary conditions and (3) vertical leakage to the aquifer. The program, written for the IBM 360 digital computer, was verified for a confined, homogeneous, isotropic aquifer with simple boundary geometry by comparing the values calculated from the digital model against those obtained from the analytical solutions. An electric analog simulator was constructed to test the precision of the digital model. The digital and electric analogs were pumped for selected periods of time and a comparison of results was made. The transmissibility and recharge boundaries of the digital model were adjusted until pump test results from the field were reproducible. (Bradbeer-NWWA)
W75-05612

CHEMICAL HYDROGEOLOGY OF THE CARBONATE PENINSULAS OF FLORIDA AND YUCATAN,
Nevada Univ., Reno.
W. Back.
Ph D Dissertation 1969. 71 p, 17 fig, 6 tab, 23 ref.

Descriptors: *Ground-water, *Carbonates, *Aquifers, *Subtropic, Mineralization, Aquifer characteristics, Artesian aquifer, Areal hydrogeology, Sinks, Circulation, Aquicludes, *Florida, *Mexico.
Identifiers: *Yucatan Peninsula(Mex), *Hawthorn aquiclude(Fla).

Aquifers of the peninsulas of Florida and northern Yucatan are Tertiary marine carbonate formations showing great lithologic and faunal similarities. In addition, the tropical to subtropical climates of the two areas are similar, with annual rainfall of about 1000 to 1500 mm. Despite similarities in these fundamental controls, contrasts in the hydrogeologic and geochemical systems are numerous and striking. For example, Florida has many rivers, while Yucatan has none. Maximum fresh ground water thickness is 700 m in Florida and less than 70 m in Yucatan. In Florida the chemical character of water changes systematically downgradient owing to solution of minerals of the aquifer and increases in dissolved solids, sulfate, calcium, and Mg-Ca ratio; in Yucatan the dominant controls are solution of minerals and simple mixing of the fresh water with the shallow salt water table. These differences are partially caused by the lower altitude of the Yucatan plain. More importantly, these differences are due to the lack of an upper containing bed in the Yucatan that is hydrologically equivalent to the Hawthorn Formation of Florida. The Hawthorn cover prevents recharge and confines the artesian water exept where it is punctured by sinkholes, which even then may be filled with sediment that impedes circulation. In Yucatan the permeability is so large that most rainfall immediately infiltrates to the water table and moves laterally to the coast. With time and length of travel path in the Florida system, the Ma-Ca ratio increases downgradient systematically and approaches unity. (Bradbeer-NWWA)
W75-05614

BIOLOGICAL POLLUTION INDICATORS IN UNDERGROUND WATERS. (IN SLOVENIAN),
Kemijski Institut Boris Kidric, Ljubljana (Yugoslavia).
For primary bibliographic entry see Field 5A.
W75-05616

DIGITAL SIMULATION OF A STREAM-AQUIFER SYSTEM,
Illinois Univ., Urbana. Dept. of Geology.
C. Lin.
PhD Dissertation 1970. 69 p, 17 fig, 1 tab, 53 ref.

Descriptors: *Computer models, *Data processing, *Simulation analysis, Synthetic hydrology, Aquifer characteristics, Drawdown, Groundwater, Aquifers, *Canada, *Surface-groundwater relationships.
Identifiers: *Musquodoboit River(Nova Scotia), Alternating direct implication method.

Ground water flow through an unconfined aquifer is described by a nonlinear second order partial differential equation similar to Poisson's equation for confined flow except that (1) the potential term is taken to the second power, (2) the coefficient of storage is replaced by the specific yield or effective porosity of the porous media, and (3) the saturated thickness of the aquifer is a time-dependent variable. Finite difference approximations based on an irregular mesh matrix have been developed for the anisotropic, nonhomogeneous aquifer under confined and unconfined conditions. Comparisons of filed test data and digital results under confined and unconfined assumptions led to the following conclusions: (1) both assumptions match the initial curve, but in long duration pumpage the theoretical unconfined data are the best fit, (2) dewatering can also account for the reported effects of a time-dependent coefficient of storage, (3) the role of transmission of the unconfined cone of depression is faster only initially and becomes the slower as pumping duration increases, (4) the maximum aquifer drawdown is controlled mainly by distance to and the rate of recharge of the Musquodoboit River (test area), (5) digital simulation appears to be consistant with a steady state, equilibrium model. (Bradbeer-NWWA)
W75-05620

EFFECT OF CO2 ON THE CHEMICAL EQUILLIBRIUM OF SOIL SOLUTION AND GROUND WATER,
Arizona Univ., Tuscon. Dept. of Hydrology.
For primary bibliographic entry see Field 2G.
W75-05623

NORMAN CREEK, A SOURCE OF RECHARGE TO MARAMEC SPRING, PHELPS COUNTY, MISSOURI,
Geological Survey, Rolla, Mo.
E. E. Gann, and E. J. Harvey.
Available from the Superintendent of Documents, GPO Washington, DC 20402, $3.15. Journal of Research of the US Geological Survey, Vol 3, No 1, p 99-102, January-February 1975. 4 fig, 1 tab, 5 ref.

Descriptors: *Springs, *Missouri, *Tracers, *Dye releases, *Groundwater movement, Karst hydrology, Hydroegology, Fluorescent dye.
Identifiers: *Maramec Spring(Mo).

Rhodamine WT dye was used to trace the subsurface movement of water from Norman Creek, a losing Ozark stream, to Maramec Spring, a straight-line distance of 8.7 mi. Grab samples and activated charcoal packets were used to check possible emergent points of the dye. The leading edge of the dye reached Maramec Spring 68-75 days after the dye injection, and the peak concentration reached the spring 82-93 days after injection. Small quantities of dye were still being recovered at the spring 114 days after injection and 39-46 days after the dye first arrived at the spring. Computed average velocities, assuming straight-line travel, are 0.47-0.42 ft/min for the leading edge and 0.39-0.34 ft/min for the peak. This apparent rate of travel compares favorably with other recent subsurface tracing studies in southern Missouri which generally range from 0.4 to 25 ft.min. (Knapp-USGS)
W75-05627

EVALUATION OF HYDRAULIC CHARACTERISTICS OF A DEEP ARTESIAN AQUIFER FROM NATURAL WATER-LEVEL FLUCTUATIONS, MIAMI, FLORIDA,
Geological Survey, Tallahassee, Fla.
F. W. Meyer.
Florida Bureau of Geology, Tallahassee, Report of Investigations No 75, 1974. 32 p, 9 fig, 2 tab, 23 ref.

Descriptors: *Aquifer characteristics, *Florida, *Waste disposal wells, Hydrogeology, Water level fluctuations, Artesian aquifers, Artesian wells, Hydraulic conductivity, Diffusivity, Transmissivity, Tides.
Identifiers: *Miami(Fla).

Natural water-level fluctuations in a 2,947-foot deep disposal well near Miami, Florida were analyzed to obtain estimates of the hydraulic diffusivity, hydraulic conductivity, specific storage, transmissivity, and the storage coefficient of the Boulder Zone aquifer. The fluctuations are caused chiefly by oceanic and earth tides, and by changes in atmospheric pressure. The oceanic tidal fluctuations probably result from loading due to tides in Biscayne Bay. Locally the water in the Boulder Zone is chemically equivalent to sea water and has a temperature of 60.8 deg F. The pressure head of the saltwater in the Boulder Zone at the 2,947-foot depth probably fluctuates at or near sea level. The quality and temperature of the water, evaluated with geologic considerations, suggest that the Boulder Zone crops out in the Straits of Florid

and that hydraulic connection exists between the Boulder Zone and the Straits of Florida. (Knapp-USGS)
W75-05633

SEDIMENTARY FACIES OF THE AQUIA FORMATION IN THE SUBSURFACE OF THE MARYLAND COASTAL PLAIN,
Maryland Geological Survey, Baltimore.
H. J. Hansen.
Report of Investigations No 21, 1974. 47 p, 28 fig, 4 plate, 83 ref.

Descriptors: *Aquifers, *Maryland, *Stratigraphy, Aquifer characteristics, Rock properties, Coastal plans.
Identifiers: Lithology.

The Aquia Formation is an important source of groundwater in several Southern Maryland (Calver, St. Mary's) and Eastern Shore (Kent, Queen Anne's, Talbot) Counties. Prior to constructing a digital simulation model for predicting hydrologic responses to future pumping arrays a stratigraphic study was undertaken to determine both the internal (Fabric) and external (Boundaries) characteristics of the formation. The marine Aquia Formation of Paleocene age outcrops in Maryland as an irregular band extending from the Potomac River bluffs in western Charles County to the upper reaches of the Sassafras River in southeastern Cecil County. The Formation thickens and becomes more coarsely-texgured toward the northeast, traversing at least two first-order facies. The oblique relationship between the outcrop belt and several lithofacies trends suggests that post-Eocene tilting has imparted to the Formation a structural strike that is demonstrably different from its depositional strike. In the subsurface the Aquia Formation exhibits a tripartite facies pattern: (1) a thick, coarser-textured sandy facies extending southwesterly in outcrop from Kent county to about the Patuxent River valley where it swings south into the subsurface toward southern St. Mary's County; (2) a finely textured sand to silt-clay facies, occurring chiefly in Charles coutny and southern Prince George's County; and (3) a thinner, very muddy facies that appears to underlie much of the Eastern Shore seaward of the Choptank River; it does not outcrop. (Knapp-USGS)
W75-05638

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
For primary bibliographic entry see Field 4A.
W75-05640

GROUND-WATER RESOURCES OF GRIMES COUNTY, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W75-05641

ANALOG-MODEL STUDIES OF GROUND-WATER HYDROLOGY IN THE HOUSTON DISTRICT, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W75-05642

LAND-SURFACE SUBSIDENCE IN THE HOUSTON-GALVESTON REGION, TEXAS,
Geological Survey, Houston, Tex.
For primary bibliographic entry see Field 4B.
W75-05643

HYDROGEOCHEMISTRY OF THE NORTHERN YUCATAN PENINSULA, MEXICO, WITH A SECTION ON MAYAN WATER PRACTICES,
Geological Survey, Reston, Va.
W. Back, and B. B. Hanshaw.
In: Field Seminar on Water and Carbonate Rocks of the Yucatan Peninsula, Mexico; published for Field Trip 2, 1974 Annual Meeting, Miami, of the Geological Society of America: New Orleans Geological Society, p 45-77, 1974. 10 fig, 4 tab, 12 ref.

Descriptors: *Hydrogeology, *Karst hydrology, *Geochemistry, *Mexico, *Limestones, Water chemistry, Water balance, Water levels, Water resources development.
Identifiers: *Yucatan(Mexico).

The flat, low-lying northern Yucatan Peninsula is composed of extensive outcrops of Teritiary limestone. Elevations range from sea-level to about 50 m. Areas of thin soil cover are interspersed with bare limestone outcrops. The area receives between 500 to 1500 mm of rainfall per year, but the high porosity and permeability coupled with thin soil cover cause the potentiometric surface to be only a few meters above sea level throughout most of the area. Chemical character of the groundwater is controlled regionally be solution of carbonate and sulfate minerals and by mixing with a body of saltwater that is believed to be a few tens of meters below land surface throughout the area studied. Contamination by sewage may also be locally important. Aspects of ancient Mayan water systems and the importance of water in the Mayan cluture, are also discussed. Present-day water systems and some problems of saltwater and sewage contamination are discribed. (Knapp-USGS)
W75-05647

MID-1971 GROUND-WATER CONDITIONS AT YANKEETOWN WELL FIELD, LEVY COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
G. L. Faulkner.
Open-file report 72001, January 1972. 23 p, 5 fig.

Descriptors: *Groundwater, *Florida, *Canals, Water levels, Water quality, Water table, Water pollution sources.
Identifiers: *Yankeetown(Fla).

By mid-1971, no measureable change in water quality in the Yankeetown well field has resulted from construction of the Cross-Florida Barge Canal. Any decline in groundwater levels in the Yankeetown well field as a result of construction of the Cross-Florida Barge Canal is too small to be assigned to a particular hydrologic factor. (Knapp-USGS)
W75-05649

APPLICATION OF STATISTICAL TECHNIQUES TO THE ESTIMATION OF GROUND-WATER WITHDRAWALS IN NORTHWESTERN KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W75-05651

CHEMICAL INTERACTION DURING DEEP WELL RECHARGE, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5B.
W75-05656

NUMERICAL ANALYSIS OF PUMPING FROM CONFINED-UNCONFINED AQUIFERS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W75-05835

2G. Water In Soils

CONTAMINATION LIMITS FOR REAL AND PERSONAL PROPERTY, PROGRESS REPORT, JULY-DECEMBER 1973,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.
W75-05379

FEASIBILITY AND ALTERNATE PROCEDURES FOR DECONTAMINATION AND POST TREATMENT MANAGEMENT OF PU-CONTAMINATED AREAS IN NEVADA,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 5G.
W75-05384

THERMAL CONDUCTIVITY OF A FROZEN HUBBARD LOAMY SANDY,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
J. E. Gilley, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 025, $4.75 in paper copy, $2.25 in microfiche. M.S. Thesis, July 1974. 80 p, 6 fig, 5 tab, 45 ref, 6 append. OWRT B-057-MINN(3), 14-31-0001-3602.

Descriptors: *Heat transfer, *Soil moisture, *Thermal conductivity, Frost, Loam, Sands, Measurement, Soils, *Frozen soils.

The heat transfer characteristics of a naturally occurring field soil were examined. A transient-state, cylindrical thermal probe was built. Tests were conducted on a fine Ottawa sand under both dry and saturated conditions to compare the probe response the results reported previously. Thermal conductivities of a naturally occurring, forzen, Hubbard loamy sand were determined at five soil moisture contents at temperatures of -15.5 and -2.5C. Results show a range in measured conductivity values from a low of .437 watts /mC at a moisture content of .82% by weight to a high of 1.74 watts/mC at 16.6% moisture content. (Walton-Minnesota)
W75-05442

NITRATE MOVEMENT IN SOIL UNDER EARLY SPRING CONDITIONS,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-05457

ADSORPTION OF PHOSPHORUS BY UNSATURATED SYNTHETIC SOIL,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-05463

CHEMICAL PROPERTIES AND PARTICLE-SIZE DISTRIBUTION OF 39 SURFACE-MINE SPOILS IN SOUTHERN WEST VIRGINIA,
Forest Service (USDA), Princeton, W. Va. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05492

FACTORS AFFECTING THE ESTABLISHMENT OF DIRECT-SEEDED PINE ON SURFACE-MINE SPOILS,
Forest Service (USDA), Princeton, W. Va. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05493

AVOID PROBLEM SPOILS THROUGH OVERBURDEN ANALYSIS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05494

INFLUENCE OF ENDRIN ON SOIL MICROBIAL POPULATIONS AND THEIR ACTIVITY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05497

EROSION OVER TIME ON SEVERELY DISTURBED GRANITIC SOILS: A MODEL,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05499

A PROCEDURE FOR PLACING LARGE UNDISTRUBED MONOLITHS IN LYSIMETERS,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
K. W. Brown, C. J. Gerard, B. W. Hipp, and J. T. Ritchie.
Soil Science Society of America Proceedings, Vol 38, No 6, p 981-983, November-December 1974. 2 fig, 7 ref. OWRR B-148-TEX (2).

Descriptors: *Lysimeters, *Research equipment, Equipment, Installation, Instrumentation, Leachate, Moisture content, Soil water, Water balance, Drainage.
Identifiers: Undisturbed soil.

Increasing need for studies of leaching water and possible pollutants through soil profiles led to the development of a method for placing large undisturbed soil monoliths in metal boxes for use as drainage lysimeters. Materials and equipment used in the technique are usually available or can be leased from local contractors. Monoliths as large as 1.5 m deep and with surface areas of 3 m have been taken. The technique could be used for even larger monoliths. Thus far, lysimeters have been installed in clay, sandy clay, loam and sand soils. The upper lip of several of the lysimeters described was buried 25 cm below the surface to allow normal tillage, bed preparation, and furrow irrigation. (Dawes-ISWS)
W75-05517

REMOVAL OF CATIONS FROM LEACHATE BY INTERACTION WITH SUBSURFACE SOILS,
Environmental Protection Agency, Boston, Mass. Solid Waste Management Branch.
For primary bibliographic entry see Field 5G.
W75-05589

MOISTURE AND DENSITY RELATIONS ON GRADED STRIP-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05592

EFFECT OF CO2 ON THE CHEMICAL EQUILLIBRIUM OF SOIL SOLUTION AND GROUND WATER,
Arizona Univ., Tuscon. Dept. of Hydrology.
K. L. Dyer.
PhD Dissertation 1967. 129 p, 4 fig, 18 tab, 112 ref.

Descriptors: *Soil chemistry, *Water chemistry, Drainage effects, *Soil water, Soil tests, Analytical techniques, Ion exchange, Absorption, *Groundwater, *Carbon dioxide.
Identifiers: Panoche, Hesperia soils, Meta soils, Foster soils, White House soils, Mount Lemmon soils, Olympic soils.

The equilibrium equations relating dissolved CO2, HCO3(-), CO3(--), H(+), solid phase CaCO3, exchangeable H(+) and ionic strength were programmed for simultaneous solution on a 7072 IBM digital computer. This routine was combined with an existing program which had been successfully used to relate the equilibrium of soluble and exchangeable Ca(++), Mg(++), Na(+), dissolved C1(-), SO4(--), and NO3(-), and solid phase CaSO4 2H2O. The final systems analysis model developed accounted for most of the dissolved substances normally present in significant quantities in ground waters and soil solutions. It is possible to calculate equilibrium concentrations resulting from an arbitrary change in a constituent. The model was used to predict the equilibrium concentrations of ionic species in soil solutions at different moisture and carbon dioxide levels. The soils tested were of a wide variety and the chemical predictions obtained were of the same level of accuracy as the experimental methods used to determine these chemical constituents. The model was used to estimate the concentrations of the chemical constituents which would have been in solution at the time they were sampled. A common origin for water above and below the water table was indicated. (Bradbeer-NWWA)
W75-05623

SALTY BARK AS A SOIL AMENDMENT,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
W. B. Bollen.
Research Paper PNW-128, 1971. 16 p, 12 tab, 27 ref. PNE 1602.

Descriptors: *Bark, *Saline water, Technology, Inhibitors, *Douglas fir trees, Sea water, Leaching, *Soil amendments.
Identifiers: Salty bark.

Bark from Douglas-fir logs floated in sea water contained 0.75 to 1.94 percent salt (NaCl). Leaching by natural and simulated rainfall and by soaking readily removed this salt. Brush bean and tomato plants were grown in the greenhouse on a sandy loam as an incorporation at the rate of 40 tons per acre. Mulches containing 0.75 and 1.41 percent salt had little effect on beams but bark containing 1.94 percent salt was slightly depressive; all the incorporations were depressive. Tomato plant yields were reduced by all the bark treatments, most severely by the incorporations. Use of salty bark at usual rates on the soil can injure salt sensitive plants. Mulches would be less hazardous than incorporations. Chunk sizes would probably cause no toxic effects. Most soil microbes and their essential activities are not likely to be appreciably influenced by salt leached into the soil from salty bark. (Forest Service)
W75-05718

FLOODPLAIN MEADOWS OF THE LOWER COURSE OF THE PRIPYAT' RIVER, (IN BYELORUSSIAN),
Akademiya Navuk BSSR, Minsk. Inst. of Experimental Botany.
N. I. Pyetruchuk.
Vyestsi Akad Navuk BSSR Syer Biyal Navuk, 1, p 15-19, 1974.

Descriptors: *Grasslands, USSR, Soil moisture, *Flood plains, Vegetation.
Identifiers: Pripyat River.

The conditions of development of the meadow vegetation of the flood plain of the lower course of the Pripyat' River in the Belorussian SSR (USSR) were analyzed on the basis of geobotanic investigations and many years' data of the hydrometeorological service. An edaphic-phytocoenotic classification of meadows is presented. For each isolated taxon, data on soil, nutrient elements, accumulation of humus, soil reaction, moisture content, characteristics of vegetation cover and yield for individual formations is presented.--Copyright 1974, Biological Abstracts, Inc.
W75-05723

EXPERIMENTS OF INFILTRATION WITH AIR EFFECTS IN A VERTICAL RECTANGULAR SLAB OF SOIL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
B. Lefevre.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 450, $5.75 in paper copy, $2.25 in microfiche. M.S. thesis, December 1973. 121 p, 32 fig, 39 tab, 16 ref, 3 append. OWRT B-070-COLO(10).

Descriptors: *Infiltration, Flow, *Sands, Soils, Simulation analysis, *Subsurface flow, *Ponding, Air circulation.
Identifiers: *Subsurface hydrology, *Two-phase flow, Air pressure.

An experimental investigation of a two-phase flow in an unconsolidated sand is described. A simulation of the natural infiltration process, more realistic than in usual columns, was tested using a larger soil surface and a rainmaker device which produced a known rainfall. Ponding and runoff were also allowed. The flume was airtight. Air and liquid pressure at various depths and the infiltration rate were measured during the progression of the wetting front. Infiltration without ponding and with ponding were studied with two types of lower boundary conditions, either impervious bottom or bottom open to the atmosphere. An air pressure build-up in the medium was observed in almost all cases. Its importance is related to the liquid saturation behind the wetting front. The air pressure variations with time are related to the variations of the infiltration rate. In the ponding case, the infiltration rate was constant at the beginning, then decreased and after a slight secondary increase tended to a value less than the hydraulic conductivity at the natural imbibition saturation. (Morel-Seytoux-Colorado State)
W75-05777

THE ESTIMATION OF SOIL MOISTURE DEFICITS BY PENMAN'S AND THORNTHWAITE'S METHOD IN MID CANTERBURY,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
For primary bibliographic entry see Field 2D.
W75-05831

CHARACTERISTICS OF THE WINTER HYDROMETEOROLOGICAL REGIME OF DRAINED MINERAL SOILS,
M. A. Borisovskiy.
Soviet Hydrology, Selected Papers No. 3, p 207-213, 1973. 2 fig, 5 tab, 4 ref. Translated from Transactions of the Voyeykov Main Geophysical Observatory (Trudy GGO), No. 306, p 61-73, 1973.

Descriptors: *Agroclimatology, *Drainage practices, *Hydrothermal studies, *Soil temperature, Winterkilling, Tile drainage, Seasonal, Snow cover, Soil moisture, Air temperature, Frozen soils, Wetting.
Identifiers: *Soil reclamation work, Frost meters, *USSR(Baltic States), Sod-calcareous loam.

Two periods with different relations between soil temperatures in drained and undrained areas were distinguished. In the warm period, the temperature of undrained soils was 1.5-2.5C higher than in drained soils. Conversely, in the cold period, drained soils averaged 1.5-2C colder than undrained soils. The temperature differences increased to 2.5-4.0C in the upper 0.5 m of the soil during very cold periods and remained high even at drain depth (0.6-0.8C). The depth of freezing of drained soils was greater by a factor of 1.3-1.5 than that of undrained soils, depending on moisture

onditions in the preceding autumn. Freezing epth increased with increasing drainage intensity, he greatest depth being recorded for cross rainage, which was 8% greater than for tile rainage, and 6% greater than for plastic drains. elations were obtained for converting the depth f soil freezing in a meteorological area to that in a rained winter wheat field. As a rule winter crops n Latvia were not damaged by low temperatures, ut by the too high temperatures observed under ne snow. Therefore, drainage of excessively wet oils was an essential part of crop cultivation prac-ces. (Schicht-ISWS)
/75-05833

FFECT OF THE ICE CONTENT, TEMPERA-URE, CEMENTATION, AND FREEZING EPTH OF THE SOIL ON MELTWATER IN-ILTRATION IN A BASIN,
. D. Komarov, and T. T. Makarova.
oviet Hydrology, Selected Papers No 3, p 243-49, 1973, 4 fig, 17 ref. Translated from Transac-ons of the Hydrometeorological Center of the SSR (Trudy Gidromettsentra SSSR), No 113, p 6-85, 1973.

escriptors: *Infiltration, *Melt water, Snowmelt, *Frozen ground, Snow cover, Tem-erature, Spring, Winter, Permeability, Field apacity, Frost, *Frozen soils, Absorption, *Ice.
dentifiers: *Cryopedology, Steepe Zone.

he main factors responsible for the permeability f the soil prior to snow melting are its ice content nd depth of freezing. The effect of the tempera-ure of the frozen soil on its permeability is not nown but is considered significant. The spatial ariations of the factors determining infiltration, articularly the ice content and depth of freezing f the soil, are vey large and are important factor the infiltration of meltwater in a basin. Further udy of the effect of various factors on meltwater nfiltration in an elementary area and in a basin as whole requires large-scale experimental and eoretical investigations. (Schicht-ISWS)
/75-05836

SAMPLER FOR TAKING SOIL SAMPLES ROM SPECIFIC SOIL ZONES,
orth Carolina State Univ., Raleigh. Dept. of Soil cience.
or primary bibliographic entry see Field 7B.
/75-05839

IMITATIONS OF THE INSTANTANEOUS ROFILE METHOD FOR FIELD MEASURE-IENT OF UNSATURATED HYDRAULIC CON-UCTIVITY,
isconsin Univ., Madison. Dept. of Soil Science.
. G. Baker, P. L. M. Veneman, and J. Bouma.
oil Science Society of America Proceedings, Vol 3, No 6, p 885-888, November-December 1974. 4 g, 13 ref.

escriptors: *Hydraulic conductivity, Unsaturated flow, *Soil moisture, *Soil tests, Soil profiles, Laboratory tests, Moisture content, uclear moisture meters, Soil moisture meters, nstrumentation, On-site laboratories, Tensiome-rs, Conductivity, Moisture.
dentifiers: Instantaneous profile method, *Soil-ater potential, Vertical flow.

echnical problems and soil profile characteristics ay limit the applicability of the instantaneous rofile method for field measurement of unsatu-ted hydraulic conductivities. A modified rocedure for tensiometer installation and dif-rent methods for measuring moisture contents ere discussed. Good agreement was found etween moisture contents determined in situ with e neutron-probe and those indirectly derived om moisture retention curves obtained from easurements of large core samples in a closed as-embly. Sloping soils with slowly permeable horizons or with lateral water movement cannot be characterized adequately with this method. The use of the crust test procedure was recommended. (Prickett-ISWS)
W75-05843

ANALYSIS OF THE YIELD-DETERMINING PROCESS AND ITS APPLICATION TO YIELD PREDICTION AND CULTURE IMPROVEMENT OF LOWLAND RICE: CXIV. ON THE IN-CREASE OF NITRATE NITROGEN UTILIZA-TION RATIO AT THE TILLERING STAGE OF RICE PLANTS. (IN JAPANESE),
National Inst. of Agricultural Sciences, Konosu (Japan). Dept. of Plant Physiology and Genetics.
A. Matsuzaki, S. Matsushima, and T. Tomita.
Proc Crop Sci Soc Jap. Vol 42, No 2, p 178-184. 1973. Illus. English summary.

Descriptors: *Rice, *Nitrates, Nitrogen, Cultivation, Till, Fertilizers, Forecasting, Analysis.
Identifiers: Yield, *Utilization ratio.

The effective duration of NO3-N applied on the surface water of paddy fields was less than 7 days. NO3-N might be utilized at least for 2 wk after top-dressing at the tillering stage. The utilization ratio of NO3-N in lowland soil was higher in the water-saturated paddy condition than in the flooded one, because of the high oxidation-reduction potentials of soil in the saturated condition. The utilization ratio of NO3-N was about 70% compared with that of NH4-N. In the upland soil, there was no difference in the utilization ratio regardless of water conditions and N sources, because of its high oxidation-reduction potentials. When temperature was low at the tillering period, the utilization ratio of NO3-N in water-saturated paddy field was inferior to that of flooded paddy field, where a growth promotion by high water temperature was concerned, because flooded water was liable to be warmed by sunlight and water temperature was higher than air temperature. NO3-N showed higher efficiency in split application at the rate of 1/2 dose/wk than that of the full dose (N 5 g/m) application at a time. The utilization ratio of NO3-N applied by the split method at the growth stage of 60-70 in the leaf number index can be raised to about 70% compared with that of NH4-N.--Copyright 1974, Biological Abstracts, Inc.
W75-05849

2H. Lakes

CHLORIDES IN LAKE ERIE BASIN,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05355

PHYTOPLANKTON PRODUCTION IN CHAR LAKE, A NATURAL POLAR LAKE, AND IN MERETTA LAKE, A POLLUTED POLAR LAKE, CORNWALLIS ISLAND, NORTHWEST TERRITORIES,
McGill Univ., Montreal (Quebec). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-05396

THE PHYSIOLOGICAL STATE WITH RESPECT TO PHOSPHORUS OF CAYUGA LAKE PHYTOPLANKTON,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Ecology and Systematics Section.
For primary bibliographic entry see Field 5C.
W75-05406

CALCULATED DISTRIBUTION OF THE CHEMICAL SPECIES OF COPPER, ZINC, CADMIUM AND LEAD IN 16 LAKES OF NORTHERN ITALY,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 5B.
W75-05413

THE RELATION BETWEEN PRIMARY PRODUCTIVITY, NUTRIENTS, AND THE TROUT ENVIRONMENT IN SOME NEW ZEALAND LAKES,
Marine Dept., Wellington (New Zealand). Fish Research Div.
For primary bibliographic entry see Field 5C.
W75-05419

CAREFUL RENEWAL OF A CAMPUS LOCH,
Sheffield Univ. (England).
For primary bibliographic entry see Field 5G.
W75-05426

JOINING FORCES TO SAVE DAMAGED LAKES IN SWEDEN AND TUNISIA,
Lund Univ. (Sweden).
For primary bibliographic entry see Field 5G.
W75-05428

MODELING INFLOWS INTO STRATIFIED LAKES WITH VERTICAL SCALE DISTORTION,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
G. E. Kouba.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 015, $4.25 in paper copy, $2.25 in microfiche. Master of Science Thesis, July 1974. 60 p, 25 fig, 1 tab, 15 ref, 2 append. OWRT A-050-OKLA(2).

Descriptors: *Dispersion, Lakes, Mixing, *Stratification, *Model studies, *Inflow, Distribution pattern, Reynolds number, Density stratification.
Identifiers: *Lake models, Vertical scale distortion, Richardson number.

The objectives were to evaluate the effect of vertical scale distortion and to develop criteria for modeling flows in stratified lakes. The inflow distribution in one lake model was compared with the distribution in another model which was identical in horizontal dimensions but different by a factor of two in the vertical dimensions. Tests were compared on the basis of different expressions for the Richardson and Reynolds numbers. Density profiles and dye fronts were examined to establish the degree of similarity between any two runs on the deep and shallow models. The degree of similarity was plotted against Richardson number ratios and Reynolds number ratios for each pair of runs. The effect of vertical scale distortion is different for lateral dispersion than for vertical distortion. A different expression for the Richardson number must be used to model the dispersion patterns as seen from the top than the one used to model the dispersion as seen from the side. (McLaughlin-Oklahoma State)
W75-05448

INVESTIGATION OF ARTIFICIAL LAKE DESTRATIFICATION -- A HYDRAULIC MODEL STUDY,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
T. A. Gibson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 187, $5.25 in paper copy, $2.25 in microfiche. Master of Science Thesis, July 1974. 90 p, 25 fig, 2 tab, 31 ref, 7 append. OWRR A-050-OKLA(1).

Descriptors: Lakes, Mixing, *Stratification, Model studies, *Destratification, *Artificial lakes, *Hydraulic models, Lake basins, Jets.

Identifiers: Mechanical destratification, *Lake models, Vertical scale exaggeration, Richardson number, Density profiles.

The objective was to develop a useful technique for modeling artificial lake destratification. The modeling technique included the use of vertical scale exaggeration. A model basin which is similar to a real lake was constructed in the laboratory, and experiments were conducted to compare the model with the prototype lake. The destratification was accomplished by the jet of water from a shrouded propeller mixing the top water into the bottom water. Data from the real lake included density profiles as a function of time and the total time required for destratification. Pairs of non-dimensional parameters were used to describe the destratification process. The ability of the technique to model artificial lake destratification was tested. The comparison of the density profile from the prototype lake and the model basin showed similarity using one form of the Richardson number. This number, with the non-dimensional time scale, forms a pair of parameters for modeling the destratification process. (Moretti-Oklahoma State)
W75-05449

SELECTIVE WITHDRAWAL AT AN INTERMEDIATE DEPTH FROM A DENSITY STRATIFIED IMPOUNDMENT,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W75-05456

THE RELATIONSHIP BETWEEN WATERFOWL AND NITROGEN SPECIES IN THE WATERS OF THE BOSQUE DEL APACHE,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-05469

THE LIFE CYCLE AND PRODUCTION OF THE LEACH EROPOBDELLA OCTOCULATA (L.) (HIRUDINEA: EROPOBDELLIDAE) IN LAKE DISTRICT STREAM,
Freshwater Biological Association, Ambleside (England).
J Anim Ecol Vol 42, No 2, p 435-448. 1973. Illus.

Descriptors: *Life cycles, Mortality, Lakes, Production.
Identifiers: *Leeches, *United Kingdom(English lake district).

The life cycle of E. octoculata took 2 yr in the Wilfin Beck, a small, stony stream in the English Lake District. The leeches bred and died at the end of their 2nd year. Exponential rates of mortality and growth varied throughout the life cycle, but were constant in each year-class for the same period in the life cycle. In most months, there was a negative correlation between rates of mortality and growth. Production was highest in the 1st year of the life cycle and occured chiefly in the period of rapid growth (March-July). Although estimates of production and standing crop varied considerably between years and between year-classes, ratios of production (P) to mean standing crop (B) were very similar in each year (Mean annual value of P/B ratio = 1.5).--Copyright 1974, Biological Abstracts, Inc.
W75-05480

HYDROBIOLOGICAL AND ICHTHYOLOGICAL STUDIES ON THE COASTAL LAKES TASAUL AND GARGALIC IN VIEW OF THEIR USE FOR FISH MANAGEMENT, (IN RUMANIAN),
For primary bibliographic entry see Field 8I.
W75-05495

THE DIEL ACTIVITY PATTERN, DRIFTING AND FOOD OF THE LEECH ERPOBDELLA OCTOCULATA (L.) (HIRUDINEA: ERPOBDELLIDAE) IN A LAKE DISTRICT STREAM,
Freshwater Biological Association, Ambleside (England).
J. M. Elliott.
J Anim Ecol. Vol 42, No 2, p 449-459, 1973, Illus.

Descriptors: Inset populations, Larvae.
Identifiers: Erpobdella octoculata, *Leeches, *United Kingdom(English lake district).

The locomotory activity of the leech E. octoculata increased at night, and the nocturnal periodicity was controlled solely by changes in light intensity. Larvae of Chironomidae were the principal food of the leeches and were taken chiefly at night. There was a strong positive correlation between mortality rate and the number of leeches with empty stomachs, and between the mean weight of food consumed/unit weight of leech and growth rate. A few leeches drifted downstream at night during periods of rapid growth, but drift losses were always less than 1% of the total losses from the population. Life tables were constructed to compare mortality in each year-class. The chief regulatory mechanism for the size of the population was mortality of the eggs which were eaten by mature leeches when the population density was high.--Copyright 1974, Biological Abstracts, Inc.
W75-05498

OHIO BIOLOGICAL SURVEY BIOLOGICAL NOTES NO. 6. EFFECTS OF ECOLOGICAL CHANGES ON BUCKEYE LAKE, OHIO, WITH EMPHASIS ON LARGEMOUTH BASS AND AQUATIC VASCULAR PLANTS,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 5C.
W75-05505

EVAPORATIVE WATER LOSS FROM LARGE LAND AREAS IN THE FINGER LAKES,
Cornell Univ., Ithaca, N.Y. Dept. of Structural Engineering.
For primary bibliographic entry see Field 2D.
W75-05532

EFFECT OF FERTILIZERS AND DENSE STOCKING IN FATTENING PONDS ON THE HYDROCHEMICAL REGIME AND NATURAL FOOD BASE, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
V. S. Polishchuk, V. P. But, G. N. Maryutina, and T. Yu. Malykhina.
Uzb Biol Zh, Vol 17, No 6, p 43-45, 1973.

Descriptors: *Carp, Ammonium nitrate, Superphosphate, *Walleye, Fish farming, Phytoplankton, Zooplankton, Benthic fauna.

Data are presented on the effect of fertilizers (ammonium nitrate and superphosphate) and dense stocking of yearling and 2-yr-old common carp, silver carp, speckled carp, grass carp, snakehead and walleye with feeding, on the hydrochemical regime, phytoplankton, zooplankton and zoobenthos in fattening ponds at the Akkurgan fishery in the Tashkent region (USSR).--Copyright 1974, Biological Abstracts, Inc.
W75-05601

SOME ECOLOGICAL EFFECTS OF ARTIFICIAL CIRCULATION ON A SMALL EUTROPHIC LAKE WITH PARTICULAR EMPHASIS ON PHYTOPLANKTON. 1. KEZAR LAKE EXPERIMENT, 1968,
New Hampshire Univ., Durham. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W75-05609

PHYTOPLANKTON AND PRIMARY PRODUCTION OF A HIGH LAKE IN THE PYRENEES: A FRACTORIAL ANALYSIS OF 'CORRESPONDENCES' APPLIED TO DATA FROM LAKE PORT-BIELH. (IN FRENCH),
Toulouse-3 Univ. (France). Laboratoire de Biologie Quantitative.
L. Bonnet, and J. Capblancq.
Ann Limnol. Vol 9, No 3, p 183-192. 1973, Illus. (English summary).

Descriptors: *Phytoplankton, *Primary productivity, Lake sediments, Thermal stratification.
Identifiers: Lake Port-Bielh, Pyrenees.

A factorial analysis of 'correspondences' shows that light and dissolved substances (CO3, PO4-P are the prime factors responsible for the phytoplankton cycle and the pelagic primary production in Lake Port-Bielh (2285 m, France). The diffusion of nutrients originating from the sediments depends on the degree of thermal stratification in the lake.--Copyright 1974, Biological Abstracts, Inc.
W75-05622

CHEMICAL AND BIOLOGICAL CONDITIONS OF LAKE OKEECHOBEE, FLORIDA, 1969-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5C.
W75-05634

ANNUAL DYNAMICS OF VERTICAL DISTRIBUTION OF THE NUMBER OF HETEROTROPHIC BACTERIA IN SOUTHERN BAIKAL, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W75-05636

PHYTOBENTHOS AND PRIMARY PRODUCTION OF A HIGH MOUNTAIN LAKE IN THE CENTRAL PYRENEES. (IN FRENCH),
Toulouse-3 Univ. (France). Laboratoire d'Hydrobiologie.
J. Capblancq.
Ann Limnol. Vol 9 No 3, p 193-230. 1973. Illus. English summary.

Descriptors: *Benthic flora, Algae, *Primary productivity, Biomass, Phyoplankton, Lakes, France.
Identifiers: Nitella Flexilis, Pyrenees.

The importance of the benthic algal community in the primary productivity of a (French) high mountain lake is evaluated. The lithophytic algae of the littoral zone (6-19 m), form a biomass about 1 times greater than the mean biomass of the phytoplankton during the summer. Nitella flexilis forms 80% of the benthic algal biomass; the variations in its chlorophyll content show an adaptation to the light climate which it partly determines. The colonization of artificial substrata was found to be not very adequate for evaluating the production of periphyton; it indicated a productivity 10 times less in the littoral zone than in the littoral-profundal zone. Measurements, with 14C of the rate of assimilation of N. flexilis and epiphytic algae revealed that, as a consequence of the phenomenon of compensation by the development of periphyton and the adjustment of chlorophyll content photosynthetic activity is not very dependent of light. The contribution of benthic algae to the primary production is estimated to be 30%. The role in the cycling of chemical elements is considered.--Copyright 1974, Biological Abstracts, Inc.
W75-05672

THE ECOSYSTEM OF THE ARCTIC LAKE NORDLAGUNA, JAN MAYEN ISLAND: ECOLOGY OF ARCTIC CHAR, SALVELINUS ALPINUS (L.),
Tromsoe Univ. (Norway). Inst. of Biology and Geology.

S. Skreslet.
Astarte. Vol 6, No 2 p 43-54. 1973 Illus.

Descriptors: *Fish food organisium, Lakes.
Identifiers: Char, Chricotopus Basalis, Jan-Mayen Island, Lake Nordlaguna(Norway), Salvelinus Alpinus.

Char (245) were caught by gill nets in 1963 and 1965 (in Lake Nordlaguna, Norway). Two size groups of adults, mature small char and large cannibals, were found. Young char fed on small benthic species (e.g. Chricotopus basalis). When the char became too large in relation to the prey, they turned to non-selective deposit feeding. Mortality was high after the 10th winter, probably due to starvation. Some char lived considerably longer because they had become cannibals. The char started to mature sexually at ages from 3-7 winters. Cannibalism probably caused the char to enter a new growth period and to remature at 12-14 winters.--Copyright 1974, Biological Abstracts, Inc.
W75-05676

THE INFLUENCE OF EUTROPHIC LAKE SEDIMENTS ON THE GROWTH OF DIFFERENT PLANKTONIC ALGAE,
Ceskoslovenska Akademie Ved, Prague. Hydrobiologicka Laborator.
P. Javornicky, and C. R. Goldman.
Arch Hydrobiol Supplement B. Vol 41, No 3, p 341-362. 1973.

Descriptors: *Lake sediments, Plankton, Algae, Phytoplankton, Eutrophication.

The sediments of Clear Lake (California, USA) enrich the lake water under fully aerobic conditions by all nutrients required by planktonic cyanophyta, Chlorophyta and diatoms. Because of originally high P concentrations in inlet and lake water, the enrichment by N and Fe from sediments promotes the most intensive stimulation of phytoplankton growth. Concerning the specific requirements and the possible selective influence of sediments on phytoplankton population dynamics, the effect of P, N and Fe on the growth of Aphanizomenon flos-aquae, Microcystis aeruginosa, Oscillatoria limnetica, Nitzschia kuetzingiana, Navicula pelliculosa, Chlorella minutissima and Scenedesmus intermedius. --Copyright 1974, Biological Abstracts, Inc.
W75-05689

WATER QUALITY IN THE GREAT LAKES: A NEW TIMETABLE,
For primary bibliographic entry see Field 5G.
W75-05694

NUMBER, BIOMASS AND PRODUCTION OF PLANKTONIC BACTERIA IN THE SHALLOW LAKE BALATON,
Fisheries Research Inst., Szarvas (Hungary).
J. Olah.
Arch Hydrobiol, Vol 73, No 2, p 193-217, 1974. Illus.

Descriptors: *Biomass, *Plankton, *Primary productivity, Lakes, Hungary.
Identifiers: Lake Balaton.

A detailed temporal and spatial analysis on the heterotrophic and total bacteroplankton was carried out in the shallow Lake Balaton. Significant daily, seasonal and yearly fluctuations were found in the number, biomass and production of the bacterioplankton. The vertical distribution is unstable except the stratification under ice. A definite differentiation was found between the littoral zone and the ocean water. Depending on the self-purification capacity of lake water, the river influence changes seasonally.--Copyright 1974, Biological Abstracts, Inc.
W75-05719

REPORT ON ESTES LAKE, YORK COUNTY, MAINE.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-05729

REPORT ON BAY OF NAPLES AND SEBAGO LAKE, CUMBERLAND COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-05731

REPORT ON RANGELEY LAKE, FRANKLIN COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-05732

REPORT ON LONG LAKE, AROOSTOOK COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-05733

REPORT ON MATTAWAMKEAG LAKE, AROOSTOOK COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5C.
W75-05734

A MATHEMATICAL MODELLING OF LAKE ECOLOGICAL SYSTEMS,
For primary bibliographic entry see Field 5C.
W75-05744

PHYSICO-CHEMICAL REGIME AND BIOPRODUCTIVE PROCESSES IN LAKE SEVAN (ARMENIA) IN TRANSITION FROM OLIGOTROPHY TO EUTROPHY,
For primary bibliographic entry see Field 5C.
W75-05747

VERTICAL PATTERNS OF PRIMARY PRODUCTIVITY IN CASTLE LAKE, CALIFORNIA,
For primary bibliographic entry see Field 5C.
W75-05755

NEARSHORE ZOOPLANKTON OF SOUTHEASTERN LAKE MICHIGAN, 1972,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
For primary bibliographic entry see Field 5C.
W75-05761

DENITRIFICATION IN INDIANA LAKE, RESERVOIR, AND POND SEDIMENTS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5B.
W75-05785

EUTROPHICATION IN THE HIGH ARCTIC--MERETTA LAKE, CORNWALLIS ISLAND (75 DEGREE N LAT.),
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W75-05799

DIATOMS IN LAKES AND LAKE SEDIMENTS AS AN INDEX TO ENVIRONMENT. PART 1.

DIATOM STRATIGRAPHY AND HUMAN SETTLEMENT IN MINNESOTA,
Minnesota Univ., Minneapolis.
For primary bibliographic entry see Field 5C.
W75-05805

THE PHOSPHORUS-CHLOROPHYLL RELATIONSHIP IN LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
P. J. Dillon, and F. H. Rigler.
Limnology and Oceanography, Vol 19, No 5, p 767-773, September 1974. 1 fig, 4 tab, 21 ref.

Descriptors: *Chlorophyll, *Mathematical models, *Nutrients, *Nitrogen, *Phosphorus, *Phytoplankton, Aquatic environment, Eutrophication, *Lakes, North America, Trophic level, Watershed management, Summer, *Canada, Lake morphometry, Methodology.
Identifiers: Ontario.

A methodology for predicting the average summer chlorophyll concentration in North American lakes from single measurements of phosphorus concentrations at spring overturn was proposed. Data for summer chlorophyll and spring total phosphorus concentrations were collected from 19 lakes in southern Ontario and combined with data reported in the literature for other North American lakes to produce a regression line that can be used to make such predictions. Until the model can be further generalized, its application may be limited, but it offers the obvious advantages of speedy results and economy of sampling. Values for both 50% and 95% confidence limits were listed. The predictive equation was not significantly different from a previously published phosphorus-chlorophyll relationship derived for a number of Japanese lakes, although the methods of determining chlorophyll concentrations may have been. (Harmeson-ISWS)
W75-05837

POND PHYTOPLANKTON OF THE TEDZHEN FISH-BREEDING FARM. (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Ashkhabad. Institut Botaniki.
Yu. E. Lyubeznov.
Izv Akad Nauk Turkm SSR Ser Biol Nauk. 5 p 55-61. 1973 Illus. (English Summary).

Descriptors: *Phytoplankton, *Fish farming, USSR, Fish reproduction.

Phytoplankton of 2 fish-breeding ponds (Turkmen SSR, USSR) includes 203 spp., varieties and forms of algae. Application of mineral fertilizers increases the number and biomass of phytoplankton algae by 10 times and above.--Copyright 1974, Biological Abstracts, Inc.
W75-05850

2I. Water In Plants

PHYSIOLOGICAL EFFECTS OF WATER STRESS ON YOUNG CORN PLANTS,
Oregon State Univ., Corvallis. Dept. of Soils.
E. W. R. Barlow.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 027, $5.75 in paper copy, $2.25 in microfiche. Ph.D. Thesis, June 1974. 128 p, 25 fig, 10 tab, 124 ref, 4 append. OWRT B-028-ORE(4).

Descriptors: *Photosynthesis, *Plant growth, *Crop production, *Corn(Field), Transpiration, Leaves, *Plant physiology, Growth rates.
Identifiers: *Leaf water potential.

Laboratory experiments were used to investigate the mechanisms of plant response to water stress by determining the sensitivity of leaf elongation, photosynthesis and transpiration in young corn plants to a decrease in leaf water potential. The

sensitivity of leaf elongation to mild water stress and its subsequent effect on photosynthesis indicates that plant growth and production may be limited by mild stress in the field situation. The vegetative growth of plants depends on both the photosynthetic rate and the rate of increase of the photosynthetic surface area. The response of leaf enlargement to water stress in the field warrants thorough further investigation.
W75-05450

FACTORS AFFECTING THE ESTABLISHMENT OF DIRECT-SEEDED PINE ON SURFACE-MINE SPOILS,
Forest Service (USDA), Princeton, W. Va. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05493

QUALITATIVE STUDY OF THE NUTRITION OF ALESTES BAREMOZE (PISCES, CHARACIDAE),
L. Lauzanne.
Cah ORSTOM Ser Hydrobiol. Vol 7, No 1, p 3-15. 1973 Illus.
Identifiers: *Alestes-Baremoze, Aquatic insects, Characidae, Crustaceaus, Nutrition, Pisces, Plankton, Spawning, *Lake Chad, *Fish diets, *Chad(Chari-Logone rivers).

The A. baremoze of the lower Chari, lower Logone and Lake Chad make a spawning run which leads them to very different surroundings. Their diet was qualitatively studied in the different areas where they live. Plenty of food was found, except when the adults go up-stream during low water. Their diet mainly consisted of planktonic crustaceans and small aquatic insects. In the rivers, however, during the flood, adults become herbivorous. --Copyright 1974, Biological Abstracts, Inc.
W75-05512

EFFECT OF POTASSIUM CHLORIDE AND PHENYLMERCURIC ACETATE ON THE REGULATION OF STOMATAL OPENING AND WATER ECONOMY IN TEPHROSIA PURPUREA PERS,
Jodhpur Univ., (India). Dept. of Botany.
For primary bibliographic entry see Field 2D.
W75-05538

DROUGHT ADAPTATION IN OPUNTIA BASILARIS: SIGNIFICANCE OF RECYCLING CARBON THROUGH CRASSULACEAN ACID METABOLISM,
California Univ., Riverside. Dept. of Biology.
S. B. Szarek, H. B. Johnson, and I. P. Ting.
Plant Physiol Vol 52, No 6, p 539-541, 1973. Illus.
Identifiers: Carbon recycling(Plants), Crassulacean-acid, Drought adaptation(Plants), *Metabolism, *Opuntia-basilaris, Photosynthesis, Respiration, Transpiration, *Carbon dioxide exchange, Organic acids.

Contrasting metabolic regimes operate in Opuntia basilaris Engelm. et Bigelov, before and after precipitation. During periods of drought, atmospheric CO2 exchange and transpiration are greatly reduced throughout the day/night cycle by stomatal closure and a highly impervious cuticle. The hypothesis is that endogenously produced CO2 is retained and recycled through dark CO2 fixation, organic acid transformations, photosynthesis, and respiration. Immediately following precipitation, nighttime stomatal opening is initiated, permitting increased atmospheric CO2 assimilation and organic acid synthesis.--Copyright 1974, Biological Abstracts, Inc.
W75-05547

EFFECTS OF AMMONIUM NUTRITION ON WATER STRESS, WATER UPTAKE, AND ROOT PRESSURE IN LYCOPERSICON ESCULENTUM MILL,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del. Central Research Dept.
For primary bibliographic entry see Field 3F.
W75-05548

INFLUENCE OF MOISTURE, HEAT AND LIGHT STRESS ON HYDROGEN FLUORIDE FUMIGATION INJURY TO SOYBEANS,
Utah State Univ., Logan. Dept. of Botany.
For primary bibliographic entry see Field 3F.
W75-05588

TOXICITY OF ACID COAL-MINE SPOIL TO PLANTS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-05591

CHEMISTRY OF THROUGHFALL UNDER DOUGLAS FIR AND ROCKY MOUNTAIN JUNIPER,
Utah State Univ., Logan. Dept. of Forest Science.
G. E. Hart, and D. R. Parent.
The American Midland Naturalist Vol 92, No 1, July 1974, p 191-201, 2 fig, 5 tab, 13 ref.

Descriptors: *Throughfall, Trees, *Douglas fir trees, *Juniper trees, *Chemistry of precipitation, *Utah, Rocky Mountain region.
Identifiers: Semi-arid region.

Chemical concentrations of sodium, calcium, magnesium, potassium, phosphorus, and nitrate nitrogen were measured in throughfall under isolated douglas fir and Rocky Mountain juniper trees in northern Utah. Concentrations were 3 to 16 times greater under the trees than in the open. Throughfall under douglas fir invariably had higher concentrations than that under juniper. Since most of the chemical input occurs as dry fallout between storms, surface area and form of the canopy is believed to be the prime factor influencing throughfall chemistry in semi-arid regions.
W75-05685

MULTIVARIATE ANALYSIS OF DESERT VEGETATION III. THE RELATION OF VEGETATION UNITS TO HABITAT CLASSES,
Hebrew Univ., Jerusalem (Israel). Dept. of Botany.
I. Noy-Meir, G. orshan, and N. H. Tadmor.
Isr J Bot Vol 22, No 4, p 239-257, 1973.
Identifiers: Deserts, Habitat classes, *Israel(Negev desert), Moisture, *Multi-variate analysis, Regression analysis, Soil structure, Forecasting, *Vegetation(Desert).

The association between vegetation units and habitats in a transect across a hill of arid shrubland at Avedat (rainfall 80 mm, altitude 550 m) in the Negev (Israel) was examined by 2 statistical methods for selecting best predictors: stepwise binary multiple regression (BMR) and predictive attribute analysis (PAA). Two types of vegetation unit were used, defined by association analysis of floristic data and by dominance, respectively. High predictability (R2 greater than or equal to 0.8) was attained for all dominance units and for most major association analysis units. PAA gives somewhat more meaningful results than BMR. Several limitations on direct causal interpretation of the results from both methods are discussed. Topographical attributes are more often better predictors than edaphic ones, but the interpretation takes into account the correlations and interactions between both. The distribution of the major floristic units is explained mainly by the interacting effects of topographic position (runoff), surface stoniness (infiltration) and soil stoniness (Moisture capacity) on the depth of wetting and the vertical distribution of soil moisture. In particular, the floristic unit characterized by Helianthemum kahiricum is strongly associated with slopes of stony surface where a hard and fissured rocky layer is close to the surface, so that a substantial amount and proportion of available moisture is in or below it.--Copyright 1974, Biological Abstracts, Inc.
W75-05698

CADMIUM IN PLANTS,
Geological Survey, Denver, Colo.
H. T. Shacklette.
Bulletin 1314-G, 1972, 28 p, 2 fig, 2 tab, 47 ref.

Descriptors: *Cadmium, *Plant tissues, *Distribution, Plant physiology, Absorption, Industrial wastes, Trace elements, Air pollution, Testing procedures, Analytical techniques, Spectroscopy, Soils, *Pollutant identification.

Cadmium in low concentrations most likely is a normal constituent of all plant tissues. The concentration in the tissue is determined by the inherent ability of a plant species to absorb cadmium and by the cadmium concentration in the environment. Differences in cadmium content among plants of different species growing in low-cadmium soils commonly are greater than differences in amounts of cadmium in the soils. The cadmium content of plant tissue tends to increase with increase of concentrations of soil cadmium above certain background amounts. Airborne cadmium originating in emissions from the combustion of hydrocarbons or from certain industrial processes may enter the soil and be absorbed by plants or may be deposited on the surface of plants in particulate matter until very high levels of cadmium are accumulated by the plants. Spanish moss, a plant with no connection to the soil, seems to be a useful indicator of the relative extent of airborne cadmium pollution, in that it contains much more cadmium if growing in areas remote from sources of pollution. There seems to be no natural means by which cadmium is eliminated from plant tissue, and no cultural practice has been found to be effective in reducing or preventing the absorption of cadmium by plants. (Jernigan-Vanderbilt)
W75-05709

USE OF REMOTE SENSING FOR VEGETATION INVENTORIES IN A DESERT SHRUB COMMUNITY,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 7B.
W75-05721

SOME REGULARITIES OF THE XEROPHILIZATION OF PLANTS. (IN RUSSIAN),
Leningrad State Pedagogical Inst. (USSR). Dept. of Botany.
G. N. Solonko.
Biol Nauki. Vol 17, No 1, p 53-58. 1974 Illus.

Descriptors: *Xerophytes, *Drought resistance, *Transpiration.
Identifiers: Festuca.

A comparative study of 5 spp. of fescue (Festuca gigantea, F. pratensis, F. rubra, F. ovina, F. sulcata) showed that these species comprise a series of sequential stages of xerophilization, the drought resistance, gradually increasing from the first to the last species in the series. The increase in drought resistance is closely related with a gradual change of a number of adaptive features, the most important ones being: a decrease of the size and reorganization of the leaf; marked reduction of the transpiring surface of the plants; decrease of the transpiration rate; considerable increase of the precocity of the plants and hence the possibility of shortening their normal vegetative period. Economical transpiration is thought to be the most important factor of the drought resistance of plants.--Copyright 1974, Biological Abstracts, Inc.
W75-05800

2J. Erosion and Sedimentation

MINERALOGY AND ION EXCHANGE CHARACTERISTICS OF SAVANNAH RIVER PLANT STREAMBED SEDIMENTS,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5B.
W75-05389

EROSION OVER TIME ON SEVERELY DISTURBED GRANITIC SOILS: A MODEL,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05499

MINERALOGY OF SUSPENDED SEDIMENT AND CONCENTRATION OF FE, MN, NI, ZN, CU, AND PB IN WATER AND FE, MN, AND PB IN SUSPENDED LOAD OF SELECTED KANSAS STREAMS,
Kansas Univ., Lawrence. Dept. of Geology; and Kansas Univ., Lawrence. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05521

CHARACTERIZATION OF CADMIUM AND NICKEL CONTAMINATED SEDIMENTS FROM FOUNDRY COVE, NEW YORK,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-05579

THE PORE WATER CHEMISTRY OF RECENT SEDIMENTS IN THE WESTERN MEDITERRANEAN BASIN,
Institut de Physique de Globe, Paris (France).
For primary bibliographic entry see Field 5B.
W75-05587

STRIP-MINING, EROSION AND SEDIMENTATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-05600

VEGETATING STRIP-MINE SPOILS FOR RUNOFF AND EROSION CONTROL,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05603

RECURRENT GEOTHERMALLY INDUCED DEBRIS AVALANCHES ON BOULDER GLACIER, MOUNT BAKER, WASHINGTON,
Geological Survey, Tacoma, Wash.
D. Frank, A. Post, and J. D. Friedman.
Available from the Superintendent of Documents, GPO, Washington, DC 20402, $3.15. Journal of Research of the U.S. Geological Survey, Vol 3, No 1, p 77-87, January-February 1975. 8 fig, 2 tab, 17 ref.

Descriptors: *Avalanches, *Washington, *Geothermal studies, *Debris avalanches, Mass wasting, Landslides, Mudflows, Glaciers, Melting.
Identifiers: *Mt. Baker(Wash).

Avalanches of snow, firn and hydrothermally altered rock and mud have been released six times since 1958 from Sherman Peak, south of the main summit of Mount Baker, Wash. The avalanches traveled nearly identical paths 2.0-2.6 km down Boulder Glacier on the east slope of the volcano. Fumaroles, thermal springs, and areas of warm ground, some of which are subglacial, are concentrated in the crater and were mapped by aerial infrared thermography. The outgoing radiant flux per unit area from a cluster of infrared anomalies within 50-150 m of the avalanche source was estimated to be 319 W per sq m in November 1972, which is sufficient to account for observed ice perforations. In addition, vapor emission (not apparent in thermography was observed along the source margin after the avalanche of August 1973. The principal conditions that produce the avalanches are the large accumulation of snow and firn on top of hydrothermally altered clay-rich ground and the saturation near the ground-firn interface by melt water produced both by summer snow ablation and by geothermal emission. The periodic avalanches have a potential a potential for impounding water in the crater. Sudden release of impounded water could present a danger to the Boulder Creek valley below. (Knapp-USGS)
W75-05624

THE SCAVENGING OF SILVER BY MANGANESE AND IRON OXIDES IN STREAM SEDIMENTS COLLECTED FROM TWO DRAINAGE AREAS OF COLORADO,
Geological Survey, Denver, Colo.
T. T. Chao, and B. J. Anderson.
Chemical Geology, Vol 14, No 3, p 159-166, November 1974. 2 fig, 1 tab, 20 ref.

Descriptors: *Water chemistry, *Sediments, *Colorado, *Manganese, *Iron oxides, Ion exchange, Adsorption, Chemical precipitation, Diffusion, Chemistry of precipitation, Oxides.
Identifiers: *Silver.

Stream sediments of two well-weathered and aerated drainage areas of Colorado containing anomalous amounts of silver were allowed to react by shaking with nitric acid of different concentrations (1-10M). Silver, manganese, and iron simultaneously dissolved were determined by atomic absorption. The relationships between silver dissolution and the dissolution of manganese and iron were evaluated by linear and multiple regression analyses. The highly significant correlation coefficient (r = 0.913) between silver and manganese dissolution suggests that manganese oxides are the major control on the scavenging of silver in these stream sediments, whereas iron oxides only play a secondary role in this regar. (Knapp-USGS)
W75-05652

THE WATER QUALITY AND BOTTOM SEDIMENT CHARACTERISTICS OF NEW JERSEY LAGOON DEVELOPMENTS,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5B.
W75-05658

A STUDY OF BENTHIC INVERTEBRATES IN LAGOON SYSTEMS IN THE SALT MARSHES OF NEW JERSEY,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Zoology.
For primary bibliographic entry see Field 2L.
W75-05664

ORIGIN OF METALLIFEROUS SEDIMENTS FROM THE PACIFIC OCEAN,
Oregon State Univ., Corvallis. School of Oceanography.
J. Dymond, J. C. Corliss, G. R. Heath, C. W. Field, and E. J. Dasch.
Geological Society of America Bulletin, Vol 84, No 10, p 3355-3371, October, 1973. 7 tab, 9 fig, 57 ref.

Descriptors: *Sediments, *Heavy metals, *Pacific Ocean, *Water pollution sources, Iron, Manganese, Lead, On-site data collections, On-site tests, Oxygen isotopes, Sea water, Basalts, Rocks.

All the sediments studied from the Bauer Deep and East Pacific Rise had rare-earth-element (REE) patterns strongly resembling the pattern of sea water, implying that the REE's were coprecipitated with ferromanganese hydroxyoxides, or that they were incorporated in small concentrations of phosphatic fish debris found in all samples. Oxygen isotopic data indicated that the metalliferrous sediments are in isotopic equilibrium with sea water and are composed of varying mixtures of two end-member phases with different oxygen istopic compositions: an iron-manganese hydroxyoxide and an iron-rich montmorillonite. A low-temperature origin for the sediments is supported by mineralogical analyses by X-ray diffraction which showed that geothite, iron-rich montmorillonite and various manganese hydroxyoxides are the dominant phases present. Ratios of lead isotopes in the metalliferrous deposits resembled values for oceanic theolite basalt, but were quite different from ratios found in authogenic marine manganese modules. Lead in the metalliferrous sediment appears to be of magnetic origin. The combined mineralogical, isotopic, and chemical data for these sediments suggest that they formed from hydrothermal solutions generated by the interactions of sea water with newly formed basalt crust at mid-ocean ridges. (Jernigan-Vanderbilt)
W75-05701

EROSION CONTROL ON LOGGING ROADS IN THE APPALACHIANS,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. N. Kochenderfer.
Research Paper NE-158, 1970. 28 p. 21 fig, 11 ref.

Descriptors: *Roads, Soil erosion, *Erosion control, *Lumbering, Planning, Drainage, Maintenance.

Practical methods of controlling erosion on logging roads are summarized through the different stages--planning, location, drainage, maintenance and care after logging. The material was derived from existing literature, road lore, contact with experienced land managers, and personal experience. (Forest Service)
W75-05713

SUSPENDED-SEDIMENT TRANSPORT RELATIONSHIPS FOR FOUR ALASKAN GLACIER STREAMS,
Alaska Univ., College. Dept. of Geohydrology.
B. L. Gaddis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 294, $5.25 in paper copy; $2.25 in microfiche. M S Thesis, August 1974, 102 p. 18 fig, 5 tab, 74 ref, 2 append. OWRR A-042-ALAS(3). Phase I 14-31-0001-3802, Phase II 14-31-0001-4002.

Descriptors: *Suspended sediments, *Glacier sediments, Melt water, *Sediment transport, *Suspended load, Mathematical models, Simulation analysis, Sediment discharge, Sediment sampling, Streams, Water sources, *Alaska, Model studies.
Identifiers: Gulkana Glacier(Alas), Maclaren Glacier(Alas), Eklutna Glacier(Alas), Wolverine Glacier(Alas), Rock flow.

Estimates of suspended-sediment transport for four Alaskan glacier streams were made for the 1973 summer melt season. Two types of field data are requisite for establishing linear models relating discharge and suspended-sediment concentration: (1) suspended-sediment concentration and corresponding discharge measurements, and (2) a seasonal discharge record. Comparison of monthly percentages of season total discharge and suspended-sediment transport suggest that variations between discharge and suspended-sediment transport magnitudes depend primarily on sediment availability. Changes in sediment availability are qualitatively discussed in relation to the glacier

drainage system. Sediment availability differences between glaciers are attributed to meteorological changes affecting the discharge, variation in the mechanics of sediment entrainment, and the differences in the amount of sediment for transport. The procedures presented for estimating suspended-sediment transport for a melt season remain similar for glaciers that have a defined glacier streams(s) issuing from the terminus, regardless of climatic or regional setting.
W75-05762

DENITRIFICATION IN INDIANA LAKE, RESERVOIR, AND POND SEDIMENTS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5B.
W75-05785

EROSION EFFECT ON SOIL FAUNA UNDER DIFFERENT CROPS,
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
O. Atlavinyte, Z. Kuginyte, and S. Pileskis.
Pedobiologia. Vol 14, No 1, p 35-40. 1974 Illus.

Descriptors: *Soil erosion, Annelids.

The most intense soil erosion took place in fallow and arable soil. In soils under sod and perennials after 2 yr, when grasses took on firm roots, erosion stopped altogether. The intensity of soil erosion is not directly proportional to the invertebrates that are carried away. When soil erosion is proceeding slowly earthworms are carried away by the flowing water. More earthworms are carried away during the 2nd and 3rd showers, though they are less intense than the 1st ones. During 5 yr of investigations the following percentage of earthworms was carried away in soils under different cover: 36.2% in fallow, 16.9% in arable soil; fewer earthworms were carried away in soils under perennials and sod, 7.6 and 4.5%, respectively. Insect larvae that were carried away made up 1.2-4.9%. Each year imago forms of insects carried away made up almost the same amount. They were also more numerous in fallow and arable soil. Arionidae were carried away diring the 1st and 2nd year and in drought years they were not found. The average biomass carried away was 2.7 g/m2.--Copyright 1974, Biological Abstracts, Inc.
W75-05793

TRANSPORT OF SUSPENDED SOLIDS ALONG THE VISTULA RIVER,
Panstwowy Instytut Hydrologiczno-Meteorologiczny, Warsaw (Poland).
J. Branski.
Nordic Hydrology, Vol 5, No 3, p 183-192, 1974. 2 fig, 1 tab, 7 ref.

Descriptors: *Suspended solids, *Sediment transport, *Erosion, *Monitoring, Methodology, Rivers, Evaluation, Reservoirs, Erosion rates, Stream stabilization, Sediment yield.
Identifiers: *Vistula River, Denudation indices, Fluvial hydraulics, *Poland.

A method is described for preparing a balance of transported solids along the Vistula river on the basis of many years' monitoring and observations of transportation of suspended solids. This method is based on direct monitoring of the transported solids and denudation indices determined for non-observed areas of the river basin. The Vistula balance was shown in tables and on a graph. The individual sections of the Vistula river bed were also characterized from the viewpoint of its stability. Working out the balance in this way permits general evaluation of the denudation processes in the river basin; the mean denudation index of the Vistula river basin was calculated with regard to the volume of solids sedimented in water reservoirs. (Singh-ISWS)
W75-05828

MOSQUITO LAGOON BARRIER BEACH STUDY,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W75-05829

2K. Chemical Processes

EXTRACTION OF COBALT, IRON, INDIUM AND ZINC FROM SEAWATER BY MEANS OF THE TRIFLUOROACETYLACETONE TOLUENE SYSTEM,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W75-05404

DETERMINATION OF HEAVY METALS IN SEAWATER BY CARBON FILAMENT ATOMIC SPECTROMETRY,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W75-05405

DIRECT PHOTOMETRIC DETERMINATION OF SOLUBLE PROTEINS IN NATURAL WATERS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
E. V. Debeiko, A. K. Ryabov, and B. I. Nabivanets.
Gidrobiol Zh. 9(6): 109-113, Illus. 1973.
Identifiers: Enzymes, Freezing-out method, *Microbiological studies, Natural waters, *Photometric method, *Proteins(Soluble), Water analysis, Pollutant identification.

Described are the reagents and method of analysis for direct determination of soluble proteins in natural waters by the photometric method. Freezing-out was used as the method of concentration, since a low temperature reduces possible losses of protein as a consequence of its destruction under the effect of enzymatic and micro-biological processes. A check of the method on various water samples showed that small systematic errors occur during freezing-out and passage through filter paper.--Copyright 1974, Biological Abstracts, Inc.
W75-05409

TRANSPORT FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W75-05416

THERMODYNAMIC STUDIES OF THE EFFECTS OF SOLVENTS ON MOLECULAR COMPLEX FORMATION EQUILIBRIA; ORIENTATION OF WATER AROUND NONPOLAR SOLUTES IN AQUEOUS SOLUTIONS,
Oklahoma Univ., Norman. Graduate Coll.
For primary bibliographic entry see Field 1B.
W75-05447

FLAMELESS ATOMIC ABSORPTION DETERMINATION OF COBALT NICKEL, AND COPPER - A COMPARISON OF TANTALUM AND MOLYBDENUM EVAPORATION SURFACES,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
For primary bibliographic entry see Field 5A.
W75-05487

SOLVENT EXTRACTION FOR USE WITH FLAME ATOMIC ABSORPTION SPECTROMETRY,
Toronto Univ., (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 5A.
W75-05488

COMPARISON OF CONTINUOUS WAVE AND PULSED CONTINUUM SOURCES FOR ATOMIC FLUORESCENCE FLAME SPECTROMETRY,
Florida Univ., Gainesville. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-05489

AVOID PROBLEM SPOILS THROUGH OVERBURDEN ANALYSIS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05494

MINERALOGY OF SUSPENDED SEDIMENT AND CONCENTRATION OF FE, MN, NI, ZN, CU, AND PB IN WATER AND FE, MN, AND PB IN SUSPENDED LOAD OF SELECTED KANSAS STREAMS,
Kansas Univ., Lawrence. Dept. of Geology; and Kansas Univ., Lawrence. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05521

ANALYSIS OF GROUND-WATER REGIMES BY USE OF NATURAL URANIUM ISOTOPE VARIATIONS,
Florida State Univ., Tallahassee. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05535

THE PORE WATER CHEMISTRY OF RECENT SEDIMENTS IN THE WESTERN MEDITERRANEAN BASIN,
Institut de Physique de Globe, Paris (France).
For primary bibliographic entry see Field 5B.
W75-05587

CHEMICAL HYDROGEOLOGY OF THE CARBONATE PENINSULAS OF FLORIDA AND YUCATAN,
Nevada Univ., Reno.
For primary bibliographic entry see Field 2F.
W75-05614

BIOLOGICAL POLLUTION INDICATORS IN UNDERGROUND WATERS. (IN SLOVENIAN),
Kemijski Institut Boris Kidric, Ljubljana (Yugoslavia).
For primary bibliographic entry see Field 5A.
W75-05616

EFFECT OF CO2 ON THE CHEMICAL EQUILIBRIUM OF SOIL SOLUTION AND GROUND WATER,
Arizona Univ., Tuscon. Dept. of Hydrology.
For primary bibliographic entry see Field 2G.
W75-05623

WATER-QUALITY CHANGES DURING A SALMON RUN IN AN INTERIOR ALASKAN STREAM,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 5B.
W75-05628

HYDROGEOCHEMISTRY OF THE NORTHERN YUCATAN PENINSULA, MEXICO, WITH A SECTION ON MAYAN WATER PRACTICES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-05647

THE SCAVENGING OF SILVER BY MANGANESE AND IRON OXIDES IN STREAM SEDIMENTS COLLECTED FROM TWO DRAINAGE AREAS OF COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2J.
W75-05652

HYDROLOGY AND PHYTOPLANKTON OF A CONTINENTAL SHELF TRANSECT OF CAMPECHE BAY, MEXICO (AUGUST, 1972). (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
For primary bibliographic entry see Field 2L.
W75-05673

CHEMISTRY OF THROUGHFALL UNDER DOUGLAS FIR AND ROCKY MOUNTAIN JUNIPER,
Utah State Univ., Logan. Dept. of Forest Science.
For primary bibliographic entry see Field 2I.
W75-05685

CATION EXCHANGE CHARACTERISTICS OF SOME METAL IONS IN NITRIC ACID-AMMONIUM ACETATE MEDIUM,
Allahabad Univ. (India). Chemistry Labs.
For primary bibliographic entry see Field 5A.
W75-05686

ORIGIN OF METALLIFEROUS SEDIMENTS FROM THE PACIFIC OCEAN,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2J.
W75-05701

DIRECT DETERMINATION OF GOLD, COBALT, AND LITHIUM IN BLOOD PLASMA USING THE MINI-MASSMANN CARBON ROD ATOMIZER,
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-05702

SPECTROPOLARIMETRIC DETERMINATION OF COPPER (II), NICKEL (II) AND IRON (III) IONS WITH N-CARBOXYMETHYLPYRROLIDINE-2-CARBOXYLIC ACID,
Turin Univ. (Italy). Istituto di Chimica Analitica.
P. Mirti.
Analytica Chimica Acta, Vol 69, No 1, p 69-77, March, 1974. 7 fig, 4 tab, 10 ref.

Descriptors: *Volumetric analysis, *Analytical techniques, *Polarographic analysis, *Copper, *Nickel, *Iron, Ions, Chelation, Colorimetry, Spectroscopy, Chemical analysis.
Identifiers: Ligands, Spectropolarimetry.

The necessary conditions for the polarimetric titration of metal ions with an optically active titrant are: (1) the stability constant of the complex formed must be high enough to allow determination of the metal ion under the experimental conditions; and (2) the molar rotations of the ligand and of the complex must be different enough to permit a good appreciation of the end-point. This last condition affects the selection of the proper wavelength at which to carry out the titration. Another consideration is that regions of high absorbance must be avoided, because this could decrease the sensitivity of the detection. This study suggested N-Carboxymethyl pyrrolidine-2-carboxylic acid (CMPCA) as an optically active titrant. The values of the acidity constants of the ligand were determined and the order of magnitude of the stability constants of the complexes formed by CMPCA with some metal ions was evaluated. In order to determine the best conditions for the spectropolarimetric titrations, the dependence of the molar rotation of CMPCA and its complexes on wavelength and pH was examined. The spectropolarimetric titrations of copper (II), nickel (II), and iron (III) ions were carried out successfully. Titrations of other metal ions, such as cobalt (II) and zinc (II) were tested, but the results were unsatisfactory. (Pulliam-Vanderbilt)
W75-05704

2L. Estuaries

THE RESPONSE OF NEARSHORE PERIPHYTON IN WESTERN LAKE SUPERIOR TO THERMAL ADDITIONS,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 5C.
W75-05354

NITROGEN BUDGET OF A NORTH CAROLINA ESTUARY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-05357

THE THREE DIMENSIONAL HEATED SURFACE JET IN A CROSS FLOW,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W75-05360

TRACE METAL ASSOCIATIONS IN SUB-ARCTIC FJORD ENVIRONMENTS, PROGRESS REPORT MAY 1972-MARCH 1974,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W75-05403

DETERMINATION OF BUDGETS OF HEAVY METAL WASTES IN LONG ISLAND SOUND, ANNUAL REPORT, PART I,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5B.
W75-05410

DETERMINATION OF BUDGETS OF HEAVY METAL WASTES IN LONG ISLAND SOUND, ANNUAL REPORT, PART II,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5B.
W75-05411

TRANSPORT FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W75-05416

THE INFLUENCE OF BIG CYPRESS LAND DEVELOPMENT IN THE DISTRIBUTION OF HEAVY METALS IN EVERGLADES ESTUARIES,
Florida State Univ., Tallahassee. Marine Lab.
For primary bibliographic entry see Field 5B.
W75-05434

THE VITAL ROLE OF PROTOZOA IN MOBILE BAY,
Organization University of South Alabama, Mobile. Dept. of Biological Sciences.
E. E. Jones.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 171, $3.25 paper copy, $2.25 microfiche. Alabama Water Resources Research Institute, Auburn, Bulletin 22, January 1975. 16 p, 3 fig, 5 ref. OWRT A-021-ALA (4).

Descriptors: *Protozoa, Estuaries, *Alabama, Systematics, Surveys, Bays, Food webs, Ecosystems.
Identifiers: *Mobile Bay(Ala), *Oikomonas termo, *Mayorella oclawaha, *Prorodon opalescens.

The results of a three-year study of the protozoa of Mobile Bay, Alabama, are described for the non-scientist. Protozoa are single cell animals which are too small to be seen without a microscope, incapable of making noise, and only rarely smell bad in heavy concentrations. Protozoa are the basal animals in the animal food web; they feed on both bacteria and the unicellular green plants and thus they are the lowest point at which plant material is converted into animal material. Most of the higher animal forms would be doomed if the protozoa were absent. Mobile Bay is the third largest drainage basin in the United States. The Bay is roughly triangular in shape with the apex pointed north. Rivers bring in fresh water, nutrients and pollution and the tide brings in saline water from the Gulf of Mexico, converting the Bay into a giant mixing bowl of fresh water and marine forms. Many of each are killed by the natural rapid environmental changes, but some from each source have been able to adapt to the rapid saline changes of the Bay and have become permanent, useful members of the Bay's animal population. Protozoa are essential to the Bay's productivity.
W75-05525

INSTREAM AERATION AND PARAMETERS OF STREAM AND ESTUARINE NITRIFICATION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
For primary bibliographic entry see Field 5A.
W75-05530

THE RATE OF MERCURY LOSS FROM CONTAMINATED ESTUARINE SEDIMENTS IN BELLINGHAM BAY, WASHINGTON,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-05578

MODELING OF PARTICULATES IN GARY, INDIANA AREA,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W75-05586

A NUMERICAL TECHNIQUE FOR AQUIFER EVALUATION,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05612

LOCATION OF THE NON-TIDAL CURRENT NULL ZONE IN NORTHERN SAN FRANCISCO BAY,
Geological Survey, Menlo Park, Calif.
D. H. Perterson, T. J. Conomos, W. W. Broenkow, and P. C. Doherty.
Estuarine and Coastal Marine Science, Vol 3, No 1, p 1-11, January 1975. 6 fig, 1 tab, 42 ref.

Descriptors: *Estuaries, *California, *Density currents, *Tides, *Water circulation, Streamflow, Saline water intrusion, Advection.
Identifiers: *San Francisco Bay(Calif).

Variations in Sacramento-San Joaquin River discharge into northern San Francisco Bay cause shifts in location of the density-current null zone. At a river flow of 2000 cu m/s this null zone is approximately 20 km from the seaward end of the estuary, whereas at a river flow of 100 cu m/s it is 80 km from the seaward end; the corresponding distances of salinity penetration are approximately 40 to 90 km from the seaward end. Seaward of the null zone, during low (Summer) river discharge conditions, the inward-flowing bottom density current appears typically strong (5-15 cm/s) relative to the outward-flowing river current (River discharge per unit cross-channel area) of greater than 2 cm/s. Landward from this null zone the average river current increases with decreasing cross-channel area. This implies that during the summer, water within the null zone has the longest average advective replacement time relative to water seaward or landward of the null zone. (Knapp-USGS)
W75-05650

THE WATER QUALITY AND BOTTOM SEDIMENT CHARACTERISTICS OF NEW JERSEY LAGOON DEVELOPMENTS,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5B.
W75-05658

A STUDY OF BENTHIC INVERTEBRATES IN LAGOON SYSTEMS IN THE SALT MARSHES OF NEW JERSEY,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Zoology.
W. S. Butterfield.
Master's Thesis, October 1973. 86 p, 15 fig, 7 tab, 4 append. OWRT B-040-NJ(3). 14-31-0001-3614.

Descriptors: *Wetlands, *Lagoons, *Benthic fauna, *Bottom sediments, Benthos, *Salt marshes, Tidal marshes, Coastal marshes, *New Jersey, *Invertebrates, Environment, Dissolved oxygen, Toxicity, Decomposing organic matter.

A study was conducted in four lagoon systems located in Ocean County, New Jersey, to determine the nature of benthic fauna populations in the bottom sediments of these systems. The associated benthic environment was also studied and the benthic populations found were used as an indication of productivity. The four lagoon systems studied were less productive than the adjacent Barnegat Bay. On any date the predicted mean number of species found in the bay was at least twice the predicted mean for the lagoon systems. Capitella capitata, one of the more tolerant estuarine species, was the most abundant organism found in the lagoons. Depth appears to be the major factor influencing the benthic environment. The benthic environment in the lagoon systems can be characterized in the following manner: deeper than adjacent bay waters, weak bottom currents, fine silt-clay sediments, low dissolved oxygen concentrations and high concentrations of organic matter in the top layer of sediments. The deeper waters of the lagoon systems make bottom water exchange difficult which, in addition to low dissolved oxygen concentrations, may result in high concentrations of toxic substances, caused by the decomposition of organic matter. (Nieswand-Rutgers)
W75-05664

MARINE ATLAS OF HAWAII: BAYS AND HARBORS.
Hawaii Univ., Honolulu. Sea Grant Program.
For primary bibliographic entry see Field 7C.
W75-05665

TAR POLLUTION SURVEY AT GOLDEN BEACH, FLORIDA,
Coast Guard, Goton, Conn. Research and Development Center.
For primary bibliographic entry see Field 5B.
W75-05667

A TECHNIQUE FOR PREDICTING THE MOVEMENT OF OIL SPILLS IN NEW YORK HARBOR,
Coast Guard, Groton, Conn. Research and Development Center.
For primary bibliographic entry see Field 5B.
W75-05668

EVALUATION TEST OF A SMALL HARBOR OIL SPILL RETRIEVAL SYSTEM,
Harding Pollution Control Corp., West Hempstead, N.Y.
For primary bibliographic entry see Field 5B.
W75-05669

HYDROLOGY AND PHYTOPLANKTON OF A CONTINENTAL SHELF TRANSECT OF CAMPECHE BAY, MEXICO (AUGUST, 1972). (IN SPANISH),
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Biologia.
H. Santoyo, and M Signoret.
Rev Latinoam Microbiol. Vol 15 No 4 p 207-215. 1973 Illus. English summary.

Descriptors: *Phytoplankton, Dissolved oxygen, Water temperature, Salinity, Continental shelf, Mexico, Bays, Algae.
Identifiers: Campeche Bay, Chroococcales.

Three hydrobiological areas were observed: Coastal with high phytoplankton density (20,000 to 70,000 cells/1) high salinity and temperature (37.00% and 28.8C) and low dissolved O (4.2 m1/1); Middle, with a low phytoplankton density (100 to 1,000 cells/1), low salinity (36.5%) high temperature (28.0C) and relative high dissolved oxygen (4.4 to m1/1); and Oceanic influenced area, with a low phytoplankton density (400 to 800 cells/1) except during a bloom of blue green chroococcales algae (286,800 cells/1) salinity and temperature high (37.1% and 28.5C) and the dissolved O2 in low proportion (4.2 ml/1). In vertical levels, the density of phytoplankton and variations, with the highest number of cells per liter in the deepest level (16% of light) and the lower number in the surface level (60% light).--Copyright 1974, Biological Abstracts, Inc.
W75-05673

DISCRIMINATION OF WASTE OILS BY MICRO EMISSION SPECTROCHEMICAL ANALYSIS,
Spectrogram Corp., North Haven, Conn.
For primary bibliographic entry see Field 5A.
W75-05680

A PHYTOPLANKTON BLOOM IN THE LAGOON OF VENICE,
Istituto di Biologia del Mare, Venice (Italy).
D. Voltolina.
Arch Oceanogr Limnol Vol 18, No 1, p 19-37, 1973. Illus.

Descriptors: *Eutrophieation, Venice, Red Tide, *Phytoplanktion, Italy.
Identifiers: Eutreoptiella pascheri, Skeletonema costatum.

A red tide-like phenomenon (Skeletonema costatum and Eutreptiella passcheri) which took place during spring 1971 in Venice, Italy is discussed. The lagoonar origin of the organisms responsible of the phenomenon appears clear; the factors influencing the bloom have not been clearly identified, but it seems likely that temperature played an important role.--Copyright 1974, Biological Abstracts, Inc.
W75-05699

ECOLOGIC AND ADAPTIVE ASPECTS OF SOME BIVALVES OF THE SAO PAULO SEACOAST, (IN PORTUGUESE),
Sao Paulo Univ. (Brazil). Dept. of Zoology.
W. Narchi.
Pap Avulsos Zool (Sao Paulo) Vol 27, No 19, p 235-262, 1974. Illus.

Descriptors: *Mollusks, Brazil.
Identifiers: Anomalocardia brasiliana, Donax hanleyanus, Iphigenia brasiliensis, Tivela mactroides.

Ecological and adaptive features of 4 spp. of Brazilian bivalves are analyzed. Two species belong to the Veneracea: Anomalocardia brasiliana and Tivela mactroides and 2 to the Tellinacea: Donax hanleyanus and Iphigenia brasiliensis. As they live in different environments, they were analyzed regarding to their adaptation to the habitat, their lines of convergence and the limitations due to phylogenesis. A general comparison was made between the 4 spp. and several adaptive features were correlated to habitat. Although belonging to different families, A. brasiliana and I. brasiliensis show some convergence in anatomy due to adaptation to calm waters and D. hanleyanus and T. mactroides to waters with bottom deposit disturbance.--Copyright 1974, Biological Abstracts, Inc.
W75-05714

ON THE DISTRIBUTION OF EURYTERMORA AFFINIS (POPPE) (COPEPODA) IN THE WESTERN SCHELDT ESTUARY,
For primary bibliographic entry see Field 5C.
W75-05748

THE ECOLOGY OF THE PLANKTON OF THE CHESAPEAKE BAY ESTUARY,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 5C.
W75-05792

PRELIMINARY MODEL OF POTOMAC ESTUARY PHYTOPLANKTON,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5C.
W75-05798

ESTUARIAL AND COASTAL POLLUTION,
For primary bibliographic entry see Field 5B.
W75-05811

MOSQUITO LAGOON BARRIER BEACH STUDY,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
A. J. Mehta, and H. K. Brooks.
Shore and Beach, Vol 41, No 2, p 26-34, October 1973. 15 fig, 1 tab, 21 ref.

Descriptors: *Oceanography, *Marine geology, *Lagoons, *Beach erosion, *Shore protection, Breakwaters, Tides, Tidal effects, Waves(Water), Barrier Islands, Dunes, On-site investigation, Coastal engineering, *Florida, Beaches, *Barriers.
Identifiers: *Mosquito Lagoon(Fla), Kennedy Space Center(Fla).

Mosquito Lagoon occurs north of False Cape, part of the cuspate foreland known as Cape Canaveral. It is part of the Kennedy Space Center property. The lagoon is separated from the Atlantic Ocean by a natural barrier beach. Major space installations are located south of the lagoon. The study was undertaken to determine if the barrier is vulnerable to an oceanic storm breakthrough,

asmuch as the resultant tide and storm surge in the lagoon could severely affect the ecological balance of the lagoon and also damage the installations. Geological and coastal engineering evidence indicated that no major barrier breakthroughs are likely to occur, and that even in the event of such a breakthrough, the resultant tidal inlet will be subsequently closed by normal wave action and littoral transport. Calculations also indicated that the barrier will not break from the lagoonal side due to water piled up by extreme winds. It was recommended that in order for the barrier to protect the lagoon it is best to maintain the barrier beach in its present natural state. (Gibb-ISWS)
W75-05829

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

FOAM AND BUBBLE FRACTIONATION FOR REMOVAL OF TRACE METAL IONS FROM WATER,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W75-05590

3B. Water Yield Improvement

ARTIFICIAL RECHARGE - A POTENTIAL SOLUTION FOR MANY WATER PROBLEMS,
Ohio State Univ., Columbus. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W75-05511

GEOHYDROLOGY OF PLEISTOCENE DEPOSITS AND SUSTAINED YIELD OF PRINCIPAL PLEISTOCENE AQUIFER, LAKE COUNTY, INDIANA,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05514

ENVIRONMENTAL CONTROLS ON GROUNDWATER CHEMISTRY IN NEW MEXICO. I. THE EFFECT OF PHREATOPHYTES,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
For primary bibliographic entry see Field 2D.
W75-05531

PRESSURE BUILDUP AND DRAWDOWN BEHAVIOR IN UNDERSATURATED RESERVOIRS OF DISCONTINUOUS PERMEABILITY,
Stanford Univ., Calif. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 4B.
W75-05617

WATERSHED VALUES IMPORTANT IN LAND USE PLANNING ON SOUTHERN FORESTS,
Forest Service (USDA), Franklin, N.C. Coweeta Hyrologic Lab.
For primary bibliographic entry see Field 4D.
W75-05716

WAMIS ABSTRACTS, NO. 1,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 10A.
W75-05767

3C. Use Of Water Of Impaired Quality

USES OF POWER PLANT DISCHARGE WATER IN GREENHOUSE PRODUCTION,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Agricultural Development.
K. J. Bond, W. K. Furlong, L. D. King, C. E. Madewell, and J. B. Martin.
Available from NTIS, Springfield, Va. as REPT. No. CONF. 740317-1, $4.00 in paper copy, $2.25 in microfiche. In: Conference on Use of Waste Water in Production of Food and Fiber, March 5, 1974, Oklahoma City, Oklahoma. Conf-740377-1, 18 p, 2 fig, 4 tab, 10 ref.

Descriptors: *Agriculture, *Research and development, *Horticultural crops, *Waste disposal, *Nuclear powerplants, *Heat, *Greenhouses, Structures, Environment, Laboratories, Thermal pollution, Water, Coolants, Governments, Economics, Design, Evaluation, System analysis, Technology, Experimental farms, Environmental control, Environmental engineering.

The TVA waste heat research greenhouse at Muscle Shoals, Alabama, is the result of the cooperative efforts of many individuals. Engineers at Oak Ridge National Laboratory (ORNL) developed the basic environmental control system for the greenhouse, and provided technical assistance to TVA engineers (Division of Chemical Development) who designed the actual facility. Funds for construction of the greenhouse were provided by the Division of Power Resource Planning. The Division of Agricultural Development coordinates the project and operates the greenhouse. The three major overall objectives of the research project are to test the capabilities of the environmental control system, to determine the effect of the resulting environment on production of horticultural crops, and to evaluate the overall economics of the system. Results of engineering and horticultural tests and economic analyses will be used to refine the system. If the resulting system proves vialbe, there are tentative plans to build a facility of approximately one acre at Browns Ferry nuclear power plant in north Alabama where TVA has reserved 180 acres inside the exclusion area for possible waste heatuse. (Houser-ORNL)
W75-05380

USE OF THERMALLY ENRICHED WATER FOR GROWING FIELD CROPS IN MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
E. R. Allred, and J. R. Gilley.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 112, $3.25 in paper copy, $2.25 in microfiche. 1974. 6 p, 13 fig, 1 tab. OWRT B-057-MINN(4), 14-31-0001-3602.

Descriptors: *Irrigation, Soils, Energy, Crops, *Minnesota, *Crop production, *Potatoes, Beneficial use.
Identifiers: *Waste heat utilization, *Soil warming, *Elk River(Minn).

The purpose was to evaluate the use of waste heat energy for the growing of agricultural crops near Elk River, Minnesota; to determine the base heat transmissibility characteristics of soil; and to evaluate crop frost protection benefits as the result of the soil warming process. Conclusions were: Soil warming is necessary for extension of the growing season for field crops in Minnesota. Soil warming cannot be done effectively by using an irrigation system alone. Artificial warming of a field soil by utilization of waste heat energy does not provide significant protection for potatoes against frosts at temperatures below 28F. Maturity date for early potatoes varieties grown in heated soil can be advanced between two and three weeks, as compared to potatoes grown in unheated field soils. Only small quantities of waste heat energy can be utilized by a field soil in Minnesota during July and August. (Walton-Minnesota)
W75-05440

CROP RESPONSE TO WARMING SOILS ABOVE THEIR NATURAL TEMPERATURES,
Oregon State Univ., Corvallis. Dept. of Soils.
K. A. Rykbost, L. Boersma, H. J. Mack, and W. E. Schmisseur.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-240 028. Paper copy $5.25, microfiche $2.25. Agricultural Experiment Station, Special Report 385, January 1974. 98 p, 11 fig, 43 tab, 46 ref. OWRT B-028-ORE(3).

Descriptors: Soils, *Crop production, Agriculture, Economic feasibility, *Oregon, Heated water, *Crops response, *Soil temperature, Irrigation.
Identifiers: *Willamette Valley(Ore), *Soil warming, *Waste heat utilization.

The subsurface application of heat to soil by circulating the warm water through a network of buried pipes was studied. The effect of increased soil temperatures on crop production was evaluated. In areas where crop irrigation is required, subsurface irrigation with warm water could be practiced or water taken from the soil heating loop could be applied with sprinklers. Experimental procedures, the crop yield response to soil warming, and the economic feasibility of production using these methods are described.
W75-05451

SOIL AND AIR TEMPERATURE CHANGES INDUCED BY SUBSURFACE LINE HEAT SOURCES,
Oregon State Univ., Corvallis. Dept. of Soils.
K. A. Rykbost, and L. Boersma.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 280, $5.25 paper copy, $2.25 microfiche. Agricultural Experiment Station, Special Report 402, December 1973. 105 p, 22 fig, 38 tab, 17 ref. OWRT B-028-ORE(2).

Descriptors: *Heated water, *Soil temperature, *Air temperature, Soil water, Energy budget, *Beneficial use.
Identifiers: *Soil warming, *Waste heat utilization.

Multiple use of waste heat from power plants may become an important consideration in their development and siting. The heat in the cooling water must be considered a resource to be managed for effective use. Soil warming was suggested as one of several possible productive uses for the heated discharges. The sub-surface application of heat to soil by circulating the warm water through a network of buried pipes was proposed and studied. In regions where soil temperatures limit plant growth, artificial soil warming may be an economically feasible practice. This hypothesis was evaluated in the soil warming experiment. Energy balances and water regimes of soils heated above natural temperatures are described.
W75-05452

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-05774

SOIL AND GROUND-WATER SALINIZATION BENEATH DIVERSIFIED IRRIGATED AGRICULTURE,
Agricultural Research Service, Fresno, Calif. Ground Water Recharge Field Station.
H. I. Nightingale.
Soil Science, Vo 188, No 6, p 365-373, December 1974. 5 fig, 1 tab, 24 ref.

Descriptors: *Saline soils, *Alkaline soils, *Soil management, *Irrigated land, *Irrigation effects, Sampling, Water sampling, Salinity, Groundwater, *California, Fruit crops, Irrigation practices, Agriculture, Agronomy, Speciality crops, Environmental effects, Soil-water-plant relationships, Orchards, Oranges, Soil analysis, Statistical methods, Variability.
Identifiers: Grapes, Row crops, Truck crops, Fresno County(Calif).

Evaluation of salinization of groundwater in a 334 sq mi area of diverse irrigation agriculture was undertaken in Fresno County, California. Cumulative percentage frequency curves for soil salinity concentrations (Based on 556 samples) were presented for the 1.83 to 6.10 m soil depth interval under four crop classifications. The geometric mean soil salinity at this depth interval under no crops, grapes, row and truck crops, and orchards was 49, 52, 63 and 97 mg total soluble salts per kg dry soil (TSS/kg), respectively. When the soil salinity exceeded 190 mg TSS/kg, orchards contributed 73.3% of the observations. When soil salinity was less than 40 mg TSS/kg, grapes contributed 52.8% and row and truck crops 28.3%. A cumulative percentage frequency curve for groundwater salinity concentrations was defined from 244 observations from 80 wells sampled in 1969, 1970, and 1972. There was good agreement with the projected curve which was based on the 556 soil salinity values. The observed groundwater geometric mean, EC, was 420 micromhos/cm as compared to 390 micromhos/cm on the projected curve. It was shown that groundwater salinity can be related to soil salinity and irrigated crop management on a field scale. (Sanderson-ISWS)
W75-05842

3D. Conservation In Domestic and Municipal Use

ANALYSIS OF THEORIES AND METHODS FOR ESTIMATING, BENEFITS OF PROTECTING URBAN FLOODPLAINS,
Washington Univ., St. Louis, Mo. Inst. for Urban and Regional Studies.
For primary bibliographic entry see Field 4A.
W75-05481

AN EVALUATION OF WATER REUSE FOR MUNICIPAL SUPPLY,
Southern Illinois Univ., Carbondale.
For primary bibliographic entry see Field 5D.
W75-05482

GEOLOGY AND GROUND WATER RESOURCES OF SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA,
New Jersey Dept. of Environmental Protection, Trenton. Div. of Water Resources.
For primary bibliographic entry see Field 4B.
W75-05513

ESTIMATION OF COMMERCIAL, INDUSTRIAL AND GOVERNMENTAL WATER USE FOR LOCAL AREAS,
California Univ., Santa Barbara.
For primary bibliographic entry see Field 6D.
W75-05604

PUBLIC PERCEPTIONS OF WATER QUALITY IN A METROPOLITAN AREA,
Georgia Inst. of Tech., Atlanta. School of Industrial and Systems Engineering.
For primary bibliographic entry see Field 5G.
W75-05605

A CLIMATIC MODEL OF URBAN ENERGY BUDGETS,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 4C.
W75-05683

WATER SUPPLY, TREATMENT, DISTRIBUTION, AND REUSE OPTIMIZATION IN ARID URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-05773

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-05774

3E. Conservation In Industry

DIGEST OF ENERGY FACTS FOR WATER RESOURCES STUDIES IN MINNESOTA,
Minnesota Univ., Minneapolis. Water Resources Research Center.
W. C. Walton.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 961, $4.75 in paper copy, $2.25 in microfiche. Bulletin 74, September 1974. 76 p, 46 tab. OWRR A-999-MINN(33).

Descriptors: *Energy, Water policy, *Minnesota, Water utilization, Resources, Conservation, Environment, Production.
Identifiers: *Energy-water relationships.

A digest is presented of available information concerning energy-water relationships, energy resources, consumption, sources, production, conservation, and environmental (including water resources) concerns which can serve as a background document for those who are interested in water resources and energy in Minnesota.
W75-05352

USES OF POWER PLANT DISCHARGE WATER IN GREENHOUSE PRODUCTION,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Agricultural Development.
For primary bibliographic entry see Field 3C.
W75-05380

CONTROL OF MERCURY IN EFFLUENTS FROM CHLORINE PLANTS,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 5D.
W75-05435

THE IMPACT OF ENERGY DEVELOPMENT ON WATER RESOURCES IN ARID LANDS, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
C. Bowden.
Available from the National Technical Information Service as PB-240 008, $8.75 in paper copy, and $2.25 in microfiche. Arid Lands Resource Information Paper No 6. January 1975. 278 p, 17 fig, 492 refs.

Descriptors: *Bibliographies, *Arid lands, *Water demand, *Water shortage, *Energy, Strip mines, Strip mine wastes, Oil shales, Coals, Great Plains, Colorado River Basin, Missouri River, Rocky Mountain region, Southwest U.S., Environmental effects, Social aspects, Water allocation(Policy), Water quality, Energy conversion, Geothermal studies, Nuclear energy, Nuclear waste.

Water is basic to energy conversion systems, natural and man-made. Consequences of energy extraction and conversion in arid lands where water is scarce. The historical past is utilized as a record for casting modern development plans into perspective; the worldwide growth in energy consumption rates is considered as the motive force behind many current energy projects in arid lands. Energy sources (Coal, oil, gas, oil shale, solar energy, alternative energy, alternative energy sources, fission, fusion, and geothermal) are reviewed in terms of their consequences on the air, land, water, and inhabitants of such regions. Two rivers, the Colorado and the Missouri, provide small-scale models of the rewards and hazards of heavily exploiting water-short areas. In both instances, energy development plans, as now proposed, will seriously deplete the water supply, alter the quality of the water, land, and air, and increase the human population. A great deal of energy can be extracted from arid lands but the consequences of such extraction on the environment are but sketchily known because development plans have received more attention than environmental impact.
W75-05471

CHARACTERIZATION OF FRUIT AND VEGETABLE PROCESSING WASTEWATERS,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 5B.
W75-05534

EXAMPLES OF WATER AND AIR PURIFICATION BY CATALYTIC REACTION (BEISPIELE FUER DIE REINHALTUNG VON WASSER UND LUFT DURCH KATALYTISCHE REAKTIONEN),
For primary bibliographic entry see Field 5D.
W75-05540

MODELING CADMIUM DISCHARGE FROM AN ELECTROPLATING LINE WITH THE GASP IV SIMULATION LANGUAGE,
Purdue Univ., Lafayette, Ind. School of Industrial Engineering.
For primary bibliographic entry see Field 5B.
W75-05573

ESTIMATION OF COMMERCIAL, INDUSTRIAL AND GOVERNMENTAL WATER USE FOR LOCAL AREAS,
California Univ., Santa Barbara.
For primary bibliographic entry see Field 6D.
W75-05604

SIMULATED EFFECTS OF OIL-SHALE DEVELOPMENT ON THE HYDROLOGY OF PICEANCE BASIN, COLORADO,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4C.
W75-05637

INDUSTRIAL WATER PRETREATMENT,
Calgon Corp., Pittsburgh, Pa. Water Management Div.
For primary bibliographic entry see Field 5D.

W75-05695

MERCURY, CADMIUM, AND CHROMIUM IN THE NETHERLANDS, (LE MERCURE, LE CADMIUM ET LE CHROME AUX PAYS-BAS),
Central Lab. TNO, Delft (Netherlands).
For primary bibliographic entry see Field 5B.
W75-05710

3F. Conservation In Agriculture

A COMPUTERIZED MODEL FOR DETERMINING THE OPTIMAL WATER UTILIZATION FOR AGRICULTURE,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-05356

PROTECTION OF THE ENVIRONMENT FROM CONTAMINATION WITH PESTICIDES USED IN COTTON GROWING, (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W75-05408

DAVIS COUNTY COMPREHENSIVE STUDY: CULINARY WATER, PRESSURE IRRIGATION WATER, SANITARY SEWERAGE.
Davis County Planning Commission, Farmington, Utah.
1970. 64 p, 1 fig.

Descriptors: *Sewerage, *Water supply development, *Utah, *Irrigation water, Planning, Urbanization, Public utilities, Scheduling, Water resources development, Irrigation engineering, Comprehensive planning.
Identifiers: *Davis County(Utah), Culinary water, Pressure irrigation, Sanitary sewerage.

A plan was prepared for Davis County, Utah, lying northwest of Salt Lake City. The objective was to (a) correlate the functions of the existing and proposed facilities of these three utility systems within the communities and county; (b) make a layout, preliminary design and cost estimate of additional facilities which would most economically serve the needs of Davis County for the next 20 years; and (c) prepare a schedule for these facilities to be constructed during each five years for the 20-year period. A separate report was prepared for each of the three utility systems, with maps showing the existing and proposed facilities and tables giving the cost estimates and construction schedules. Inventories and projections of the 9 water systems of the County are presented. The same type of information is given for three conservancy districts pertaining to pressure irrigation. Sanitary sewerage plans are described for three sewer systems in the County. Countrywide maps for culinary water and pressure irrigation are included. (Poertner)
W75-05418

USE OF WASTE HEAT FOR SOIL WARMING AND IRRIGATION IN NORTHERN CLIMATES,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
A. R. Allred, P. E. Read, and J. R. Gilley.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 881, $3.25 in paper copy, $2.25 in microfiche. Presented at 1973 Winter Meeting American Society of Agricultural Engineers. Chicago, Illinois December 11-14, 1973. Paper No 73-2544. 8 p, 11 fig, 1 tab. OWRT B-057-MINN(2), 14-31-0001-3602.

Descriptors: *Irrigation, Soils, Energy, Crops, Minnesota, *Potatoes, Loam, *Crop production, Cold regions.
Identifiers: *Waste heat utilization, *Soil warming, Elk River(Minn).

Maturity rates, yield and frost protection benefits were measured for potatoes being grown in a Hubbard sandy loam soil near Elk River, Minnesota. Field plot soil was heated by circulation of water (100F) through underground piping system. Growing season was advanced sufficiently in spring to permit harvest of second potato crop. (Walton-Minnesota)
W75-05444

PHYSIOLOGICAL EFFECTS OF WATER STRESS ON YOUNG CORN PLANTS,
Oregon State Univ., Corvallis. Dept. of Soils.
For primary bibliographic entry see Field 2I.
W75-05450

AQUATIC PLANTS FROM MINNESOTA, PART 5 - DIGESTIBILITY AND FERMENTATION OF AQUATIC PLANTS,
Minnesota Univ., Minneapolis. Dept. of Animal Science.
J. G. Linn, R. D. Goodrich, and E. J. Staba.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 206, $3.75 in paper copy; $2.25 in microfiche. Water Resources Research Center, Minneapolis, University of Minnesota, Bulletin 70, Aug 1974. 24 p, 9 tab, 35 ref. OWRT A-025-MINN(10).

Descriptors: *Aquatic plants, Forage, *Silage, *Minnesota, *Fermentation, *Digestion, *Forage palatability, Sheep, Alfalfa.
Identifiers: Ensiling.

The research was conducted to characterize the fermentation of aquatic plants ensiled with and without additives and to determine the digestibility of dried and ensiled aquatic plants by lambs. Aquatic plants ensiled with the addition of organic acids, corn or haylage produced silages of undesirable quality. Additions of haylage to sterilized aquatic plants before ensiling resulted in a silage of more desirable quality. Dry matter and crude protein digestibilities for sheep fed diets that contained either Myriophyllum exalbescens or Potamogeton pectinatus were lower than for lambs fed dehydrated alfalfa. However, energy digestibility was highest for lambs fed Myriophyllum exalbescens. Myriophyllum exalbescens appeared to be more palatable than Potamogeton pectinatus, but both were inferior to dehydrated alfalfa. Dry matter intakes of lambs fed ensiled aquatic plants, aquatic plants plus corn or aquatic plants plus haylage were lower than lambs fed either haylage or haylage plus corn diets. Additions of corn and haylage significantly increased aquatic plant organic matter digestibility. Energy and nitrogen digestibilities were lower for lambs fed diets that contained aquatic plants than for lambs fed haylage diets. The palatability of aquatic plants is a limiting factor in their use as a forage. Drying or ensiling do not appear to improve palatability. (See also W73-13716) (Walton-Minnesota)
W75-05466

MULTIPLICATION OF ALGAE IN SEWAGE WATER,
Tamil Nadu Agricultural Univ., Coimbatore, (India).
For primary bibliographic entry see Field 5G.
W75-05539

EFFECTS OF AMMONIUM NUTRITION ON WATER STRESS, WATER UPTAKE, AND ROOT PRESSURE IN LYCOPERSICON ESCULENTUM MILL,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del. Central Research Dept.
B. Quebedeaux, Jr., and J. L. Ozbun.
Plant Physiol Vol 52, No 6, p 677-679, 1973. Illus.
Identifiers: *Ammonium, Lycopersicon-esculentum, Nitrates, Nutrition, Root pressure, Water stress, *Tomatos, Root exudation, Absorption.

Ammonium (NH_4^+) nutrition inhibits w-ter uptake and root exudation of decreases leaf water potential of tomato plants grown in solution culture. This inhibition is readily reversible by NO_3^- for short term exposures to NH_4^+; however, recovery is delayed following long term exposures.--Copyright 1974, Biological Abstracts, Inc.
W75-05548

INFLUENCE OF MOISTURE, HEAT AND LIGHT STRESS ON HYDROGEN FLUORIDE FUMIGATION INJURY TO SOYBEANS,
Utah State Univ., Logan. Dept. of Botany.
H. H. Wiebe, and B. W. Poovaiah.
Plant Physiol, Vol 52, No 6, p 542-545, 1973.
Identifiers: Air, *Fumigation, Glycine-max, Heat, *Hydrogen fluoride, Light, Pollution, *Soybeans, *Stomatal closure, Absorption, Soil moisture stress.

Soybean (Glycine max (L) Merr) plants were exposed to a single fumigation with hydrogen fluoride (HF) at concentrations sufficient to cause visible injury within 2 days. They were subjected to soil moisture or osmotic stress prior to, during or after fumigation. Moisture stress before or during fumigation reduced injury because of stomatal closure and reduced F uptake. Moisture stress after fumigation markedly accentuated the injury resulting from a single fumigation compared to plants kept continually under optimum soil moisture conditions. Full sunlight following the fumigation accentuated injury, while shade reduced it. Higher temperatures following fumigation also increased severity of symptoms.--Copyright 1974, Biological Abstracts, Inc.
W75-05588

YIELD OF GREEN PEAS: II. EFFECTS OF WATER AND PLANT DENSITY,
Agricultural Research Council, Trumpington (England). Plant Breeding Inst.
J. A. D. Anderson, and J. G. H. White.
N Z J Exp Agric, Vol 2, No 2, p 165-171, 1974, Illus.
Identifiers: *Green peas, *Irrigation, Pisum-sativum, Rainfall, Soils, *Crop yield, *Soil moisture.

Green peas (Pisum sativum L. cv. 'Victory Freezer') were grown at 5 plant densities (52, 90, 105, 182, 358 plants/sq m) and 3 soil moisture treatments: natural rainfall, irrigation at flowering and pod swelling, and water stress at these periods. Both total green yield and green pea yield increased with increasing density, although green pea yield dropped slightly below 182 plants/sq m. No significant differences occurred between natural rainfall and water stress treatments. Irrigation gave an 87% increase in total green weight and a 56% increase in green pea yield. There was no indication of maximum yield occurring at a higher population under irrigation than under dryland conditions. Dryland peas matured 5-7 days earlier than those irrigated, the highest density being 2-4 days earlier than the lowest. Total vine length, full pods/plant, ovule initials/pod, peas/pod, and percentage of peas and pods at higher nodes all increased with decreasing plant density and irrigation. Vine length to the 1st pod and percentage of peas $>$ 11.1 mm sieve size increased with irrigation. The percentage of peas $<$ 7-9 mm increased with decreasing plant density, and the reverse occurred with the percentage of pale peas. Highest mature seed yields were obtained at 105 plants/sq m . The response to irrigation was similar to that for green peas. Practical implications of these results are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-05758

INVENTORY THEORY APPLICATION TO THE OPTIMUM CONTROL OF IRRIGATION WATER,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.

For primary bibliographic entry see Field 6A.
W75-05771

CHARACTERISTICS OF THE WINTER HYDROMETEOROLOGICAL REGIME OF DRAINED MINERAL SOILS,
For primary bibliographic entry see Field 2G.
W75-05833

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

COMMERCIAL NAVIGATION ON THE UPPER MISSISSIPPI RIVER: AN ECONOMIC REVIEW OF ITS DEVELOPMENT AND PUBLIC POLICY ISSUES AFFECTING MINNESOTA,
Minnesota Univ., Minneapolis. Dept. of Agriculture and Applied Economics.
R. W. Christianson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 962, $5.25 in paper copy, $2.25 in microfiche. University of Minnesota Water Resources Research Center, St. Paul, Bulletin No. 75, October 1974. 115 p, 15 tab, 10 fig. OWRT B-054-MINN(6). 14-31-0001-3601.

Descriptors: *Navigation, Water resources development, *Minnesota, *Water policy, *Transportation, *Inland waterways, Economics, Reviews, *Mississippi River, *Water demand, Model studies, Dredging, Waste disposal, Pollution taxes(Charges), Costs.
Identifiers: Public policy.

Inland waterway transport is a significant carrier of domestic cargo, accounting for about 14% of the total traffic. During the past decade cargo carried by the inland waterways increased by 46% (62% when the Great Lakes are excluded). By increasing the absolute amount of freight carried greater than the average (42%), the inland waterway's relative share of total freight traffic has also grown over the past decade. Also, development of the Upper Mississippi River into a major inland waterway has been even more significant for Minnesota and the Midwest than for much of the rest of the nation. A transportation model, based on competitive assumptions and employing a derived demand analysis, is presented. The model predicts that there will be an increase in demand for transportation services, especially barge services. However, derivation of the elasticity of demand for barge services revealed that the demand for barge services will become more elastic in the future. The current issues in commercial navigation which affect Minne,ota involve a resolution of the conflict between developmental and environmental values. The dredging issue reduces to one of what cost is the public willing to bear to preserve environmental values being destroyed by present methods of dredging and placement of dredge spoil. However, instead of the general public bearing the cost, users of the 9-foot navigation channel could be required to pay the full costs of environmentally sound dredge spoil disposal. With a system of user charges in effect, environmental values would be better accounted for and barge transportation would be assigned to its most efficient position in the national transportation system. (Waelti-Minnesota)
W75-05353

DRAINAGE PLANS WITH ENVIRONMENTAL BENEFITS.
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 8A.
W75-05422

HYDROLOGICAL BALANCING ACT ON A TEXAS NEW TOWN SITE.
American Society of Landscape Architects Louisville, Ky.
For primary bibliographic entry see Field 8A.
W75-05424

PONDING AGAINST THE STORM,
Obrist, (Alfred), Syracuse, N.Y.
For primary bibliographic entry see Field 8A.
W75-05425

SMOOTHER WATERS FOR THE NEXT 110,000,
Northampton Development Corp. (England).
For primary bibliographic entry see Field 8A.
W75-05427

LAND-USE CHANGES AND THE ECONOMIC EVALUATION OF NATURAL VIRGINIA PINE STANDS ON THE DIAL CREEK WATERSHED, DURHAM COUNTY, NORTH CAROLINA,
North Carolina State Univ., Raleigh. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-05446

INVESTIGATION OF ARTIFICIAL LAKE DESTRATIFICATION -- A HYDRAULIC MODEL STUDY,
Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 2H.
W75-05449

SELECTIVE WITHDRAWAL AT AN INTERMEDIATE DEPTH FROM A DENSITY STRATIFIED IMPOUNDMENT,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W75-05456

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN NORTHERN NEVADA IN RELATION TO DAM SAFETY,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 8B.
W75-05468

MUNICIPAL AND INDUSTRIAL REIMBURSEMENT FOR A WATER RESOURCE PROJECT IN WYOMING'S PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W75-05472

ANALYSIS OF THEORIES AND METHODS FOR ESTIMATING, BENEFITS OF PROTECTING URBAN FLOODPLAINS,
Washington Univ., St. Louis, Mo. Inst. for Urban and Regional Studies.
IWR Contract eport 74-14, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., November 1974. 103 p, 5 fig, 8 tab, 23 ref, 3 append.

Descriptors: *Flood protection, *Flood plains, *Methodology, *Land use, *Estimating, *Benefits, Management, Economics, Planning, Constraints, Measurement, Linear programming, Regression analysis, Simulation analysis, Mathematical models, Systems analysis.
Identifiers: *Urban flood plains, *Land values, Urban studies, Open space, Benefit maximization, Impact assessment, Flood risk.

Subject to problems caused by externalities, the benefits of floodplain protection can be appropriately measured by direct estimation or by examining changes in site values, with and without protection, on the affected areas. Usually, benefit calculations must be made in some kind of general equilibrium framework, though a relatively simple theoretical scheme will suffice in most circumstances. Such a theoretical model is presented which includes provision for 'amenity' as well as for 'locational' advantages of flood control, considers floodproofing as well as containment structures as a damage reduction technique, and considers restriction of flood plain occupancy as an alternative to control flood waters. Described is the theory underlying two major completed methodologies using the above-mentioned measurments. Weisz uses a linear programming model to maximize the benefits as measured by land values. INTASA, however, avoids the maximization approach, preferring to work within the frame of very detailed planner projections and rankings. INTASA uses changes in land values in estimating the value of amenities and social environment effects. The theory underlying these two methodologies is found to be substantially the same and generally sound. A regression model of the effect of flood risk on land values developed with St. Louis data is found to be much more empirically satisfactory than either the Weisz or the INTASA. (Bell-Cornell)
W75-05481

LIME RETENTION IN ANTHRACITE COAL-BREAKER REFUSE,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05496

SIMULATION OF STORM VELOCITY EFFECTS ON FLOW FROM DISTRIBUTED CHANNEL NETWORKS,
Nebraska Univ., Lincoln. Dept. of Computer Science.
For primary bibliographic entry see Field 2E.
W75-05518

DRAINAGE BASIN RESPONSE: DOCUMENTED HISTORICAL CHANGE AND THEORETICAL CONSIDERATIONS. STUDIES IN FLUVIAL GEOMORPHOLOGY. NO. 3,
Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
For primary bibliographic entry see Field 2E.
W75-05527

GENETIC VARIABILITY IN SURVIVAL AND GROWTH OF VIRGINIA PINE PLANTED ON ACID SURFACE-MINE SPOIL,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05594

PERFORMANCE OF RED PINE AND JAPANESE LARCH PLANTED ON ANTHRACITE COAL-BREAKER REFUSE,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05597

VEGETATING STRIP-MINE SPOILS FOR RUNOFF AND EROSION CONTROL,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05603

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tuscon. Graduate Committee on Hydrology.
For primary bibliographic entry see Field 2E.

V75-05619

COMBINING ESTIMATES OF LOW-FLOW CHARACTERISTICS OF STREAMS IN MASACHUSETTS AND RHODE ISLAND,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 2E.
W75-05629

ADJUSTMENT OF LOGARITHMIC FLOOD-FREQUENCY STATISTICS FOR GAGED CALIFORNIA STREAMS TO MINIMIZE THE TIME SAMPLING ERROR,
Geological Survey, Menlo Park, Calif.
J. E. Rantz, and J. R. Crippen.
Available from the Superintendent of Documents, GPO Washington, DC 20402, $3.15. Journal of Research of the US Geological Survey, Vol 3, No 1, p 113-121, January-February 1975. 1 fig, 4 tab, 7 ref.

Descriptors: *Flood frequency, *Statistics, California, Statistical methods, Snowmelt, Rainfall-runoff relationships, Peak discharge.
Identifiers: *Pearson type III distribution.

Methods for adjusting logarithmic flood-frequency statistics for gaged streams to minimize the time sampling error that is inherent in short records are discussed. Statistical procedures for adjusting the mean and standard deviation of a short-term array of annual peak discharges are already well established; two standard sets of equations for utilizing the additional information contained in longer records of peak discharge observed at nearby gaging stations are given. A standard method for adjusting the coefficient of skew does not exist, and consequently a special technique for estimating the long-term value of that statistic was developed for this study. Regional equations were developed that relate the logarithmic skew coefficient to logarithmic transformations of mean annual basinwide precipitation and mean annual peak discharge per square mile. The technique appears to be satisfactory for use in the greater part of California, where over large areas the peak discharge in any year is usually associated with a single widespread general storm-or with a series of such storms where snowmelt runoff is involved--rather than with localized precipitation events. (Knapp-USGS)
W75-05630

SUMMARY OF MULTISPECTRAL FLOOD INUNDATION MAPPING IN IOWA,
Iowa State Geological Survey, Iowa City.
For primary bibliographic entry see Field 7C.
W75-05639

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
H. Motz.
Open file report 74257, 1974. 2 fig, 4 tab, 19 ref.

Descriptors: *Surface-groundwater relationships, Canals, *Florida, *Flood control, *Diversion, Water levels, Aquifers, Hydrologic aspects, Hydrogeology.
Identifiers: *Tampa Bypass Canal(Fla).

Floodwater of the Hillsborough River will be diverted at a point upstream from areas of flood-plain encroachment in the cities of Tampa and Temple Terrace into nearby McKay Bay by means of the Tampa Bypass Canal System, which is being built through an area east of Tampa. The canal system will breach the underlying artesian Floridan aquifer in places where the potentiometric surface of the aquifer is at or near land surface, causing drawdowns over a wide area and diverting flow from other parts of the hydrologic system. A water-control structure would maintain the pool level in the Eureka Springs and Harney Flats areas at a 5-foot higher level than without the structure, reducing drawdown in and discharge from the Floridan aquifer in these areas. The canal system, as presently designed, will lower the potentiometric surface of the Floridan aquifer by 1 foot or more over an area of about 92 square miles with C-132 (Thonontosassa Canal) included in the system and about 48 square miles without C-132; discharge from the aquifer into the canal system will be 22 million gallons per day with C-132 and 15 million gallons per day without C-132. If another control structure is added to the canal system, the area of drawndown (1 foot or more) of the potentiometric surface will be less by 45% and the discharge less by 40% withC-132 included in the system; without C-132 the area of drawdown will be less by 50% and the discharge less by 45%. (Knapp-USGS)
W75-05640

DERIVATION OF HOMOGENEOUS STREAMFLOW RECORDS IN THE UPPER KENTUCKY RIVER BASIN, SOUTHEASTERN KENTUCKY,
Geological Survey, Louisville, Ky.
For primary bibliographic entry see Field 2E.
W75-05644

A MANUAL FOR ESTIMATING THE MAGNITUDE AND FREQUENCY OF FLOODS ON UNGAGED STREAMS IN INDIANA,
Geological Survey, Indianapolis, Ind.
L. G. Davis.
Indiana Department of Natural Resources, Division of Water Technical Memorandum 75-1, 1975. 19 p, 12 fig.

Descriptors: *Peak discharge, *Floods, *Indiana, Flood recurrence interval, Small watersheds, Discharge(Water), Rainfall-runoff relationships, Flood frequency.

Peak discharges for the 10-, 25-, 50-, and 100-year recurrence intervals may be estimated from relations given for ungaged sites on naturally flowing streams in Indiana. The discharges estimated from the equations and graphs do not include any safety factors or 'freeboard' requirements that may be a part of design criteria. Estimating relations were defined from data on the flow magnitudes and on the characteristics of the contributing drainage basins of gaged streams. The sample of gaging sites includes rural streams draining an area larger than 15 square miles and containing no significant flow-regulating structures; the estimating relations should be used only for similar ungaged stream sites. For gaged streams, probability analyses of the flood record provide a more reliable estimate of future flood occurrence than the estimating relations. (Knapp-USGS)
W75-05645

LAKES MARION-MOULTRIE STREAM SYSTEM INVESTIGATION: PART I--MODEL SELECTION, CALIBRATION, AND ERROR ANALYSIS,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 2E.
W75-05646

FLOOD OF AUGUST 2, 1972, IN THE LITTEL MAQUOKETA RIVER BASIN, DUBUQUE COUNTY, IOWA,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 2E.
W75-05648

FLOOD-FLOW CHARACTERISTICS OF THE CHENANGO RIVER AT PROPOSED INTERSTATE HIGHWAY IN TOWNS OF FENTON AND CHENANGO, BROOME COUNTY, NEW YORK,
Geological Survey, Albany, N.Y.
B. Dunn.
Open-file report, June 1972. 11 p, 5 fig, 1 tab, 3 ref.

Descriptors: *Floods, *Design flood, *New York, Stage-discharge relations, Highways, Bridges.
Identifiers: *Chenango River(NY).

The New York State Department of Transportation is planning a proposed interstate highway alongside the Chenango River in the towns of Fenton and Chenango, Broome County, New York. An analysis of flood-flow characteristics of the channel for four proposed highway routes was made to determine the effect of each plan. Information is provided on magnitude and frequency of floods and an analysis is presented of the effects of the proposed routes on hydraulic characteristics of the stream reach. The 100-year flood discharge used was 57,000 cfs. The normal water-surface elevation was determined to be 851.80 feet at the downstream end of the reach and 858.36 feet at the Erie-Lackawanna Railroad bridge. The proposed highway routes would result in stage increases of from 1.2 feet to 2.3 feet at the E-L railroad bridge for the design discharge of 57,000 cfs. The maximum mean velocity would be 10.9 feet per second. (Knapp-USGS)
W75-05655

STOCHASTIC MODELING OF THE PASSAIC RIVER FLOW,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Chemical Engineering; and Rutgers - the State Univ., New Brunswick, N.J. Dept. of Biochemical Engineering.
For primary bibliographic entry see Field 2E.
W75-05660

REVERSE FLOW ROUTING BY THE IMPLICIT METHOD,
State Univ. of Iowa, Iowa City. Dept. of Mechanics and Hydraulics.
For primary bibliographic entry see Field 2E.
W75-05675

BEDROCK INTENSITY ATTENUATION AND SITE FACTORS FROM SAN FERNANDO EARTHQUAKE RECORDS,
California Univ., Los Angeles. Dept. of Mechanics and Structures.
For primary bibliographic entry see Field 8E.
W75-05684

WATERSHED VALUES IMPORTANT IN LAND USE PLANNING ON SOUTHERN FORESTS,
Forest Service (USDA), Franklin, N.C. Coweeta Hyrologic Lab.
For primary bibliographic entry see Field 4D.
W75-05716

USE OF REMOTE SENSING FOR VEGETATION INVENTORIES IN A DESERT SHRUB COMMUNITY,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 7B.
W75-05721

A TIME-SPACE TECHNIQUE TO ANALYZE SNOWPACKS IN AND ADJACENT TO OPENINGS IN THE FOREST,
Arizona Univ., Tucson, Dept. of Watershed Management.
S. R. Gopen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 276, $4.75 in paper copy; $2.25 in microfiche. Master's Thesis, 1974. 77 p, 3 fig, 5 tab, 40 ref, 6 append. OWRR A-037-ARIZ(2). 14-31-0001-3803.

Descriptors: Snowmelt, Runoff, Forests, *Snowpacks, Time series analysis, *Land management, *Arizona, *Forest management, Water supply, *Regression analysis, Water yield, Lumbering.
Identifiers: *Forest openings.

A general technique was developed to enable the land manager to predict the 'net' effect of an opening on the snowpack in and adjacent to that opening at any given location at any point in time. The technique was illustrated by collecting data at seven study sites located in the ponderosa pine type of Arizona on 10 measurement dates. Multiple regression analyses utilizing these data produced several significant equations for predicting the 'net' effect of an opening in the ponderosa pine type of Arizona. In addition, the significant equations yielded site information, within the range of conditions studied, which could be utilized to maximize or minimize the 'net' effect of openings, depending upon the desired land management objectives. Knowledge of these site variables could aid the land manager in decisions concerning the location and size of proposed timber cuts in situations where water yield from snowpacks is an important consideration.
W75-05764

WAMIS ABSTRACTS, NO. 1,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 10A.
W75-05767

A DECISION-AIDING MODEL FOR PLANNING OPTIMAL RESOURCE ALLOCATION OF WATER BASINS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 6A.
W75-05770

PROCEDURE FOR ESTIMATING TOTAL FLOOD DAMAGE IN URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 469, $3.25 in paper copy, $2.25 in microfiche. (1974). 3 p, 3 ref. OWRT B-113-COLO(3).

Descriptors: City planning, *Drainage, Economic analysis, *Flood control, *Flood damage, Estimating, *Urban drainage, *Damages.

When flooding occurs in urban areas the category of damage normally reported in the press and therefore receiving most attention, is direct damage to property. This is, however, only one of about five empirical categories of flood damages. The five categories are: direct damages, indirect damages, secondary damages, intangible damages, uncertainty damages. These categories of damage are discussed according to how they affect urban drainage decisions.
W75-05776

CRITERIA FOR EVALUATION OF URBAN DRAINAGE AND FLOOD CONTROL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 449, $3.75 in paper copy, $2.25 in microfiche. Presented at Urban Drainage Seminar, April 1974. 25 p, 3 tab, 6 fig, 16 ref. OWRT B-113-COLO(1).

Descriptors: *City planning, *Drainage, Economic analysis, *Flood control, *Flood damage, *Urban drainage, Evaluation, *Benefits, Standards.

The evaluation of urban drainage and flood control (UDFC) projects is a familiar problem to engineers in the public sector. On the one hand, public works managers are faced with the problem of procuring funds for UDFC projects which requires that the project benefits be clearly enunciated. Benefits for UDFC projects can best be understood by breaking UDFC systems into major and minor subsystems and thereafter considering major drainage mostly as a protective service and minor drainage mostly as an environmental management service. In this regard, the use of traditional evaluation tools is more applicable to the major system evaluation problem because of the quantifiable nature of the direct benefits (damage reduction). The evaluation of minor drainage systems is restricted to the procedure of setting drainage standards and criteria, then finding minimum cost solutions for meeting the standards. This approach can be part of a healthy political evaluation procedure in which community objectives are discussed in the light of willingness to pay.
W75-05778

A SYSTEMS APPROACH TO THE OPERATION OF FLOOD CONTROL RESERVOIRS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
J. E. Schaufelberger.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 451, $7.00 in paper copy, $2.25 in microfiche. PhD Thesis, 1971. 178 p, 46 fig, 21 tab, 86 ref, 3 append. OWRR B-030-ILL(8). 14-31-0001-1899.

Descriptors: *Systems analysis, Dynamic programming, *Flood control, *Reservoir operation, *Indiana, *Regression analysis, Optimization, Multiple-purpose reservoirs, Equations, Model studies.
Identifiers: *Wabash River(Ind), Operation policy.

This study was aimed at the presentation of a systems approach for determining operating policies for systems of flood control reservoirs. The Upper Wabash River Basin in Indiana was used since it was well gaged and excellent economic data were available. Routing equations were developed by multiple linear regression analysis based upon the linear Muskingum routing model. Flood damage was determined as a function of a peak discharge and the time of year. While investigating the characteristics of flood control systems, it was concluded that dynamic programming is applicable for the optimization of the systems operation. After near optimal solutions were obtained for the five-year period of 1957 through 1961, they were analyzed by multiple linear regression analysis to determine an operating release equation for each reservoir. Operation from the operating equation provided a greater reduction in flood damage than did the actual operations. The systems approach for determining operating policies for flood control systems was determined to be successful. Other parameters might be used in characterizing the flood; the development of a stochastic model to replace the deterministic optimization model would be an interesting extension. Further studies should be made concerning multiple purpose systems and economic tradeoffs. (Chow-Illinois)
W75-05784

COMMERCIAL NAVIGATION ON THE UPPER MISSISSIPPI: ECONOMIC AND ENVIRONMENTAL CHOICES,
Minnesota Univ., St. Paul. Dept. of Agricultural and Applied Economics.
For primary bibliographic entry see Field 6E.
W75-05788

A SOCIO-ECONOMIC EVALUATION OF ALTERNATIVE WATER MANAGEMENT POLICIES ON THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W75-05790

EVALUATION OF POPULATION GROWTH AND PER CAPITA CONSUMPTION OF WATER ON THE REGIONAL ECONOMIC GROWTH IN THE RIO GRANDE REGION IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W75-05791

EROSION EFFECT ON SOIL FAUNA UNDER DIFFERENT CROPS,
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 2J.
W75-05793

CONTROL OF WATER CHESTNUT WITH 2,4-D AMINE.
Army Engineer District, New York.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-784 351, $3.75 paper copy, $2.25 microfiche. Final Environmental Statement, August 1971. 27 p.

Descriptors: *Herbicides, *Aquatic plant control, *New York, Spraying, Water supply, Hudson River, Recreation, 2,4-D, Water resources, Rate of application, Rooted aquatic plants.
Identifiers: *Water chestnut, Mohawk River(NY), Environmental Impact Statements.

This Environmental Impact Statement describes the method to be employed for eradicating waterchestnut. Large, dense stands are to be chemically treated and small infestations are to be hand-pulled. Spraying is done both by hand and by boat. The chemical formulation found to give the best results is undiluted 2,4-D at four pounds acid equivalent applied at a minimum rate of 1-2 gallon/acre. No spraying will take place in the immediate vicinity of water supply intakes nor for a distance of 1000 feet upstream of the intake. Control of waterchestnut in the Hudson and Mohawk Rivers would open up about 1000 additional acres of new water for sport fishing and about 350 acres for hunting. Boating, a recreational activity hampered by the existence of waterchestnut, would no longer be restricted due to the weed. The adverse environmental effects are the profligation of duckweed due to the release of nutrients from the deteriorating waterchestnut plants. Cutting has proved costly and inefficient and air spraying has drift problems. There have been no observable negative long term effects on fish or waterfowl as a consequence of using 2,4-D. (Jones-Wisconsin)
W75-05806

THE EFFECTS OF DRAINAGE AND ASSOCIATED DEVELOPMENT IN THE BIG CYPRESS SWAMP,
Bureau of Sport Fisheries and Wildlife, Atlanta, Ga.
For primary bibliographic entry see Field 6G.
W75-05807

CONTROL APPARATUS FOR A WATER SUPPLY SYSTEM,
Weil-McLain Co., Inc., Dallas, Tex. (assignee)
For primary bibliographic entry see Field 8C.
W75-05817

4B. Groundwater Management

CHEMICAL ENGINEERING DIVISION, WASTE MANAGEMENT PROGRAMS, QUARTERLY REPORT, APRIL-JUNE 1974,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-05383

INVESTIGATION AND VERIFICATION OF MODEL FOR THE DISPERSION COEFFICIENT TENSOR IN FLOW THROUGH ANISOTROPIC

OMOGENEOUS, POROUS MEDIA WITH AP-
LICATION TO FLOW FROM A RECHARGE
ELL THROUGH A CONFINED AQUIFER,
Visconsin Univ., Madison. Dept. of Civil and En-
ronmental Engineering.
or primary bibliographic entry see Field 2F.
75-05458

LTRATION ANALYSIS OF FOUR DIF-
ERENT FILTER FABRICS,
ansas State Univ., Manhattan. Dept. of Agricul-
ral Engineering.
D. Rose.
vailable from the National Technical Informa-
n Service, Springfield, Va 22161 as PB-240 185,
.75 in paper copy; $2.25 in microfiche. M.S. The-
, 1970. 75 p, 13 fig, 2 tab, 45 ref. OWRT A-021-
AN(3). 14-01-0001-1084.

escriptors: *Filtration, *Water treatment, Water
rification, Water resources.
entifiers: *Filter fabrics.

e purpose was to analyze the filtration per-
rmance of four different filter fabrics. These
er cloths consisted of the following: one
onofilament polypropylene cloth, two multifila-
nt polypropylene cloths of different porosities,
d one multifilament nylon cloth. For testing
se cloths the apparatus was composed of a feed
k, a centrifugal pump, and pressure regulating
ve, a pressure gauge, a column two inches in
meter to support filter cloth, and an effluent
k in which the water level was recorded by
e. The results showed that flow through the
er could be mathematically predicted. Filtration
s found to be dependent upon the cake and in-
endent of the filter cloth. The only requirement
electing the filter cloth is that the pore openings
he cloth be small enough to allow the formation
a cake. The filter cake was found to be com-
ssible as the pressure was increased, and the
stance to flow in the cake, a result of the com-
ssibility increased linearly as a function of the
olute pressure squared. At increased pressure
flow through the filter is dependent upon the
stance to flow in the cake as described previ-
ly. The samples taken ahead of and behind the
r showed that large amounts of turbidity could
removed. Most of the turbidity is removed in
cake. Some particles bleed through the cloth
r once having formed as cake.
5-05460

E USE OF BOUNDING WELLS TO CON-
OL FLUX IN UNDERGROUND WATER
RAGE PROJECTS,
isiana State Univ., Baton Rouge. Dept. of
oleum Engineering.
Langhette, III.
ilable from the National Technical Informa-
Service, Springfield, Va 22161 as PB-240 017,
5 in paper copy; $2.25 in microfiche. M.S. The-
August 1974. 92 p, 11 fig, 1 tab, 14 ref, 2 ap-
. OWRT A-027-LA(4). 14-31-0001-3818.

criptors: Groundwater recharge, *Water
ge, Injection wells, *Flow, Recharge wells,
raulics, Artificial recharge, Computer pro-
s, *Underground storage, Aquifer charac-
tics.
tifiers: *Bounding wells, Flux, Saline
fers.

theoretical feasibility of using a peripheral
field to negate the effects of pre-existing fluid
ement (flux) over a circular area of arbitrary
was investigated. This would render the area
r water storage. Such a bounding well field
d contain both production and injection wells
would be operated in such a way as to balance
ke and injection. A computer program has
written which calculates the bounding well
rates which will cause the storage boundary
come a circular isopotential. The program
es the principle of superposition to establish a potential balance at a number of points on the desired boundary circle. This yields a set of simultaneous equations in the unknown flow rates which is solved by a type of Gauss-Jordan elimination. The results of many computer runs indicate that as few as six properly placed bounding wells will usually negate the effects of flux to a degree sufficient for practical purposes. Furthermore, the rates at which these wells must be operated are readily obtainable with current technology. For a desired storage volume, the required bounding well rates are shown to be a function of pre-existing potential gradient, aquifer properties, and the number and location of the bounding wells.
W75-05464

STORAGE OF FRESH WATER IN SALINE AQUIFERS USING A WELL FIELD,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
W. R. Whitehead.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 009, $6.25 in paper copy; $2.25 in microfiche. PhD Dissertation, August 1974. 142 p, 19 fig, 6 tab, 30 ref, 5 append. OWRT A-022-LA(3). 14-31-0001-4018.

Descriptors: Groundwater, *Water storage, Multi-well injection, Hydraulics, *Flow, Water supply, Groundwater recharge, Injection wells, Recharge wells, Artificial recharge, Aquifers, *Underground storage, Cost comparisons, Mixing, Dispersion.
Identifiers: *Saline aquifers, Multi-well injection.

The computational procedure presented should enable the practicing engineer to design well fields for storage of fresh water in horizontal saline aquifers in which there is no pre-existing groundwater movement. The recovery efficiency of the injection/storage/retrieval process can now be reliably computed, making possible an economic analysis of the process in any specified area. An economic comparison of storage of approximately one billion gallons in a saline aquifer that underlies the New Orleans area was made with the present most feasible alternate--steel tanks. The results favored the saline aquifer storage project by a factor of more than 50 to 1. Recovery efficiencies obtained from a laboratory-size miniature aquifer were compared with recovery efficiencies predicted by the computational procedure. The computational procedure predicted the experimental data within 10 percent for multiple well systems. The predicted recovery efficiencies were invariably lower than the experimentally determined recovery efficiencies. The two most important factors which determine the amount of usable water that can be recovered are: (1) mixing of the two fluids due to molecular diffusion and convective dispersion, and (2) gravitational segregation of the two fluids due to density difference.
W75-05465

POROSITY AND HYDROLOGY OF JOINTED MIDDLE ORDOVICIAN LIMESTONES IN THE J. PERCY PRIEST DAM AREA OF CENTRAL TENNESSEE,
Vanderbilt Univ., Nashville, Tenn. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05470

AQUIFER TESTS IN LARGE DIAMETER WELLS IN INDIA,
Geological Survey, Menlo Park, Calif.
E. A. Sammel.
Ground Water, Vol 12, No 5, p 265-272, September-October, 1974. 1 fig, 24 ref.

Descriptors: *Aquifer testing, *Data collections, *Shallow wells, Dug wells, Well data, Specific capacity, Drawdown, Fracture permeability.
Identifiers: *India, Large-diameter well, Semilog method.

In areas of crystalline and basaltic rocks in India, dug wells of large diameter may offer the only opportunity to test for the hydrologic characteristics of the shallow aquifers. If the volume of water stored in the wells contributes significantly to their discharge during tests, analysis of test results is difficult. In most dug wells, the time rate and spatial distribution of drawdowns in the aquifer, and the rate of change of head are not predicted by the Theis equation. High pumping rates result in difficulties due to the insensitivity of head distributions to drawdowns in the well. Serious theoretical and practical deficiencies exist in current methods of aquifer test analysis in large-diameter wells. The best available approaches are Papadopulos and Cooper (1967) and Papadopulos (1967). Aquifer tests in fractured rock can best be handled by treating the aquifer as an anisotropic porous medium on a macroscopic scale and utilizing observation wells. (Bradbeer-NWWA)
W75-05501

DISSOLVED ORGANIC CARBON (DOC), AN INDEX OF ORGANIC CONTAMINATION IN GROUND WATER NEAR BARSTOW, CALIFORNIA,
Geological Survey, Garden Grove, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W75-05502

GROUND WATER ACTIVITIES IN THE USGS,
Geological Survey, Washington, D.C. Ground Water Branch.
G. Meyer.
Water Well Journal, Vol 28, No 11, p 43-45, November, 1974.

Descriptors: *Groundwater, *Water utilization, *Administration, *Research priorities, Water resources development, Organizations.

The world has rediscovered water as a resource and seeks information -- more information than is available. The United States Geologic Survey is a principal source of public information and should respond readily to the new interest in water resources and the control of them. Five principal trends in the use of ground water and aquifers have recently been surfacing. First, there is a consistent increase in utilization of ground water and programs to assess ground water as a water resource and provide standard answers to standard questions about development, management and quality. Second, aquifers will be examined more intensively as water management facilities. Third, there is a rising interest in saline aquifers, not particularly for their potential for a desalinated water supply, but for development of understanding of aquifer systems. Fourth, subsurface waste disposal is looming as a problem in environmental geology and must be controlled. The last trend is a general new interest in the subsurface that demands supporting groundwater knowledge -- geothermal energy, environmental protection, oil shale, subsidence, earthquake management and many more. The great variety of new interest is a powerful argument for orderly programs of deep and shallow geologic and ground water investigation, on which special studies of immediate problems can ride piggyback. (Bradbeer-NWWA)
W75-05503

DISPOSAL OF HAZARDOUS WASTES,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5G.
W75-05504

GROUNDWATER MODELS FOR TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 2F.
W75-05508

TECHNOLOGICAL LIMITATIONS TO GROUND-WATER MANAGEMENT,
Guyton (William F.) and Associates, Houston, Tex.
For primary bibliographic entry see Field 6E.
W75-05510

ARTIFICIAL RECHARGE - A POTENTIAL SOLUTION FOR MANY WATER PROBLEMS,
Ohio State Univ., Columbus. Dept. of Geology.
W. A. Pettyjohn.
Water Well Journal, Vol 38, No 9, p 48-51, September, 1974, 1 tab.

Descriptors: *Artificial recharge, Water spreading, Injection wells, Management, Water supply, Water management(Applied), Ohio, North Dakota.
Identifiers: Minot(N Dak), Dayton(Ohio), Souris River.

Artificial recharge is a means of augmenting the natural infiltration of surface water into a ground water reservoir by wells, water spreading, or altering natural conditions. Water commonly used for artificial recharge includes natural stream flow, high flows diverted from a nearby water course, cooling waters, diverted storm drainage water, or sludge effluent (treated or untreated). Increase in production of ground water supplies, and water quality control (through prevention of saline water encroachment or through addition of higher quality water to contaminated water) are uses of artificial recharge. Several examples of artificial recharge programs, including the program instituted in Minot, North Dakota in 1964 and the recharge system of Dayton, Ohio, illustrate the advantages of artificial recharge. (Bradbeer-NWWA)
W75-05511

GEOLOGY AND GROUND WATER RESOURCES OF SUSSEX COUNTY AND THE WARREN COUNTY PORTION OF THE TOCKS ISLAND IMPACT AREA,
New Jersey Dept. of Environmental Protection, Trenton. Div. of Water Resources.
J. W. Miller, Jr.
Bureau of Geology and Topography, Bulletin 73, 1974. 143 p, 6 fig, 12 tab, 59 ref.

Descriptors: *Hydrology, *Groundwater, Stratigraphy, Fracture permeability, *New Jersey, Chemical analysis, Geology.
Identifiers: *Tock Island area(NJ).

Sussex County and the Warren County, New Jersey portion of the Tocks Island Impact Area are primarily agricultural. Commercial, industrial, and resort developments are occurring at an increasingly rapid rate. Ground water supplies approximately sixty per cent of the estimated daily water consumption. Water utilities furnish the balance with surface water or a combination of ground water and surface water. Most of the ground water is obtained from rock wells; only a small percentage of the wells are located in unconsolidated Pleistocene deposits. Over 3000 records of domestic, industrial and public supply wells were examined. The interpretations and conclusions presented are based on these driller's records which, although not precise or complete, give a good indication of reasonable expectations of depth and yield for each formation. There are no known areas where ground water levels have declined because of over pumping. Domestic supplies may be developed almost anywhere in the study area. Moderate to large supplies can generally be developed from wells located in stratified drift, in cavernous members of the Kittatinny Formation and in shear zones near faults. Wells completed in Precombrian crystallines, in the non-cavernous members of the Kittatinny Formation, and in the Martinsburg Formation usually have very low yields; between 36 and 47 per cent will have yields of 5 gpm or less. The quality of ground water is generally good for most uses. Locally treatments for hardness, low pH, high iron content and high SO4 may be needed. (Bradbeer-NWWA)
W75-05513

GEOHYDROLOGY OF PLEISTOCENE DEPOSITS AND SUSTAINED YIELD OF PRINCIPAL PLEISTOCENE AQUIFER, LAKE COUNTY, INDIANA,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05514

THEIS EQUATION ANALYSIS OF RESIDUAL DRAWDOWN DATA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 2F.
W75-05519

AQUIFER CLOGGING IN COMBINED WASTE-WATER RECHARGE,
Massachusetts Univ., Amherst. Dept. of Plant and Soil Sciences.
For primary bibliographic entry see Field 5D.
W75-05520

AN EVALUATION OF THE THEORY OF GROUND-WATER AND RIVER-WATER INTERCHANGE, WINNEMUCCA REACH OF THE HUMBOLDT RIVER, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 2A.
W75-05529

ENVIRONMENTAL CONTROLS ON GROUND-WATER CHEMISTRY IN NEW MEXICO. I. THE EFFECT OF PHREATOPHYTES,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
For primary bibliographic entry see Field 2D.
W75-05531

WATER OR AIR, WHICH DO YOU PUMP,
FMC Corp., Indianapolis, Ind. Pump Div.
For primary bibliographic entry see Field 8C.
W75-05542

TREATED EFFLUENT GOES 'UNDERGROUND',
For primary bibliographic entry see Field 5D.
W75-05544

A SOIL AND GROUND-WATER POLLUTANT TRANSPORT MODEL,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
For primary bibliographic entry see Field 5B.
W75-05581

STUDY OF FLUID MOVEMENTS THROUGH CAUSEWAY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2F.
W75-05610

A NUMERICAL TECHNIQUE FOR AQUIFER EVALUATION,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05612

VALUATION OF A GROUND-WATER SUPPLY FOR MANAGEMENT AND DEVELOPMENT,
Nevada Univ., Reno.
P. A. Domenico.
Ph D Dissertation 1967. 63 p, 8 fig, 39 ref.

Descriptors: *Groundwater, *Management, Saf
yield, Economics, Sustained yield, Overdevelop
ment, Property, *Nevada, *Water supply.
Identifiers: *Great Basin(Nev), Extra-social cost

An attempt is made to analyze problems
ground-water management and development
terms of valuation of a resource or property th
represents a source of future money receipts. A
analytical expression is derived which gives bo
present worth of gains forthcoming from resour
exploitation over a variable time period and t
remaining worth of a ground-water supply after
has been partially depleted. With water-level po
tion selected as the denominator common to bo
the system and its economic worth, a course of
ploitation is charted so that (1) present worth of
ture returns is maximized, and (2) water rights
protected to the extent that water levels are
lowered below the economic limit of pumping. T
results enable a conceptual valuation of (1) de
sion rules for efficiency in management, (2)
timal mining yield for specified conditions and
the state of development of the resource at
time. (Bradbeer-NWWA)
W75-05613

ANALYSIS OF SHALLOW HARD ROCK WE
PUMPING AND RECOVERY TEST DATA,
Kaunasskii Politekhnicheskii Institut (USS
Hydraulic Div.
For primary bibliographic entry see Field 8G.
W75-05615

PRESSURE BUILDUP AND DRAWDO
BEHAVIOR IN UNDERSATURATED RES
VOIRS OF DISCONTINUOUS PERMEABILI
Stanford Univ., Calif. Dept. of Petroleum
gineering.
D. A. Rowland.
PhD Dissertation 1969. 116 p, 26 fig, 9 tab, 80 r

Descriptors: *Mathematical models, Hydra
models, Hydraulic properties, *Permeabi
Variability, Heterogeneity, *Drawdown, Aqu
tests, Penetration, *Reserviors, *Pressure.
Identifiers: Skin effect, Fractional penetra
Flow capacity, Horizontal fracture effect,
posite reservoirs, Stratified reservoirs, Lentic
reservoirs.

Analytical expressions developed for evalu
the results of pressure testing are based gene
on the assumption of homogeneous rock pro
ties, even though reservoir inhomogeneities
as faulting, lensing, stratification, fracturing,
anisotrophy introduce anomalies in the test
and may affect calculation accuracy. Analys
results from mathematical models develope
dicates that when vertical permeability vari
exists, the determination of skin effect and
capacity may be performed in the usual ma
Whenever radial discontinuities exist, consi
ble differences in computed values and a
values of skin effect result. A method
developed for determining true skin effect i
presence of radial discontinuities. It gives re
results in composite and lenticular rese
systems. Skin effect evaluations in part
penetrated reservoirs may be made by app
the Brons and Marting pseudo-skin effect
rection factors and an additional factor due
fact that the flow rates through the damag
gion increased proportionally to the recipro
the fractional penetration. Horizontal fra
and shale barriers may also be treated as sk
fects in partially penetrated wells. Here aga
true skin effect to be used in designing re
programs is obtained after correcting for t
creased flow rate through the damaged
(Campbell-NWWA)
W75-05617

A THEORETICAL STUDY ON THE
TERPRETATION OF RESISTIVITY SOUN

DATA MEASURED BY THE WENNER ELECTRODE SYSTEM,
Missouri Univ., Rolla. Dept. of Geophysical Engineering.
For primary bibliographic entry see Field 8G.
W75-05618

DIGITAL SIMULATION OF A STREAM-AQUIFER SYSTEM,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05620

CHANGES IN CONCENTRATION OF CERTAIN CONSTITUENTS OF TREATED WASTE WATER DURING MOVEMENT THROUGH THE MAGOTHY AQUIFER, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 5B.
W75-05625

MOBILIZATION OF IRON IN WATER IN THE MAGOTHY AQUIFER DURING LONG-TERM RECHARGE WITH TERTIARY-TREATED SEWAGE, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 5B.
W75-05626

NORMAN CREEK, A SOURCE OF RECHARGE TO MARAMEC SPRING, PHELPS COUNTY, MISSOURI,
Geological Survey, Rolla, Mo.
For primary bibliographic entry see Field 2F.
W75-05627

CHEMICAL AND PHYSICAL DATA FOR DISPOSAL WELLS, EASTERN SNAKE RIVER PLAIN, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 5B.
W75-05632

EVALUATION OF HYDRAULIC CHARACTERISTICS OF A DEEP ARTESIAN AQUIFER FROM NATURAL WATER-LEVEL FLUCTUATIONS, MIAMI, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W75-05633

GROUND-WATER RESOURCES OF GRIMES COUNTY, TEXAS.
Geological Survey, Austin, Tex.
E. T. Baker, jr., C. R. Follett, G. D. McAdoo, and C. W. Bonnet.
Texas Water Development Board, Austin, Report 186, September 1974. 109 p, 26 fig, 10 tab, 28 ref.

Descriptors: *Groundwater, *Texas, *Water supply, Water yield, Hydrogeology, Aquifers, Saline water, Irrigation water.
Identifiers: *Grimes County(Tex).

Fresh to slightly saline groundwater is available everywhere in Grimes County, Texas. The Yegua Formation, Jackson Group, Catahoula Sandstone, Fleming Formation, and flood-plain alluvium are the sources of almost all water presently (1971) being pumped. The Carrizo, Queen City, and Sparata Sands have varying capacities for potential development, but are not tapped by wells. The Willis Sand and terrace deposits contain only small quantities of water, are tapped by only a few wells, and have a relatively small areal extent. Only 1.63 million gallons per day of groundwater were used for all purpose in 1970. Of this amount, 53% was used for public supply, 38% for irrigation, and 9% for rural-domestic and livestock needs. Because of the small pumpage, regional water-level declines have been insignficant. The groundwater is of good chemical quality. Much of it is suitable for public-supply, rural-domestic, and industrial use with little or no treatment; and the overall appraisal of the groundwater for irrigation with respect to plant growth and soil effects is favorable. The better quality water, in general, is associated with the younger aquifers. A total of 52 mgd of fresh to slightly saline water is also available on a long-term basis. Wells that are properly constructed can be expected to yield more than 500 gpm from most of the aquifers. (Knapp-USGS)
W75-05641

ANALOG-MODEL STUDIES OF GROUND-WATER HYDROLOGY IN THE HOUSTON DISTRICT, TEXAS,
Geological Survey, Austin, Tex.
D. G. Jorgensen.
Texas Water Development Board, Austin, Report 190, February 1975. 84 p, 40 fig, 3 tab, 25 ref.

Descriptors: *Subsidence, *Artesian aquifers, *Analog models, *Texas, Withdrawal, Compaction, Water resources development, Safe yield, *Groundwater.
Identifiers: *Houston(Tex).

The major water-bearing units in the Houston district of Texas are the Chicot and the Evangeline aquifers. The Chicot aquifer overlies the Evangeline aquifer, which is underlain by the Burkeville confining layer. Both aquifers consist of unconsolidated and discontinuous layers of sand and clay that dip toward the Gulf of Mexico. Heavy pumping of freshwater has caused large declines in the altitudes of the potentiometric surfaces in both aquifers and has created large cones of depression around Houston. The declines have caused compaction of clay layers, which has resulted in land-surface subsidence and the movement of saline groundwater toward the centers of the cones of depression. An electric analog model was used to study the hydrologic system and to simulate the declines in the altitudes of the potentiometric surfaces for several alternative plans of groundwater development. The results indicate that the largest part of the pumped water comes from storage in the water-table part of the Chicot aquifer. Development of additional groundwater supplies from the water-table part of the Chicot aquifer north of Houston would result in a minimum decline of the altitudes of the potentiometric surfaces. Total withdrawals of about 1,000 million gallons per day may be possible without seriously increasing subsidence or saltwater encroachment. Both land surface subsidence and saltwater encroachment could be reduced by artificially recharging the artesian part of the aquifer. (Knapp-USGS)
W75-05642

LAND-SURFACE SUBSIDENCE IN THE HOUSTON-GALVESTON REGION, TEXAS,
Geological Survey, Houston, Tex.
R. K. Gabrysch, and C. W. Bonnet.
Texas Water Development Board, Austin, Report 188, February 1975. 19 p, 12 fig, 6 ref.

Descriptors: *Subsidence, *Land subsidence, *Texas, Withdrawal, Artesian aquifers, Compaction, Water wells, Groundwater, Pumping.
Identifiers: *Houston(Tex), *Galveston(Tex).

The pumping of large amounts of groundwater in the Houston-Galveston region, Texas, has resulted in water-level declines of as much as 200 feet in wells completed in the Chicot aquifer and as much as 325 feet in wells completed in the Evangeline aquifer during 1943-73. The maximum average annual rates of decline for 1943-73 were 6.7 feet in the Chicot aquifer and 10.8 feet in the evangeline aquifer. During 1964-73, the maximum rates were 10 feet in the Chicot and 17.8 feet in the Evangeline. The declines in artesian pressures have resulted in pronounced regional subsidence of the land surface. The center of subsidence is at Pasadena, where as much as 7.5 feet of subsidence occurred between 1943 and 1973. More than 1.0 foot of subsidence occurred at Pasadena between 1906 and 1943. The maximum amount of subsidence during 1964-73 was about 3.5 feet. In the Southern part of Harris County, about 55% of the subsidence is a result of compaction in the Chicot aquifer. The area in which subsidence is 1 foot or more has increased from about 350 square miles in 1954 to about 2,500 square miles in 1973. Estimates of subsidence are based on the amount of water level decline, the thickness of the clay, and the compressibility of the clay. At Seabrook, it is estimated that for each 1 foot of average water-level decline, 1 foot of average water-level decline, 1 foot of clay would compact 0.000031 foot. At Seabrook, for 1 foot of water-level decline, 0.0248 foot of subsidence would occur. Planned use of surface water instead of groundwater will probably result in some recovery of artesian pressures. If pressure recovery occurs the rate of subsidence should decrease substantially in the more critical areas. (Knapp-USGS)
W75-05643

HYDROGEOCHEMISTRY OF THE NORTHERN YUCATAN PENINSULA, MEXICO, WITH A SECTION ON MAYAN WATER PRACTICES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-05647

MID-1971 GROUND-WATER CONDITIONS AT YANKEETOWN WELL FIELD, LEVY COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W75-05649

APPLICATION OF STATISTICAL TECHNIQUES TO THE ESTIMATION OF GROUND-WATER WITHDRAWALS IN NORTHWESTERN KANSAS,
Geological Survey, Lawrence, Kans.
W. M. Kastner.
Available from NTIS, Springfield, Va 22161, as PB-239 018, $3.25 in paper copy, $2.25 in microfiche. Water-Resources Investigations 41-74, November 1974. 11 p, 5 ref.

Descriptors: *Groundwater mining, *Withdrawal, *Statistical models, Estimating, Water supply, Planning, Methodology, Analytical techniques, Statistical methods, *Kansas.
Identifiers: *Ogallala formation(Kan).

A study was made to determine the accuracy of using readily available data with statistical techniques to estimate groundwater withdrawals in western Kansas. The data were from a sample of wells chosen from the total inventoried irrigation wells in nine counties in northwestern Kansas. The hypothesis that each of 3 physical characteristics of the wells had the same distribution in the sample as in the total population was accepted at the 95% significance level. These characteristics (saturated thickness of the aquifer, depth to water below land surface, and reported well yield) were assumed to be related to the withdrawal of the wells, and the sample was considered to be representative of the total population in regard to groundwater withdrawals. Metered withdrawal values for the wells were not available, so derived withdrawals were obtained by using power-conversion coefficients to convert power records to pumpage. The power-conversion coefficient is the ratio of values obtained in short simultaneous measurements of power use and discharge for a well. Trend-surface and multiple-regression analyses were performed on the power-conversion coefficients and on the pumpage per irrigated acre derived from the coefficients. The equations developed using the available data proved to be

poor tools for estimating withdrawals. All the expected relationships appeared to be either very weak or nonexistent. The expected relations may actually be weak; however, a more likely conclusion is drawn that the withdrawal values, which have been derived using the power-conversion coefficients and the available data, do not reflect the true withdrawals. (Woodard-USGS)
W75-05651

A TAX SYSTEM FOR GROUNDWATER MANAGEMENT,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 6C.
W75-05654

CHEMICAL INTERACTION DURING DEEP WELL RECHARGE, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y. Water Resources Div.
For primary bibliographic entry see Field 5B.
W75-05656

MANAGEMENT OF SUBSIDING LANDS: AN ECONOMIC EVALUATION,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
C. A. McCauley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 305, $4.75 in paper copy; $2.25 in microfiche. PhD Dissertation, 1973. 70 p, 8 fig, 4 tab, 38 ref, append. OWRT A-030-ARIZ(1). 14-31-0001-3503.

Descriptors: *Land subsidence, *Groundwater, Overdraft, Evaluation, *Management, *Arizona, Aquifers, Costs, Damages, Cost-benefit analysis, *Alternative costs, *Alternative planning.
Identifiers: Economic analysis.

Land subsidence as a result of removal of groundwater is a common occurrence in many areas of the world. In south-central Arizona, subsidence of agricultural land over a groundwater aquifer offered a simplified economy against which the economic importance of subsidence could be tested. To perform the test, all of the various damages that are caused by subsidence were inventoried. Costs of damages were evaluated by the use of Benefit-Cost Analysis with alternative management proposals. The impact of subsidence-caused damages to the economy of the study area was almost negligible. Furthermore, no steps could be recommended to halt subsidence because of the excessive cost of halting water pumping and imported water.
W75-05765

NEW PRIORITIES FOR GROUND-WATER QUALITY PROTECTION,
Geraghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 5B.
W75-05827

NUMERICAL ANALYSIS OF PUMPING FROM CONFINED-UNCONFINED AQUIFERS,
Birmingham Univ. (England). Dept. of Civil Engineering.
K. R. Rushton, and A. Turner.
Water Resources Bulletin, Vol 10, No 6, p 1255-1269, December 1974. 8 fig, 1 tab, 8 ref.

Descriptors: *Groundwater movement, *Confined water, *Mathematical studies, *Numerical analysis, *Aquifers, Aquifer characteristics, Water wells, Aquifer testing, *Drawdown, Porous media, Storage coefficient, Analytical techniques, Equations, Dewatering, Unsteady flow, Finite element analysis, Digital computers, *Pumping.
Identifiers: Type curves.

A numerical method was presented for the analysis of a pumped well in a homogeneous aquifer with allowance made for the decrease in saturated depth, vertical components of flow, the possibility of regions of the aquifer changing between the confined and unconfined states, and the effect of different outer boundaries. The method was based on a discrete space, backward difference time, approximation. A particular example considered in detail concerned heavy pumping from one of a regular array of wells in an unconfined aquifer until the drawndown in the well reached a critical value. Nondimensional curves were presented relating the time and volume dewatered to the quantity discharged from the well. A further example investigated the effect of an initial confining pressure on the aquifer behavior. (Prickett-ISWS)
W75-05835

4C. Effects On Water Of Man's Non-Water Activities

CHLORIDES IN LAKE ERIE BASIN,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05355

THE INFLUENCE OF BIG CYPRESS LAND DEVELOPMENT IN THE DISTRIBUTION OF HEAVY METALS IN EVERGLADES ESTUARIES,
Florida State Univ., Tallahassee. Marine Lab.
For primary bibliographic entry see Field 5B.
W75-05434

THE IMPACT OF ENERGY DEVELOPMENT ON WATER RESOURCES IN ARID LANDS, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 3E.
W75-05471

AN ANNOTATED BIBLIOGRAPHY OF THE EFFECTS OF LOGGING ON FISH OF THE WESTERN UNITED STATES AND CANADA,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 5C.
W75-05500

MOISTURE AND DENSITY RELATIONS ON GRADED STRIP-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Ecology and Reclamation of Devastated Land. Vol. 1. R. J. Hutnik, and G. Davis, (editors). Gordon and Breach, NY., p 135-144, 1973. 2 fig, 2 tab, 6 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Moisture content, *Soil density, *Grading, Topography.

The disposition of moisture in strip-mine spoil in relation to grading compaction is important to the successful establishment of a vegetative cover. A study of subsurface moisture and density on a graded spoil on an area-type mining operation showed 'valley' sites to be about 20 pounds per cu ft less dense than the 'ridge' sites. Except for the surface layer there was more moisture available to plants in the 'valley' areas. Ridge and valley locations refer to topography of spoil prior to grading. Indications are that deep-rooted plants may be better adapted to spoil environments than shallow-rooted species. (Forest Service)
W75-05592

EFFECTS OF STRIP MINING ON THE HYDROLOGY OF SMALL MOUNTAIN WATERSHEDS IN APPALACHIA,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Ecology and Reclamation of Devastated Land. Vol. 1. R. J. Hutnik, and G. Davis, (editors). Gordon and Breach, New York, p 145-157, 1973. 3 fig, 2 tab, 25 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Turbidity, *Dissolved solids, Sediments, Hydrology, Streamflow, *Small watersheds, *Kentucky.
Identifiers: Peak discharge.

Strip mining in Appalachia is generally considered to have pronounced adverse effects on the hydrology of affected watersheds. Data from six watersheds show that stream turbidity and peak flows increase during mining but turbidity returns to near pre-mining levels within six months or so. Total dissolved solids content of streamflow increases significantly. Knowledge of the influence of strip mining on the water resource is useful in the design of standards for control of adverse effects and is basic to the development of improved mining and reclamation methods. (Forest Service)
W75-05593

EFFECTS OF STRIP MINING ON SMALL-STREAM FISHES IN EAST-CENTRAL KENTUCKY,
Eastern Kentucky Univ., Richmond. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-05598

STRIP-MINING, EROSION AND SEDIMENTATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-05600

SIMULATED EFFECTS OF OIL-SHALE DEVELOPMENT ON THE HYDROLOGY PICEANCE BASIN, COLORADO,
Geological Survey, Reston, Va.
J. B. Weeks, G. H. Leavesley, F. A Welder, and G. J. Saulnier, Jr.
Available from Sup Doc, GPO, Washington D.C. 20402, Price $3.15 in paper copy, $2.25 in microfiche. Professional Paper 908, 1974. 84 p, 56 fig, 1 plate, 13 tab, 49 ref.

Descriptors: *Mining, *Oil shales, *Colorado, Water resources, Mine water, Water demand, Mathematical models, *Simulation analysis, Dewatering, Water pollution sources, Groundwater, Surface waters.
Identifiers: *Piceance Basin(Colo).

Digital models were used to simulate effects of oil-shale development on the hydrologic system of the Piceance Basin, Colo. The effects of precipitation changes on the hydrologic system due to the introduction of atmospheric pollutants from oil-shale development of from cloud seeding were also simulated. Each 10-percent change in precipitation results in a 40-percent change in groundwater recharge. A 10-percent decrease in October-May precipitation results in a 30-percent decrease in mean annual runoff, whereas 10- and 20-percent increases in precipitation result in 40- and 85-percent increases in mean annual runoff. For the hypothetical dewatering scheme simulated, the model study indicates that one of the mines will not produce enough water to meet the demand for processing and disposal of oil shale, whereas another mine will produce water in excess of the demand. The concentration of dissolved solids of the water discharged from the mines would probably not exceed 5,000 milligrams per

litre for the hypothetical dewatering scheme considered. Dewatering will only slightly affect groundwater discharge in the Yellow Creek drainage. However, after 30 years of dewatering, groundwater discharge will cease in a 10-mile reach of Piceance Creek. After 30 years of dewatering the hydraulic head in the aquifers is decreased in 75 percent of the basin area, and about 500,000 acre-feet of water is removed from storage in the aquifers. (Knapp-USGS)
W75-05637

MID-1971 GROUND-WATER CONDITIONS AT YANKEETOWN WELL FIELD, LEVY COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W75-05649

FLOOD-FLOW CHARACTERISTICS OF THE CHENANGO RIVER AT PROPOSED INTERSTATE HIGHWAY IN TOWNS OF FENTON AND CHENANGO, BROOME COUNTY, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 4A.
W75-05655

A CLIMATIC MODEL OF URBAN ENERGY BUDGETS,
California Univ., Los Angeles. Dept. of Geography.
W. H. Terjung, and S. S-F, Louie.
Geographical Analysis, Vol 6, p 341-367, 1974. (Univ. of California Water Resources Center Project UCAL-WRC-W-237). OWRT-B-121-CAL(6).

Descriptors: *Climatic data, *Energy budget, Cities, Computer models, Landscaping, Model studies, *Temperature, *Forecasting.
Identifiers: *Climatic models, *Urban landscapes.

A deductive model of the energy budgets of urban landscapes, based on the exchanges of energy, mass and momentum, is introduced. The absorption of shortwave and longwave radiation and their dissipation via the channels of reradiation, convection, conduction, and evaporation are generated by the model in order to simulate the interplay of the many energy cascades among the myriad of city surfaces. A city can be geographically analyzed by determining its energy budget and resultant surface temperatures on a block-by-block basis. In spite of some simplifying assumptions, the predictions of surface temperatures of this initial model compare favorably with observations. (Snyder-California, Davis)
W75-05683

APPLICATION OF THE ALEKSANDRA MINERAL WATER FROM WYSOWA AND ITS SALT TABLETS IN THE TREATMENT OF DUODENAL ULCERS, (IN POLISH),
Military Hospital, Poznan (Poland).
For primary bibliographic entry see Field 6D.
W75-05712

THE EFFECTS OF PRESCRIBED BURNING ON SAWGRASS, CLADIUM JAMAICENSE CRANTZ, IN SOUTH FLORIDA,
Miami Univ., Coral Gables, Fla.
For primary bibliographic entry see Field 6G.
W75-05740

A TIME-SPACE TECHNIQUE TO ANALYZE SNOWPACKS IN AND ADJACENT TO OPENINGS IN THE FOREST,
Arizona Univ., Tucson, Dept. of Watershed Management.
For primary bibliographic entry see Field 4A.
W75-05764

RUNOFF WATER QUALITY OF THREE TUCSON WATERSHEDS.
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
K. R. Blackwood.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 287, $3.75 in paper copy; $2.25 in microfiche. Research Report, 1974. 39 p, 14 fig, 4 tab, 13 ref. OWRT B-023-ARIZ(4). 14-31-0001-3556.

Descriptors: Storms, Rainfall-runoff relationships, Urbanization, Water Management(Applied), *Water quality, *Storm runoff, *Arizona, Watershed management, Watersheds(Basins), *Urban runoff, Monitoring, Flow measurement, *Land use.
Identifiers: Urban storm runoff quality, *Tucson(Ariz).

An interdisciplinary study of three watersheds was conducted during the years of 1969 through 1973 by the Water Resources Research Center, University of Arizona, to monitor the quantity and quality of urban runoff in Tucson, Arizona. Three watersheds are drained by nearly natural drainage channels. Flow was measured by concrete critical flow measuring flumes. Quality was determined through tests run on manually collected samples taken at various intervals throughout runoff events. Because of a rapidly burgeoning population and a growing recognition of the limited water resources available to the Tucson metropolitan area, many suggestions for the use of stormwater runoff have been made. The water quality of the runoff water is presented in order to enable a better evaluation of these proposals to be made. The study was divided into three sections. The first compared the land-use and geological characteristics of the three watersheds in an attempt to determine their effect on water quality. The second section examined the variation in average water quality between storms for each watershed. Characteristics of the storms were examined to determine the possibility of predicting the water quality. Finally, water quality variations during a storm were investigated to determine if they followed a predictable pattern, and whether significant improvements in average quality of the captured water could be obtained if some of the runoff water was bypassed.
W75-05768

PROCEDURES FOR DEVELOPING A MODEL FOR PLANNING WATERBASED LINEAR PARKS ALONG STREAM CHANNELS IN SEMIARID URBAN REGIONS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 6B.
W75-05769

STATUS OF COLONIES OF LAND WADING BIRDS IN SOUTH FLORIDA,
National Audubon Society, New York.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 633, $3.25 paper copy, $2.25 microfiche. Bureau of Sport Fisheries and Wildlife, Atlanta, Ga. Ecological Report No. DI-SFEP-74-32, June 1973. 18 p, 1 fig, 3 tab, 7 ref, 1 append.

Descriptors: *Birds, *Wildlife, *Florida, *Wading birds, Surveys, Habitats, Nests, Broods.
Identifiers: *South Florida, Wood storks, Corkscrew Swamp(Fla), Egrets, Herons, Ibis.

A 1971-1972 survey was made of wading birds in south Florida in the area south of Caloosahatchee River and the St. Lucie Canal, including Lake Okeechobee, but excluding colonies within the Everglades National Park. In most cases, the colony population was determined by low-level aerial counts, but a few, careful ground counts were available. Coverage of wood stork Mycteria americana colonies was statewide. The relation of weather and the demand for water for human use upon the bird colony sites are discussed. Without change in current trends in south Florida, wading bird populations will continue to decline. A total of 1368 breeding pairs of wood storks were counted in 1971, of which 1200 were found in Corkscrew Swamp. About 1500 storks were fledged in 1971, but only 200 fledged in 1972. Most other large wading birds did not breed in 1971 because of drought; however, about 37,000 pair (including 10,000 cattle egrets) nested in 1972. Comparison with previous counts indicates a drastic long-term decline in wading bird populations from about 2.5 million to 150,000 birds in the last 100 years. Recommendations are presented for preserving wading bird populations from an increasing loss of habitat and food supply. (Jones-Wisconsin)
W75-05803

4D. Watershed Protection

LAND-USE CHANGES AND THE ECONOMIC EVALUATION OF NATURAL VIRGINIA PINE STANDS ON THE DIAL CREEK WATERSHED, DURHAM COUNTY, NORTH CAROLINA,
North Carolina State Univ., Raleigh. School of Forest Resources.
H. J. Van Loock, III.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 178, $5.25 in paper copy, $2.25 in microfiche. M.S. Thesis Dept. of Forestry, 1972. 107 p, 10 fig, 25 tab, 53 ref, append. OWRT B-010-NC(4), 14-01-0001-1934.

Descriptors: *North Carolina, *Land-use, Forests, *Land classification, Watersheds(Basins), *Aerial photography, Remote sensing, Pine trees, Evaluation, *Watershed management, Forecasting, Projections.
Identifiers: *Dial Creek watershed(NC), Land use changes.

Land-use changes on a 3,384 acre watershed in northeastern Durham County were measured over the period 1940 to 1970 with the use of aerial photographs. Seven land-use categories were recognized and land-use activity was determined by observing 607 permanent sample points over the thirty year period. The purpose was to identify the land-use classes most likely to change over time and to determine the causal factors involved. Joint and conditional probability transition matrices were used to show land-use change and total land-use activity over the thirty year period. For all land-use classes total change was found to be much greater than net change. This indicates considerable within class and between class activity over the period. Between the three forest land-use classes recognized, significant reduction in the Pine Forest Type and substantial increase in Hardwood Type was observed. Since pine is generally more valuable than the hardwood found in the area, the conversion from pine to hardwood, accelerated by poor logging practices, is considered deterimental to the forest conditions of the area. To prevent further reduction in Pine Forest Type on the Watershed, the feasibility of natural Virginia pine stands was analyzed. (Howells-North Carolina)
W75-05446

CHEMICAL PROPERTIES AND PARTICLE-SIZE DISTRIBUTION OF 39 SURFACE-MINE SPOILS IN SOUTHERN WEST VIRGINIA,
Forest Service (USDA), Princeton, W. Va. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05492

FACTORS AFFECTING THE ESTABLISHMENT OF DIRECT-SEEDED PINE ON SURFACE-MINE SPOILS,
Forest Service (USDA), Princeton, W. Va. Northeastern Forest Experiment Station.
W. T. Plass.
Research Paper NE-290, 1974. 5 p, 4 fig, 4 tab, 6 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Soil texture, *Soil chemical properties, Pine trees, Growth rates.

In a greenhouse study the emergence, survival, and growth of seven species of pine were related to chemical and textural characteristics of twelve Kentucky surface-mine spoils. The results identify three factors that may affect the establishment of direct-seeded pine on surface-mine spoils. (1) Fine-textured spoil material may restrict seedling emergence while coarse-textured sandstones and hard shales may provide a better seedbed. (2) Species vary in their response to chemical and physical characteristics of the spoil material. Loblolly and longleaf pine were adapted to a wide range of spoils. Growth of shortleaf and white pine was reduced on extremely acid spoils. (3) Growth of loblolly pine was directly related to the amount of phosphorus in the whole plant. (Curtis-Forest Service)
W75-05493

LIME RETENTION IN ANTHRACITE COAL-BREAKER REFUSE,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
M. M. Czapowskyj, and E. A. Sowa.
Research Note NE-154, 1973. 4 p, 2 fig, 1 tab, 2 ref.

Descriptors: *Mine wastes, *Lime, *Appalachian Mountain region, *Vegetation establishment, Acidic soils.

Liming will minimize the acidity of anthracite coal-breaker refuse but it is not known for how long such treatment is effective. Lime applied to coal-breaker refuse at rates of 2.5 and 5.0 tons per acre raised the pH to neutral range, and this range was still in evidence 7 years after treatment. The pH readings decreased with the depth of the refuse profile, and below 9 inches they approximated those of the control plots. The 2.5 ton rate was almost as effective as the 5.0 ton treatment. Liming coal-breaker refuse is a practical treatment for establishing vegetation. (Forest Service)
W75-05496

EROSION OVER TIME ON SEVERELY DISTURBED GRANITIC SOILS: A MODEL,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
W. F. Megahan.
Research Paper INT-156, September 1974. 14 p, 6 fig, 16 ref.

Descriptors: *Erosion control, *Sheet erosion, Roadbanks, Equations, *Accelerated erosion, *Soil erosion, Rainfall intensity, Soil stabilization, Soil compaction, Particle size, Soil texture, *Model studies, Idaho.
Identifiers: Surface erosion, Erosion pavement, *Armoring, Granitic bedrock, Soil disturbance, Time trends, Erodibility index, Rainfall energy, *Idaho Batholith.

A negative exponential equation containing three parameters was derived to describe time trends in surface erosion on severely disturbed soils. Data from four different studies of surface erosion on roads constructed from the granitic materials found in the Idaho Batholith were used to develop equation parameters. Surface 'armoring' was the dominant factor causing the time trends in surface erosion. The significance of time trends in surface erosion is discussed. (Forest Service)
W75-05499

TOXICITY OF ACID COAL-MINE SPOIL TO PLANTS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-05591

GENETIC VARIABILITY IN SURVIVAL AND GROWTH OF VIRGINIA PINE PLANTED ON ACID SURFACE-MINE SPOIL,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. T. Plass.
In: Ecology and Reclamation of Devastated Land. Vol. 1. R. J. Hutnik, and G. Davis, (editors). Gordon and Breach, New York, p 493-507, 1973. 4 fig, 6 tab.

Descriptors: *Strip mines, *Appalachian Mountain region, *Plant breeding, *Pine trees, Vegetation establishment, Growth rates, Genetics.

The success of pine seedlings planted on toxic spoils may depend on the physiologic efficiency of seedlings in coping with adverse site conditions. Field and greenhouse studies show that some Virginia pine progeny are definitely superior for planting on toxic spoil. Differences in growth and survival were related to the stand from which the seed for each progeny were collected. Those greenhouse grown progeny with foliar nutrient levels of .20% Ca or more and 15 ppm B or more may make above-average growth in the field. These findings may lead to a breeding program to produce genotypes specifically adapted to adverse sites and result in substantial improvement in revegetation success. (Vogel-Forest Service)
W75-05594

COMPARISON OF FALL AND SPRING PLANTING IN STRIP-MINE SPOILS IN THE BITUMINOUS REGION OF PENNSYLVANIA,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
G. Davis.
In: Ecology and Reclamation of Devastated Land. Vol. 1. R. J. Hutnik, and G. Davis, (editors). Gordon and Breach, New York, p 525-538, 1973. 6 tab, 1 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Trees, *Shrubs, *Seasonal, Grading, Acidic soils, *Pennsylvania.

To test the possibility of planting trees and shrubs throughout both the spring and fall seasons, plantings of 10 coniferous tree species and 5 hardwood shrub species were made on 7 graded strip-mine spoils. Spring planting of trees and shrubs was more successful on the more acid sites, but shrubs survived well with fall planting on the better sites. Season of planting had no significant effect on fifth-year height of either trees or shrubs. Spring and fall planting of trees and shrubs is feasible on favorable spoil sites and the good performance of shrubs indicates that their wider use is warranted, especially where wildlife plantings are desired. (Vogel-Forest Service)
W75-05595

FERTILIZER AND HERBACEOUS COVER INFLUENCE ESTABLISHMENT OF DIRECT-SEEDED BLACK LOCUST ON COAL-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. G. Vogel, and W. A. Berg.
In: Ecology and Reclamation of Devastated Land. Vol. 2. R. J. Hutnik, and G. Davis, (editors). Gordon and Breach, New York, p 189-198, 1973. 3 tab, 5 ref.

Descriptors: *Strip mines, *Appalachian mountain region, *Black locust trees, *Fertilization, Vegetation establishment, Phosphorus.

Obtaining adequate stocking of black locust direct seeded with mixtures of herbaceous species has previously been uncertain. Phosphorus fertilization at the rate of 49 kilograms per hectare appears adequate for establishing seeded black locust on most spoils. Greater success with the black locust can be achieved with slower developing herbaceous species or species that grow in late spring and summer. Fertilization enhances the establishment of quick cover along with the long-term tree cover. (Forest Service)
W75-05596

PERFORMANCE OF RED PINE AND JAPANESE LARCH PLANTED ON ANTHRACITE COAL-BREAKER REFUSE,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
M. M. Czapowskyj.
In: Ecology and Reclamation of Devastated Land. Vol. 2. R. J. Hutnik and G. Davis, (editors). Gordon and Breach, New York, p 237-245, 1973. 5 tab, 2 ref.

Descriptors: *Mine wastes, *Pine trees, *Acidic soils, Mulching, Fertilizers, Lime, Appalachian Mountain region.

Anthracite coal-mine spoils create a severe environmental problem and, as a rule, neither natural vegetation nor planted trees or shrubs have survived on these spoils. This study shows that lime is the most essential amendment in the establishment of red pine and Japanese larch. Commercial fertilizer had only a slight effect on growth and no effect on survival, although mulching did improve overall survival. The surface of the limed plot was still in the neutral pH range after 4 years. (Vogel-Forest Service)
W75-05597

MICRO-TOPOGRAPHIC PROFILE GAGE,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 7B.
W75-05599

VEGETATING STRIP-MINE SPOILS FOR RUNOFF AND EROSION CONTROL,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Proceedings Revegetation and Economic Use of Surface-Mined Land and Mine Refuse Symposium. December 2-4, 1971. Pipestem State Park, West Virginia, p 40-41, (1971). 6 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Erosion control, *Runoff, *Vegetation establishment, Slope stability.

Excessive runoff and erosion are considered among the most important adverse effects of surface mining. If erosion is not prevented, continued exposure of fresh, relatively unweathered spoil will prolong acid and soluble salt production. An adequate cover of vegetation that is quickly established can be effective in runoff and erosion control. (Forest Service)
W75-05603

WATERSHED VALUES IMPORTANT IN LAND USE PLANNING ON SOUTHERN FORESTS,
Forest Service (USDA), Franklin, N.C. Coweeta Hyrologic Lab.
J. E. Douglass.
Journal of Forestry, Vol 72, No 10, p 617-621, October 1974. 2 fig, 1 tab, 25 ref.

Descriptors: Water resources, *Planning, *Water quality, Water pollution, *Water supply, Water yield, *Watershed protection, *Soil erosion, Impaired water quality, Mineral content, Oxygen content, *Southeast U.S., *Land use, Forests, Forest soils.

Forests cover 20 to 65 percent of the land in the major water resource regions of the South, and forest management practices control or regulate the volume and timing of streamflow from these lands. Although water quality is emerging as the major water problem, quantity and timing of streamflow are also important and interrelated watershed values which should be considered in land use planning. Protection or improvement of hydrologic performance of forest soils will continue to be an important consideration in planning. (Forest Service)
W75-05716

SALTY BARK AS A SOIL AMENDMENT,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2G.
W75-05718

RIVER FLOW INCREASES IN CENTRAL NEW ENGLAND AFTER THE HURRICANE OF 1938,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2E.
W75-05720

RUNOFF WATER QUALITY OF THREE TUCSON WATERSHEDS.
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 4C.
W75-05768

PROCEDURES FOR DEVELOPING A MODEL FOR PLANNING WATERBASED LINEAR PARKS ALONG STREAM CHANNELS IN SEMIARID URBAN REGIONS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 6B.
W75-05769

A DECISION-AIDING MODEL FOR PLANNING OPTIMAL RESOURCE ALLOCATION OF WATER BASINS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 6A.
W75-05770

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

THE RESPONSE OF NEARSHORE PERIPHYTON IN WESTERN LAKE SUPERIOR TO THERMAL ADDITIONS,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 5C.
W75-05354

ENVIRONMENTAL EFFECTS OF A TRITIUM GAS RELEASE FROM THE SAVANNAH RIVER PLANT ON MAY 2, 1974,
Du Pont deNemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5C.
W75-05361

ENVIRONMENTAL SURVEILLANCE AT LOS ALAMOS DURING 1973,
Los Alamos Scientific Lab., N.M.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT. No. LA-5586, $5.45 in paper copy, $2.25 in microfiche. Report LA-5586, May 1974. 57 p, 14 fig, 31 tab, 11 ref. (Compiled by K. J. Schiager, and K. E. Apt.)

Descriptors: *Radioactivity, *Monitoring, Environment, *Air pollution, *Water pollution Soil contamination, *Nuclear wastes, Effluents, Ecology, Ecosystems, Ttitium, Bioindicators, Soils, Physical properties, Chemical properties, Meteorology, Climatology, Hydrogeology, Rainfall Disposition, *New Mexico.
Identifiers: Dosimetry, Surveillance program, *Los Alamos(NM).

The CY 73 environmental monitoring program of the Los Alamos Scientific Laboratory (LASL) is described. Data are presented for concentrations of radioactivity measured in air, ground and surface waters, liquid effluents, sediments, and soils and are compared with those of AEC guides and/or data from other reporting periods. Levels of external penetrating radiation measured in LASL environs are given. The average whole body radiation dose to residents of Los Alamos County resulting from LASL operations was calculated. Chemical and biological qualities of liquid effluents and surface and ground waters of LASL environs were determined, and are compared to applicable standards. Results of related environmental studies are compared to applicable standards. Results of related environmental studies are presented. Ecological investigations include (a) an environmental inventory of LASL and environs, (b) the honeybee as a potential tritium indicator organism, (c) radionuclides in Los Alamos area canyon ecosystems, and (d) physical and chemical characterizations of Los Alamos area soils. Results are given of meteorological investigations of Los Alamos climatological records, rainfall distributions, and windfield patterns. There are also data pertaining to the geo-hydrological determination of flood frequencies and maximum discharges of Los Alamos area canyons. (Houser-ORNL)
W75-05362

COMPATIBILITY OF HAFNALLOYS 105 AND 150 WITH 238PUO2,
Los Alamos Scientific Lab., N.M.
C. C. Land, and D. E. Peterson.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT No. LA-5593, $4.00 in paper copy, $2.25 in microfiche. Report LA-5593, August 1974. 8 p, 14 fig, 1 tab, 6 ref.

Descriptors: *Thermodynamic behavior, Research and development, *Storage tanks, *Hafnium, *Plutonium, *Oxides, *Compatibility, Fuels, Temperature, Duration, Diffusion, Metals.

The compatibility between two Hafnalloys (hafnium-platinum-palladium formulations) and 238PuO2 (plutonia) was investigated after their exposure at 1000 degrees C for 2000 and 5800 h. Hafnalloy samples with and without preapplied surface layers of hafnia were studied. To interpret the oxidation behavior of the two alloys, thermodynamic and diffusion calculations of their reactivites with plutonia were correlated with experimental ebservations. The two Hafnalloys proved to be unsuitable materials for plutonia storage at 1000 degree C for 2000 hours or longer, because oxygen and plutonium diffuse into the alloy lattice and the container becomes brittle. Calculations indicate that they also would not make suitable containers for plutonia at 800 degrees C. (Houser-ORNL)
W75-05363

DEVELOPMENT OF AIR-SAMPLING TECHNIQUES, PROGRESS REPORT, OCTOBER 1, 1973, THROUGH MARCH 31, 1974,
Los Alamos Scientific Lab., N.M.
E. E. Campbell, G. O. Wood, and R. G. Anderson.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT. No. LA-5634-PR, $4.00 in paper copy, $2.25 in microfiche. Report LA-5634-PR, June 1974. 8 p, 10 fig, 2 tab.

Descriptors: Research and development, *Air pollution, *Sampling, *Analytical techniques, *Adsorption, *Colorimetry, *Chromatography, Amino acids, Sorption, Design criteria, Evaluation, Technology, *Pollutant identification, Gas chromatography.
Identifiers: Formaldehyde, Amines, Sorbents.

Thermal desorption-gas chromatographic analysis of formaldehyde collected on alumina has been abandoned in favor of a colorimetric method. This modified chromotopic acid method has been found to have much greater sensitivity and specificity and acceptable precision and accuracy. Capacity and breakthrough measurements have been made for a selected alumina sorbent by sampling air containing formaldehyde. As a result, a sampling tube has been designed capable of sampling for up to 1600 s (27 min) under extreme humidity conditions. Additional breakthrough measurements have been done for anilane, o-toluidine, and xylidine in a high-humidity atmosphere sampled with 45/60-mesh silica gel. From these results a new sampling tube has been designed for sampling aromatic amines. The precision of the total sampling and analysis method has been determined. The accuracy of the method was also confirmed by comparison with an independent sampling and analysis procedure. (Houser-ORNL)
W75-05365

BIBLIOGRAPHY OF PUBLISHED PAPERS OF THE ATOMIC BOMB CASUALTY COMMISSION,
Atomic Bomb Casualty Commission, Hiroshima (Japan); and Atomic Bomb Casualty Commission, Nagasaki (Japan).
For primary bibliographic entry see Field 5C.
W75-05366

BIBLIOGRAPHY ON PUBLISHED PAPERS OF THE ATOMIC BOMB CASUALTY COMMISSION.
Atomic Bomb Casualty Commission, Hiroshima (Japan); and Atomic Bobm Casualty Commission, Nagasaki (Japan).
For primary bibliographic entry see Field 5C.
W75-05367

FEASIBILITY STUDIES OF THE PARTITIONING OF COMMERCIAL HIGH-LEVEL WASTES GENERATED IN SPENT NUCLEAR FUEL REPROCESSING: ANNUAL PROGRESS REPORT FOR FY-1974,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W75-05368

ASSESSING AND CONTROLLING THE HAZARD FROM TRITIATED WATER,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5G.
W75-05369

RADIATION DATA: SECTION II. WATER.
Office of Radiation Programs, Washington, D.C.
Available from sup Doc, U.S. Gov. Print Office, Wash, D.C. as REPT. No. RDDRA4,15(9) 1974. Radiation Data and Reports, Vol 15, No 9, p 587-591, September 1974. 2 fig, 1 tab, 4 ref.

Descriptors: *Monitoring, *Radioactivity, *Environment, *Sampling, Water, Water pollution, Fallout, Governments, Administrative agencies, Analytical techniques, Radioisotopes, Tritium.
Identifiers: *Surveillance program.

Data provided by Federal, state, and foreign governmental agencies and other cooperating organizations are presented. Data is accumulated from surveillance programs concerning radionuclide concentrations of surface, ground, and treated water. Most of the analytical determinations are for gross beta and gross alpha radioactivity. These values are compared with the Public Health Service Drinking Water Standards. (Houser-ORNL)
W75-05374

ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION ISTALLATION,
Office of Radiation Programs, Washington, D.C.
Available from Sup Doc, U.S. Gov. Print. Office as REPT No. RDDRA4,15(9), 1974. Radiation Data and Reports, Vol 15, No 9, p 609-624, September 1974. 6 fig, 7 tab, 4 ref.

Descriptors: *Monitoring, *Assay, *Assessment, *Radioactivity, *Sites, Nuclear powerplants, Nuclear energy, Facilities, Administrative agencies, Water, Sediment, Uranium, Thorium, Radium, Standards, Regulation, Strontium, Cesium, Atlantic Ocean, Public health.
Identifiers: *Surveillance program, Mohawk River, Farmington River.

The U.S. Atomic Commission (AEC) receives from its contractors annual reports on the levels of environmental contaminants including radioactivity in the vicinity of major Commission installations. The reports include data from routine monitoring programs where operations are of such a nature that plant environmental surveys are required. The summaries of the environmental radioactivity data are presented for Feed Materials Production Center and Knolls Atomic Power Laboratory. (Houser-ORNL)
W75-05375

RADIATION DATA. SECTION II. WATER,
Office of Radiation Programs, Washington, D.C.
Available from Sup Doc, U.S. Gov. Print. Office, Wash. D.C. as REPT No. RDDRA4-15(10) (1974). In: Radiation Data and Reports, Vol 15, No 10, p 667-671, October 1974. 6 fig, 2 tab, 4 ref.

Descriptors: *Monitoring, *Environment, *Water, *Water pollution, *Radioactivity, Assessment, Assay, Data collections, Governments, Sampling, Analytical techniques, Publications, Domestic water, Public health, Potable water, *Washington.
Identifiers: Surveillance Program.

The Environmental Protection Agency and other Federal, State, and local agencies operate extensive water quality sampling and analysis programs for surface, ground, and treated water. Most of these programs include determinations of gross beta and gross alpha radioactivity and specific radionuclides. Although the determination of the total radionulcide intake from all sources is of primary importance, a measure of the public health importance of radioactivity levels in water can be obtained by comparison of the observed values with the Public Health Service Drinking Water Standards. Surveillance data from a number of Federal and State programs are published periodically to show current and long-range trends. Radioactivity in Washington surface water, July 1971. June 1972 in reported. (Houser-ORNL)
W75-05377

RADIATION DATA. SECTION IV. OTHER DATA. ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION INSTALLATIONS,
Goodyear Atomic Corp., Piketon, Ohio.
Available from Sup Doc, U.S. Gov. Print. Office, Wash. D.C. as REPT No. RDDRA4-15(10) (1974). 3 fig, 5 tab, 2 ref.

Descriptors: *Monitoring, *Nuclear energy, *Nuclear powerplants, *Uranium, *Effluents, *Water pollution sources, Water pollution, Radioactivity, Ohio River, Regulation, Governments, Water quality standards.

Described are the monitoring programs for the Portsmouth area gaseous diffusion plant and the Shippingport Atomic Power Station for the calender year 1972. Discussed are the various environmental standards applicable to the plants; the sampling, monitoring, and analytical procedures; and the extent of conformance with the standards. Liquid effluents from the Shippingport plant are collected, processed, sampled, and analyzed to ensure conformance with the applicable water quality standards prior to release to the environment. Liquid effluents containing radioactivity are processed to reduce the amount of radioactivity to the lowest practical level. Water containing radioactivity is generated primarily from draining the reactor collant system and decontaminating equipment. The plant is equipped with systems to collect and process this water and remove most of the radioactivity before it is released to the Ohio River. (Houser-ORNL)
W75-05378

CONTAMINATION LIMITS FOR REAL AND PERSONAL PROPERTY, PROGRESS REPORT, JULY-DECEMBER 1973,
Los Alamos Scientific Lab., N. Mex.
J. W. Healy, and W. J. Smith.
Available from NTIS, Springfield, Va. as Rept. No LA-5579-PR, $4.00 in paper copy, $2.25 in microfiche. Report LA-5579-PR, April 1974. 6 p, 3 tab, 5 ref.

Descriptors: *Plutonium, *Soil contamination, *Transfer, *Kinetics, *Absorption, *Path of pollutants, Movement, Measurement, Model studies, Soils, Particle size, Meteorology, Public health, Air pollution, Water pollution.
Identifiers: Dose, Internal dose, External dose.

Work performed from July to December-1973 along with some needed programs to obtain additional data are described. A brief description of the preliminary standard for plutonium in soils along with progress on a calculation of the FIDLER calibration and a conceptual model for contamination transfer from an object to the body are included. (Houser-ORNL)
W75-05379

ANNUAL REPORT ON PROJECT ANO115A, FISCAL YEAR 1974,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W75-05382

MINERALOGY AND ION EXCHANGE CHARACTERISTICS OF SAVANNAH RIVER PLANT STREAMBED SEDIMENTS,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5B.
W75-05389

DESCRIPTION OF A NEW WASTE WATER ANALYZER FOR LABORATORIES (RESPIROMETER) (IN HUNGARIAN),
W. Fleps.
Hidrologiai Kozlony, No 5, p 217-221, 1974. 5 fig, 11 ref.

Descriptors: *Analytical techniques, *Water purification, *Laboratory equipment, Waste water, Biochemical oxygen demand, Sludge, *Pollutant identification.
Identifiers: *Respirometer, Hungary.

New batch type and flow-through respirometers were developed in Hungary for complex laboratory analysis of waste waters and activated sludge regarding the parameters which determine the biological purification of waste waters. An oxygen supply is automatically controlled by oxygen displacement from a burette which permits visual checkup and also automatic recording of the oxygen consumption in both the batch type and flow-through respirometers. The batch type respirometer is suitable for the determination of the complete BOD curve, the rate of carbon dioxide formation, the sludge growth, and, by means of two respirometers, the total biochemical oxygen consumption, including that for endogenous respiration. The flow-through respirometer with a peristaltic pump for water supply and discharge at preset rates is suitable for the determination of: the rate of oxygen consumption of the mixture of waste water and activated sludge; the specific oxygen demand; the specific endogenous and substrate respiration; the specific sludge formation; the waste water toxicity; and, the total BOD. (Takacs-FIRL)
W75-05398

MICROBIOLOGY OF WATER, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 5B.
W75-05400

TRACE METAL ASSOCIATIONS IN SUB-ARCTIC FJORD ENVIRONMENTS, PROGRESS REPORT MAY 1972-MARCH 1974,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W75-05403

EXTRACTION OF COBALT, IRON, INDIUM AND ZINC FROM SEAWATER BY MEANS OF THE TRIFLUOROACETYLACETONE TOLUENE SYSTEM,
Alaska Univ., College. Inst. of Marine Science.
M. L. Lee, and D. C. Burrell.
Analytica Chimica Acta, Vol 62, No 1, p 153-161 November, 1972. 8 fig, 22 ref, In: University of Alaska, Institute of Marine Science, Report No RLO 2229-TI-27, 1974, p. 55-63.

Descriptors: *Metals, *Seawater, *Analytical techniques, *Chelation, Chemical reactions, Iron, Zinc, Cobalt, Trace elements, Gas chromatography, Chemical analysis, Water pollution, *Pollutant identification, *Separation techniques.

This extraction method was studied since gas liquid chromatography, although not yet applied to seawater trace metal analysis, requires partition and detection of metals as organo-complexes, and also since chelation and extraction may be used to prepare volatile metal compounds for mass spectrometric analysis. Iron, indium, cobalt and zinc were completely and rapidly extracted in a single extraction with an equal volume of toluene trifluoroacetylacetone (0.1M) for Fe and In, and toluene-trifluoroacetylacetone (0.1M)-isobutylamine (0.4M) for Co and Zn. A 90% extraction of indium was obtained with an aqueous/organic volume ratio of 20 and a 88.5% extraction for iron with a volume ratio of 40. There was a deviation of the iron and indium extraction curves from sea water compared with the theoretical trivalent metal curves: this was attributed to the high concentration of halogen ions in seawater; which makes seawater a superior medium for solvent extraction. (See also W75-05403) (Pulliam-Vanderbilt)
W75-05404

DETERMINATION OF HEAVY METALS IN SEAWATER BY CARBON FILAMENT ATOMIC SPECTROMETRY,
Alaska Univ., College. Inst. of Marine Science.
D. C. Burrell.

In: University of Alaska, Presented at National Fall Meeting, American Geophysical Union, San Francisco, December, 1972. 7 p, 12 fig, Institute of Marine Science, Report RLO-2229-TI-27, p 88-106.

Descriptors: *Heavy metals, *Sea water, *Spectrophotometry, *Analytical techniques, *Trace elements, Water pollution, Pollutants, Chemical analysis, Testing procedures, *Pollutant identification.
Identifiers: *Flameless photometry.

The superior cell characteristics of discrete, flameless atomic adsorption atomization provide a detection limit capability for the direct determination of many trace heavy metals in natural waters without preanalysis concentration. This work was concerned with the use of carbon filament cells operated in the mini-Massman mode for the determination of soluble cadmium, copper, lead and silver in marine water. Sequential atomization of raw seawater yielded non-reproducible results and solvent extraction separation of analyte and matrix metals has been adopted. Filament atomization enables the extraction step to be optimized with regard to phase volumes and choice of organic ligand and solvent. (See also W75-05403) (Pulliam-Vanderbilt)
W75-05405

DIRECT PHOTOMETRIC DETERMINATION OF SOLUBLE PROTEINS IN NATURAL WATERS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 2K.
W75-05409

MEASUREMENTS OF MERCURY SORPTION BY ALGAE,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
P. J. Hannan, P. E. Wilkniss, C. Patouillet, and R. A. Carr.
Available from the National Technical Information Sep 31, 11pringfield, Va. 22161 as AD-774 694, $3.75 in paper copy, $2.25 in microfiche. NRL Report 7628, December, 1973. p 31, 11 tab, 7 fig, 33 ref. NRL Problem G04-01.

Descriptors: *Mercury, *Algae, *Sorption, Aquatic life, Laboratory tests, Radioisotopes, Tracers, Analytical techniques, Fluorescence, Absorption, *Pollutant identification, Measurement.

The results of laboratory experiments concerning mercury sorption by two marine algae, Phaeodactylum tricornutum and Chaetoceros galvestonensis were described. Measurements of mercury uptake were made with the use of isotopes (carrier-free Hg-197, and Hg-203 incorporated in mg mercury/liter concentrations). Significant mercury concentrations were found in cells grown in media prepared from chemically pure reagents; concentrations of 14 to 116 mg/kg were present in cells harvested from 10% and 100% concentrations of culture medium. Phaeodactylum cells grown in a 10% culture medium in the presence of 0.05 mg mercury/liter contained 2400 mg mercury/kg but their growth was inhibited only 55% in a 4-day period. Chaetoceros cells had a greater affinity for mercury and contained 7400 mg mercury/kg when cultured for the same time period in a 25% culture medium containing 0.10 mg mercury/liter. They had not grown, as determined by fluorescence analysis. Mercury sorption to Millipore filters was greater in the presence of dilute culture medium than in 3.5% NaCl solution. To circumvent the problems associated with this phenomenon, a procedure was devised whereby the activity of isotopically tagged cells could be determined without collecting them on a filter. Less than 2% of the mercury sorbed to Phaeodactylum cells was in the pigments. (Jernigan-Vanderbilt)
W75-05415

THE RELATION BETWEEN PRIMARY PRODUCTIVITY, NUTRIENTS, AND THE TROUT ENVIRONMENT IN SOME NEW ZEALAND LAKES,
Marine Dept., Wellington (New Zealand). Fish Research Div.
For primary bibliographic entry see Field 5C.
W75-05419

A NEW TECHNIQUE FOR REMOTE MONITORING OF FRESHWATER INVERTEBRATE POPULATIONS,
Minnesota Univ., Duluth. Lake Superior Basin Studies Center.
W. R. Swain, R. S. Pozos, R. M. Wilson, and R. P. Neri.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 228, $3.25 in paper copy, $2.25 in microfiche. (1974). 10 p, 4 fig, 20 ref. OWRT B-097-MINN(1), 14-31-0001-4097.

Descriptors: *Remote sensing, Freshwater, *Invertebrates, *Plankton, Monitoring, *Vertical migration, Instrumentation, Measurement, *Pollutant identification.
Identifiers: Thermistor probes.

The use of thermistor probes for remote non-invasive monitoring of the vertical movement of freshwater invertebrate populations was demonstrated. The system consisted of a rectangular column constructed of plexiglass. A bipolar arrangement of stainless steel and electrodes (20 mesh/inch; 0.023 guage wire, type 304) were cemented on opposing walls in series 10 cm apart. These electrodes were then connected by shielded cable to a Brush Impedance Coupler (model 11-4307-06) which utilized an excitation frequency of 50 KHz and maximum excitation current of 1.5 milliamperes. The signal output from the impedance converter was then amplified and monitored on Brush 440 multichannel recorders, a cathode ray oscilloscope, and a 3 watt audio monitoring system. The system has been used to monitor individual species for twenty days at a time with excellent results. (Walton-Minnesota)
W75-05441

CADMIUM AND ZINC BINDING IN MAMMALIAN LIVER AND KIDNEYS,
Dalhousie Univ. Halifax, (Nova Scotia). Dept. of Biochemistry.
Archives of Environmental Health, Vol 24, No 6, p 419-425, June, 1972, 1 tab, 5 fig, 20 ref. MR-1544, MA-4526.

Descriptors: *Cadmium, *Zinc, *Mammals, *Proteins, Human pathology, Public health, Laboratory tests, Laboratory animals, Rodents, Testing procedures, Analytical techniques, Adsorption, *Pollutant identification.

Rats and mice were injected subcutaneously with cadmium chloride Cd109 and zinc chloride Zn65. Both isotopes concentrated primarily in liver and kidneys. Tissue subcellular fractionation showed 70 to 80% Cd109 and Zn65 associated with cytoplasmic soluble fraction. Soluble fraction gel filtration revealed most Cd109 was bound to proteins of 11,000 to 12,000 molecular weight; Zn65 was associated mainly with larger sized molecules. In rats, two weeks following isotope dose, depletion of Zn65 from cytoplasmic macromolecules was demonstrated; Cd109 remained fixed to cadmium-binding proteins (Cd-BP). By ion-exchange chromatography, Cd-BP was resolved into major components. Similar components were separated from human kidney Cd-BP. Presence of Cd-BP was noted in humans and monkey liver tissues. It is suggested that mammalian organism intracellular Cd-BP apparently acts as biochemical mechanism for sequestration of toxic Cd2+ ions. (Jernigan-Vanderbilt)
W75-05485

FLAMELESS ATOMIC ABSORPTION DETERMINATION OF COBALT NICKEL, AND COPPER - A COMPARISON OF TANTALUM AND MOLYBDENUM EVAPORATION SURFACES,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
Analytical Chemistry, Vol 46, No 13, p 1983-1987, November, 1974, 8 fig, 3 tab, 15 ref.

Descriptors: *Spectrophotometry, *Cobalt, *Nickel, *Copper, *Analytical techniques, Chemical analysis, Trace elements, Heavy metals, Testing procedures, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

Molybdenum and tantalum evaporation filaments were investigated for their suitability in determining nanogram quantities of Co, Ni, and Cu by flameless A.A.S. Tantalum filament surfaces interacted with these elements during evaporation making the determination of Co and Ni very difficult and lowering the precision of the Cu determination. Molybdenum filaments showed no sign of interaction with these elements and gave very reproducible results with high absolute sensitivities (5-30 pg). The presence of any oxide or nitride on the evaporation surface produced marked interelemental interference effects. However, when very clean filaments were used, interference effects were significantly lower than those observed for graphite surfaces. An increase in filament temperature resulted in reduced interelemental interference and improved precision. The effects of the presence of various foreign ions were also investigated. Throughout the work, particularly strong cross interferences occurred between iron, cobalt, nickel, and chromium. (Pulliam-Vanderbilt)
W75-05487

SOLVENT EXTRACTION FOR USE WITH FLAME ATOMIC ABSORPTION SPECTROMETRY,
Toronto Univ., (Ontario). Dept. of Geology.
Analytical Chemistry, Vol 46, No 13, p 1894-1898, November, 1974, 3 fig, 5 tab, 8 ref.

Descriptors: *Chelation, *Spectrophotometry, *Analytical techniques, *Heavy metals, *Solvent extractions, Cadmium, Cobalt, Copper, Iron, Lead, Nickel, Zinc, Testing procedures, Trace elements, *Pollutant identification.
Identifiers: *Atomic absorption spectrometry.

A method for concentrating metals from natural waters prior to flame A.A. analysis was described. By using two chelating agents, ammonium pyrolidindithiocarbamate (APDC) and diethylammonium diethyldithiocarbamate (DDDC), a total of eight metals were simultaneously extracted-cadmium, cobalt, copper, iron, lead, nickel, silver, and zinc. All of the metal complexes formed were stable for nearly 9 hours. In the study, F, Ca, K, Mg, Na, phosphate, silicate, and biodegradable detergent at 50- and 100-ppm were tested for interference. Only the detergent appeared to affect the metal to any degree. The method also showed high sensitivity and good precision - generally less than 5% coefficient of variation on a routine basis. Accuracy was tested using EPA water standards and was found to be good. The application of this method to mercury, chromium (III), and manganese was also considered. (Pulliam-Vanderbilt)
W75-05488

COMPARISON OF CONTINUOUS WAVE AND PULSED CONTINUUM SOURCES FOR ATOMIC FLUORESCENCE FLAME SPECTROMETRY,
Florida Univ., Gainesville. Dept. of Chemistry.
Analytical Chemistry, Vol 46, No 13, p 1898-1902, November, 1974, 6 fig, 3 tab, 23 ref.

Descriptors: *Spectrophotometry, *Fluorescence, *Analytical techniques, *Metals, Testing procedures, *Flame photometry, Laboratory tests, *Pollutant identification.

The study involved the application of pulsed xenon lamp as well as a point source continuous wave (cw) source xenon arc lamp with a special mirror system enabling the transfer of nearly all the radiation produced by the source into the flame atomizer. With the pulsed lamp, either an analog or digital boxcar detector was used, whereas with the cw source either a lock-in amplifier or a synchronous photon counter was used. Both sources were used with a large solid angle collection efficiency. Both the sources and the detection systems were compared. It was reported the digital detection system had little advantage over the analog one. The detection limits obtained for all elements studied with the pulsed source were poorer than with the cw source. It was found the cw source gave a larger signal-to-noise ratio, which was possibly due to the useable source flux (at the atomizer) ratio determined largely by solid angle considerations. The overall convenience of the cw source with either detection system and the detection limits found for 13 elements indicated to the analysts that the cw source has practical value in AFS. (Pulliam-Vanderbilt)
W75-05489

CHEMICAL PROPERTIES AND PARTICLE-SIZE DISTRIBUTION OF 39 SURFACE-MINE SPOILS IN SOUTHERN WEST VIRGINIA,
Forest Service (USDA), Princeton, W. Va. Northeastern Forest Experiment Station.
W. T. Plass, and W. G. Vogel.
Research Paper NE-276, 1973. 8 p, 3 fig, 6 tab.

Descriptors: *Strip mines, *Appalachian Mountain region, *Particle size, *Soil chemical properties, Vegetation establishment, Fertilizers, *West Virginia, *Pollutant identification.

The chemical composition and particle-size distribution of spoil material affects establishment and growth of vegetation and water quality in areas disturbed by surface mining. The soil-size fraction of spoils analyzed averaged 37%. The spoils had a median pH of 5.0 or more, low (3.1 to 7.0 parts per million) or very low (< 3.0 parts per million) P, exchangeable acidity ranging from 0.05 to 14.35 milliequivalents per 100 grams and exchangeable Al ranging from 0 to 7.25 milliequivalents per 100 grams. Yields of K-31 fescue were much lower on spoils having a pH below 5.0 even with added fertilizer while the same effect for sericea lespedeza occurred at pH 4.5. There is generally adequate soil-size material for satisfactory plant growth; however, tests show that addition of N and P fertilizer is essential for establishing vegetation. (Curtis-Forest Service)
W75-05492

AVOID PROBLEM SPOILS THROUGH OVERBURDEN ANALYSIS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
T. L. Despard.
General Technical Report NE-10, 1974. 4 p, 1 fig, 5 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Soil chemical properties, *Core drilling, Grading, Chemical analysis, Pollutant identification.

During strip mining of coal and subsequent grading operations, indiscriminant placement of toxic overburden strata at the spoil surface creates reclamation problems that are difficult and expensive to correct. Evaluation of overburden material before mining is suggested as a reliable means of predicting spoil quality and devising a reclamation plan. This can best be accomplished by core-drilling the proposed area and submitting the recovered core sample to a laboratory for analysis. Color, pyrite content, and pH are field guides that can be used to determine the potential toxicity of exposed overburden strata. By pre-mining tests of overburden it is possible to avoid forming toxic spoil as a result of unknowingly placing material from problem strata at the surface. (Forest Service)
W75-05494

DISSOLVED ORGANIC CARBON (DOC), AN INDEX OF ORGANIC CONTAMINATION IN GROUND WATER NEAR BARSTOW, CALIFORNIA,
Geological Survey, Garden Grove, Calif. Water Resources Div.
J. L. Hughes, L. A. Eccles, and R. L. Malcolm.
Ground Water, Vol 12, No 5, September-October, 1974. p 283-290. 3 fig, 1 tab, ref.

Descriptors: Water pollution effects, *Degradation(Decomposition), *Groundwater, Waste disposal, Distribution, Analytical techniques, Laboratory tests, Testing procedures, *California, *Biodegradation, Carbon, *Pollutant identification, Path of pollutants.
Identifiers: Barstow(Calif), Mojave River(Calif), *Dissolved organic carbon.

The alluvial aquifer underlying and adjacent to the Mojave River near Barstow, California, has been subjected to degradation from percolation of industrial and municipal wastes for more than sixty years. Effluents discharged to the aquifer have contained high concentrations of both organic (detergents, oil and grease, phenols, humic compounds) and inorganic (chromium, chloride, phosphates) substances. The concentration of dissolved organic carbon (DOC), as determined by a wet combustion technique, has been shown to be a definitive parameter in identifying ground water affected by waste disposal. The vertical distribution of DOC and other constituents indicates that two plumes of degraded water occur at different depths. A comparison of areal distribution of DOC and detergents (as MBAS) suggests that some organic compounds may have been adsorbed by the aquifer sediments. (Bradbeer-NWWA)
W75-05502

HEAVY METAL CONCENTRATIONS AND DEPOSITION IN BULK PRECIPITATION IN MONTANE ECOSYSTEMS OF NEW HAMPSHIRE,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
For primary bibliographic entry see Field 5B.
W75-05509

INSTREAM AERATION AND PARAMETERS OF STREAM AND ESTUARINE NITRIFICATION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
T. J. Tuffey, J. V. Hunter, W. Whipple, and S. L. Yu.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 183, $4.25 in paper copy, $2.25 in microfiche. Water Resources Research Institute, Rutgers University - The State Univ. of N.J., New Brunswick, N.J., November 1974. 59 p, 21 tab, 15 fig, 38 ref. OWRT B-027-NJ(3). 14-31-0001-3305.

Descriptors: *Nitrification, Water quality, *Biochemical oxygen demand, *Oxygen demand, Oxygen sag, *New Jersey, Aeration, Model studies, Rivers, Measurement, Instrumentation, Estuaries, On-site investigations, Water pollution sources, Pollutant identification.
Identifiers: *Nitrosomonas, *Nitrobacter, Warburg apparatus, *Passaic River(NJ), Artificial aeration, *Little Miami River(NJ).

The first objective was to verify a tentative hypothesis that artificial stream aeration might be found to stimulate the nitrification process. Field investigations on the Passaic River, N.J., and the Little Miami River gave a clear cut negative answer to this hypothesis. The second objective was to investigate more fully the chemical and biochemical mechanisms of stream nitrification. It was found that the much used Warburg apparatus is relatively inaccurate in measuring BOD of streams, and inherently unsuitable for use in measuring nitrification. Nitrification does occur in shallow surface-active streams and in estuaries (but through entirely different processes). The central portions of medium-sized rivers generally do not nitrify to a significant extent. Requirements for modelling such processes are discussed.
W75-05530

AUTOMATED MONITORING OF RECOVERED WATER QUALITY,
NASA Tech Brief No B74-10029, May, 1974. 2 p, 2 fig.

Descriptors: *Potable water, *Reclaimed water, *Monitoring, *Equipment, Testing, Water analysis, Quality control, Analytical techniques, Regulation, Maintenance, Data analysis, *Pollutant identification, Waste water treatment.

A laboratory prototype water quality monitoring system is described. The system provides an automatic method for online monitoring of the chemical, physical, and bacteriological properties of recovered water and for identifying a malfunction in the water recovery system. Parameters monitored are chloride ion concentration, ammonium ion concentration, pH, specific conductance, total organic carbon, and E. coli. The system is a practical method to assess the potability of reclaimed water and utilizes commercially available sensors that can be suitably modified. The bacteriological quality of recovered water is monitored by a chemiluminescence produced by the catalytic action of bacterial porphyrins, specifically hematin, on a luminol-hydrogen peroxide mixture. An eighteen-step programmer performs most of the process control. During each step twenty functions can be controlled. Signals are sent to the processing electronics from the photo-multiplier and provide a readout to be used for permanent records and analysis of data. (Orr-FIRL)
W75-05545

WATER QUALITY ANALYSIS SYSTEM WITH MULTICIRCUIT SINGLE SHELL HEAT EXCHANGER,
Beckman Instruments, Inc., Fullerton, Calif.
E. A. Houser, and B. W. Schwindt.

Descriptors: *Patents, *Analytical techniques, *Instrumentation, *Water analysis, Water quality, Power plants, Flow rate, Cooling water, *Heat exchangers, Pollutant identification.

A modular water quality analysis system for steam electric power generating plants includes a novel single shell multicircuit heat exchanger that varies the rate of flow of cooling water through each of the multiple circuits. The heat exchanger has a physical construction such that it can be mounted on top of the system rack thereby replacing a plurality of individually manifolded and valved heat exchangers formerly mounted at the back of the rack. The flexibility of design in the modular system also permits the same basic apparatus to be adapted to a large variety of different sizes and types of power generating plants having different analysis requirements. (Sandoski-FIRL)
W75-05549

DEVELOPING WATER SAMPLING STANDARDS.
Environmental Science and Technology, Vol 8, No 9, p 786-787, September, 1974.

Descriptors: Equipment, *Sampling, *Water analysis, *Quality control, Water sampling, On-site data collection, Data collection, Variability, *Water quality standards, *Pollutant identification.

The concensus of opinion at the D-19 Symposium on Aquatic Sampling and Measurement for Water Pollution Assessment held in Washington, D.C., in June, 1974, (sponsored by the American Society for Testing and Materials), was that no standard sampling equipment or technique exists for determining how polluted a given waste water stream is. One of the most difficult sampling jobs is to obtain representative samples from storm or combined sewers. Different methods for sampling sewers include discrete samples, simple composite samples, flow-proportional composite samples, and sequential composite samples. Equipment and sampling standards are in a formation stage; standards should emphasize intake, transport, tubing and piping, sample size, flow control, power sources, and temperature control. An ideal sampler should operate on batteries weighing less than 40 pounds which are capable of reliable sampling for three days in a standard manhole with uniform atmosphere and protection from vandalism. It should have the ability to: take flow-proportional and time-composite samples; separate the sample from all metal; purge the intake; vary the intake from 2 to 10 ft/sec; multiplex; vary the collection intervals from ten minutes to four hours. The sampler should be explosion proof, have a watertight exterior case, a security lock, a 2 1/2 gallon capacity, and a lift of 20 feet. (Orr-FIRL)
W75-05555

TRI-UNIVERSITY REPORT ON THE STATUS OF ENVIRONMENTAL CONTAMINATION BY LEAD,
Missouri Univ., Rolla.
For primary bibliographic entry see Field 5B.
W75-05567

PROBLEMS WITH MODELING TRANSPORT AND BIOLOGICAL TRANSLOCATION,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5B.
W75-05568

OVERVIEW OF A UNIFIED TRANSPORT MODEL,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
For primary bibliographic entry see Field 5B.
W75-05569

A MULTI-SOURCE ATMOSPHERIC TRANSPORT MODEL FOR DEPOSITION OF TRACE CONTAMINANTS,
Union Carbide Corp., Oak Ridge, Tenn. Computer Science Div.
For primary bibliographic entry see Field 5B.
W75-05570

PHYSICAL MODELING OF ATMOSPHERIC DIFFUSION,
Colorado State Univ., Fort Collins. Fluid Mechanics Program.
For primary bibliographic entry see Field 5B.
W75-05571

ANALYSIS OF CADMIUM PATHS IN ZINC SMELTER OPERATIONS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5B.
W75-05572

MODELING CADMIUM DISCHARGE FROM AN ELECTROPLATING LINE WITH THE GASP IV SIMULATION LANGUAGE,
Purdue Univ., Lafayette, Ind. School of Industrial Engineering.
For primary bibliographic entry see Field 5B.
W75-05573

PROBLEMS WITH THE USE OF CASCADE IMPACTORS,
Maryland Univ., College Park. Dept. of Chemistry.
G. E. Gordon, E. S. Gladney, J. M. Ondov, T. Conry, and W. H. Zoller.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 138-145, 2 fig, 2 tab, 5 ref.

Descriptors: *Data collections, *Air pollution, *Particle size, Analytical techniques, *Trace elements, *Sampling, Aluminum, Calcium, Manganese, Filters, *Instrumentation, Pollutant identification.

The problems with the use of cascade impactors were discussed. In studies of atmospheric particles to determine size distribution of particles bearing specific elements, the particles are collected with a cascade impactor, the size fractions collected are analyzed. Considerable care must be taken in the use of cascade impactors because of experimental artifacts that can distort the size distributions, especially wall losses and particle bounce-off, the latter followed by re-entrainment and deposition of the particles on later stages of the impactor. Side-by-side comparisons were made of three types of impactors in common use in particulate studies: the Lundgren and Scientific Advances (or 'Battelle') impactors and a modified Andersen sampler. The Scientific Advances impactor gave the highest collection efficiencies and the least amount of bounce-off. The modified Andersen produced slightly more distortion and the Lundgren exhibited serious bounce-off effects, especially for particles bearing aluminum. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05574

INDUSTRIAL SOURCE SAMPLING FOR TRACE METALS,
Purdue Univ., Lafayette, Ind.
R. B. Jacko.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 146-169, 10 fig, 3 tab.

Descriptors: *Sampling, *Trace elements, *Industrial wastes, *Municipal wastes, Particle size, Cadmium, Filters, Zinc, Lead, Nickel, Copper, *Air pollution, *Pollutant identification.

An EPA stack sampling train was described for the measurement of trace metals from a power plant, municipal incinerator, zinc smelter and a steel mill. The 'back half' of the train was found to collect insiginificant amounts of specific trace metals. A particle sizing sampling head fitted to the working end of the EPA stack probe indicated a segregation of trace metals toward the submicron particle size ranges. Over fifty per cent by weight of the cadmium in some samples was found in the submicron size range. A significant difference in the cadmium concentrations was found in the material collected on the glass fiber filter as compared to the probe backwash. For relatively cool stacks (180-400F) the cadmium concentration was from 2 to 40 times greater in the material collected on the glass fiber filter, whereas in a hot stack (1200F), the reverse was found by a factor of approximately 2.0. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05575

DETERMINATION OF A TRACE ELEMENT MASS BALANCE FOR A COAL-FIRED POWER PLANT,
Colorado Univ., Boulder. Dept. of Chemical Engineering.
J. W. Kaakinan, and R. M. Jorden.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., p 170-184, March, 1974. 3 fig, 4 tab, 21 ref.

Descriptors: *Trace elements, *Coals, *Fossil fuels, *Power plants, Sampling, Gases, Analytical techniques, Spectroscopy, X-rays, Fluorescence, Arsenci compounds, Copper, Iron, Lead, Tin, Zinc, Radioactivity, *Pollutant identification, *Colorado.
Identifiers: Boulder(Colo).

A mass balance for sixteen elements at a coal-fired power plant has been determined. Samples were obtained from Unit No. 5 of the Valmont Power Plant located near Boulder, Colorado and owned by the Public Service Company of Colorado. Unit No. 5 burns low sulfur pulverized coal or natural gas and has a maximum power output of 180 megawatts. This unit is unique in that particulate emissions are controlled by a mechanical collector followed by an electrostatic precipitator in parallel with a wet scrubber. Samples were collected during three days of scrubber-precipitator performance tests. Samples included coal, bottom ash, mechanical collector hopper ash, electrostatic precipitator hopper ash, scrubber slurry, scrubber make-up water, and particulates sampled isokinetically at the inlet to the scrubber and at the outlets to the precipitator and scrubber. The variety of types of samples required the use of several different handling and preparation techniques. Concentration measurements using wet chemistry, atomic absorption spectroscopy, and x-ray fluorescence spectroscopy have allowed the calculation of a mass balance for arsenci, copper, iron, lead, molybdenum, niobium, rubidium, selenium, strontium, tin, yttrium, zinc and zirconium and for the radioactive species lead-210, polonium-210, and radium-226. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05576

CHARACTERIZING STEEL MILL DUST,
Purdue Univ., Lafayette, Ind.
B. L. Dow, and K. J. Yost.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 185-197, 8 fig, 1 tab, 6 ref.

Descriptors: *Dusts, *Particle size, *Air pollution, *Steel, Industrial wastes, Metallurgy, Cadmium, Zinc, Lead, Filters, Electron microscopy, X-rays, Analytical techniques, Iron Managanese, Trace elements, *Pollutant identification, *Waste identification.

This paper focused on the emissions from the pyrometallurgical processes associated with the steel industry. The concentrations of cadmium, zinc, and lead in the emissions and the extent to which metals tend to concentrate in different size ranges were examined. The possibility of identifying steel mill emission particles collected on high-volume filters has also been investigated. If the emission from a source can be poorly characterized, it should be possible to identify these emissions when they are found at some distance away from the source. A JSM-U3 scanning electron microscope equipped with an energy dispersive x-ray analysis system was used to characterize the steel mill emissions. Using the relative concentrations of Fe, Zn, Ca, Pb, and Mn it was not only possible to identify particles emitted from a steel mill but in certain cases to identify the steel

mill process from which the particle originated. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05577

THE RATE OF MERCURY LOSS FROM CONTAMINATED ESTUARINE SEDIMENTS IN BELLINGHAM BAY, WASHINGTON,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W75-05578

CHARACTERIZATION OF CADMIUM AND NICKEL CONTAMINATED SEDIMENTS FROM FOUNDRY COVE, NEW YORK,
Oak Ridge National Lab., Tenn.
E. H. Bondietti, F. H. Sweeton, T. Tamura, R. M. Perhac, and L. D. Hulett.
In:Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 211-224, 7 tab, 1 fig, 9 ref.

Descriptors: *Cadmium, *Nickel, *Sampling, *Industrial effluents, Separation techniques, Electron microscopy, Ions, Calcium, Sediments, Aquatic life, Analytical techniques, Spectroscopy, Cobalt, Zinc, Oxidation, Laboratory tests, Rivers, *New York, *Pollutant identification.
Identifiers: Foundry Cove(NY).

Two sediment samples contaminated with cadmium and nickel from Foundry Cove, New York were studied and characterized in cooperation with New York University Medical Center. Concentrations of cadmium and nickel in the sample (designated NY2) closest to a nickel-cadmium battery plant discharge were about 40,000 and 32,000 ppm, respectively. Another sample (NY1), obtained about 100 yds from the discharge point, contained 2100 ppm Cd and 780 ppm Ni, respectively. Techniques used in characterizing the sample included density gradient separation, x-ray diffraction, electron microscope-electron probe analysis, and a cadmium specific ion electrode. Results show that most of the cadmium in NY2 is in a mixed calcuim-cadmium carbonate system, while organic constituents in NY1 appear to hold most of the nickel and cadmium. Despite the larger amount of cadmium present in NY2, and the fact that the bulk of the cadmium in each sample is present in a different form, solution-phase levels were quite similar, indicating that the two sediments may not present distinctly different hazards to aquatic organisms. Biological availability studies are needed to clarify this point. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05579

CADMIUM ACCURAL IN A COMBINED WASTEWATER TREATMENT-AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W75-05580

A SOIL AND GROUND-WATER POLLUTANT TRANSPORT MODEL,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
For primary bibliographic entry see Field 5B.
W75-05581

ANALYSIS OF TRACE METAL MASS BALANCE FOR AQUEOUS SYSTEMS,
Colorado Univ., Denver. Dept. of Biometrics.
For primary bibliographic entry see Field 5B.
W75-05582

COMPUTER MODEL FOR CHEMICAL EXCHANGE IN THE STREAM SYSTEM,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
For primary bibliographic entry see Field 5B.
W75-05583

MODELING ATMOSPHERIC DISPERSION OF LEAD FROM AUTOMOTIVE SOURCES,
Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 5B.
W75-05584

NORMALIZATION AND INTERPRETATION OF ATMOSPHERIC TRACE ELEMENT CONCENTRATION PATTERNS,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-05585

MODELING OF PARTICULATES IN GARY, INDIANA AREA,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5B.
W75-05586

EFFECTS OF SURFACE IRRIGATION WITH DAIRY MANURE SLURRIES ON THE QUALITY OF GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-05606

BIOLOGICAL POLLUTION INDICATORS IN UNDERGROUND WATERS. (IN SLOVENIAN),
Kemijski Institut Boris Kidric, Ljubljana (Yugoslavia).
M. Rejic.
Biol Vestn Vol 21, No 1, p 11-15, 1973. English summary.

Descriptors: *Ground water, Rivers, Yugoslavia, *Bioindicators.

Chemical and biological investigations of the Pivka-Unica underground flow (Yugoslavia) were carried out. The Pivka River is polluted when it goes underground but through self-purification it becomes relatively clean before confluence with the Rak. Typical representatives of subterranean waters and inhabitants of the Pivka surface flow were found among the animals living in the Pivka-Unica underground flow. Changes occurring in the chemistry of the underground flow were compared with the species composition of animals which are characteristic of underground waters. Some species of gastropods, and of amphipod or isopod crustaceans might be practicable indicators of underground water pollution.--Copyright 1974, Biological Abstracts, Inc.
W75-05616

PYRROLIDONE-A NEW SOLVENT FOR THE METHYLATION OF HUMIC ACID,
Geological Survey, Denver, Colo.
R. L. Wershaw, D. J. Pinckney, and S. E. Booker.
Available from Superintendent of Documents, GPO Washington, D.C. 20402, $3.15 in paper copy, $2.25 in microfiche. Journal of Research of the U.S. Geological Survey, Vol 3, No 1, p 123-126, January-February 1975. 1 fig, 1 tab, 22 ref.

Descriptors: *Humic acids, *Chemical analysis, *Solvents, Organic matter, Mass spectrometry, Analytical techniques, Solvent extractions, *Pollutant identification, Chemical reaction.
Identifiers: *Pyrrolidone, *Methylation.

Humic acid may be dissolved in 2-pyrrolidone and methylated by the addition of diazomethane in diethyl ether and ethanol to the solution. Because of the Humic acid is completely dissolved in the reaction medium, disaggregation of the humic acid particles takes place and much more complete methylation is obtained. The methylated products may be fractionated by countercurrent distribution and analyzed by mass spectrometry. (Knapp-USGS)
W75-05631

WATER-QUALITY DATA OF THE SACRAMENTO RIVER, CALIFORNIA, MAY 1972 TO APRIL 1973,
Geological Survey, Menlo Park, Calif.
L. J. Britton, and R. C. Averett.
Open-file report, July 15, 1974. 2 fig, 7 tab, 25 ref.

Descriptors: *Water quality, *California, Rivers, Trace elements, Suspended load, Dissolved solids, Nutrients, Phytoplankton, Periphyton, Benthos, Pollutant identification, Path of pollutants.
Identifiers: *Sacramento River(Calif).

Measurements of suspended sediemnt, major dissolved chemical constituents, selected trace elements and plant nutrients, phytoplankton, periphyton, and benthic organisms were made at five sampling sites along a 175-mile reach of the Sacramento River, California between Red Bluff and Knights Landing. The study period began in May 1972 and continued on a near monthly basis through April 1973. Mean suspended-sediment concentrations ranged from a low of 3 milligrams per litre at two upstream sampling sites in July and September to a high of 566 mg per litre at one downstream sampling site in January. The dissolved-solids concentration ranged from a low of 75 mg per litre at one upstream site in September to a high of 135 mg per litre at the lowermost site in August. Phytoplankton concentrations increased in a downstream direction to a high of 980 cells per millilitre at one downstream site in September. The diatoms were the dominant group of algae present, both in numbers and diversity, at all sampling sites. The diversity of benthic organisms decreased in a downstream direction. The Diptera, especially members of the family Chironomidae, were the most commonly found organisms at all sites. (Knapp-USGS)
W75-05635

PESTICIDES IN SELECTED WESTERN STREAMS--1968-71,
Geological Survey, Austin, Tex. Water Resources Div.
J. A. Schulze, D. B. Manigold, and F. L. Andrews.
Pesticides Monitoring Journal, Vol 7, No 1, p 73-84, June 1973. 3 fig, 3 tab, 9 ref.

Descriptors: *Pesticide residues, *Monitoring, *Pollutant identification, Water pollution, Water pollution sources, Path of pollutants, Surface waters, Streams, Water quality, *Chlorinated hydrocarbon pesticides.
Identifiers: *Western US.

Chlorinated insecticides and herbicides were studied in western U.S. streams, 1968-71. Heptachlor and its epoxide were not detected during the 3-year period, and aldrin was found only once. DDT was the most frequently occurring insecticide, and 2,4,5-T the most common herbicide. The amounts observed were small; the maximum concentration of an insecticide was 0.46 micrograms per litre for DDT, and of an herbicide 0.99 micrograms per litre for 2,4-D. Concentrations were highest in water samples containing appreciable amounts of suspended sediments. Beginning in July 1970, the phosphorothioate insecticides--parathion, methyl parathion, malathion, and diazinon--were determined monthly on all samples. Malathion was not found during this period. Polychlorinated biphenyl (PCB's) compounds which were monitored for beginning in October 1969 were also detected at two stations. (Knapp-USGS)

W75-05653

THE DETECTION AND STUDY OF NITRIFICATION IN STREAMS AND ESTUARIES,
Rutgers-the State Univ., New Brunswick, N.J. Dept. of Environmental Services.
T. J. Tuffey.
Doctor of Philosophy Thesis, January 1973. 180 p, 20 fig, 77 ref. OWRT B-027-NJ(4).

Descriptors: *Nitrification, Water quality, *Biochemical oxygen demand, *Oxygen demand, Oxygen sag, Aeration, *New Jersey, Streams, Estuaries, *Pollutant identification.
Identifiers: *Nitrosomonas, *Nitrobacter, Warburg respirometer, *Passaic River(NJ), Artificial aeration.

Nitrifying phenomena in streams and estuaries were investigated in order to characterize the nitrifying activity of physically different aquatic environments. An evaluation was first made of the existing tools used for the detection and study of nitrification. The Warburg respirometer, BOD bottle techniques, and the chemical analyses for oxidized nitrogen species were compared. Bacterial growth curves for both Nitrosomonas and Nitrobacter were obtained from laboratory systems to determine the potential generation time in an inland river and to relate organism concentration with nitrifying activity. The results from these two phases of research were applied to field studies of three inland waterways and literature evidence of estuarine nitrification. A hypothesis was formulated which identifies nitrifying activity with shallow, surface active streams and long detention time rivers and estuaries.
W75-05659

DISCRIMINATION OF WASTE OILS BY MICRO EMISSION SPECTROCHEMICAL ANALYSIS,
Spectrogram Corp., North Haven, Conn.
J. D. Johnson, and H. R. Gram.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD787 717, $4.25 in paper copy, $2.25 in microfiche. Report No CG-D-21-75, June 1974. 52 p, 11 fig, 15 tab, 18 ref. DOT-CG-33-185A.

Descriptors: *Instrumentation, *Spectrometers, *Oil wastes, Metals, Testing, *Oil pollution, Estuaries, Sampling, Analytical techniques, Data collections, Evaluation, *Pollutant identification.
Identifiers: Spectrochemical analysis.

The discrimination of waste oil from unused oil products, when recovered from the surface of navigable waters, is made by the determination of the metallic content of the oil. A microemission spectrochemical technique was developed, together with a low-power, pulsed, high frequency spark discharge source. Tests were conducted on samples exposed to laboratory extractions of sea water. Tests were also conducted on samples naturally weathered on the surface of brackish tidal water from an estuary. Iron, lead, copper, and silicon were selected as the key elements which identify an oil as a waste. A conceptual design of a compact, portable direct reading instrument, based on this study, was included. (Sims-ISWS)
W75-05680

A QUANTITATIVE AND QUALITATIVE SURVEY OF OILS AND TARS STRANDED ON GALVESTON ISLAND BEACHES,
Texas A and M Univ., Galveston. Center for Marine Resources.
S. M. Ray, R. K. Oja, L. M. Jeffrey, and B. J. Presley.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD787 718, $4.75 in paper copy, $2.25 in microfiche. Report No CG-D-10-75, January 1974. 78 p, 11 fig, 10 tab, 13 ref. DOT-CG-23681-A.

Descriptors: *Oil pollution, Beaches, *Texas, Sampling, Seashores, *Gulf of Mexico, Oil, Gas chromatography, Spectrophotometry, X-ray diffraction, Analytical techniques, On-site data collections, *Pollutant identification.
Identifiers: *Tar, *Galveston Island(Tex).

Strandings of oil and tar on Galveston Island beaches were assessed for 1 year. Oil-tar deposition was quantified on three designated test plots -- 80, 120, 160, feet long. All oil pieces greater than 0.025 inch occurring between the high tide (strand line) and water line were collected at 1 to 2 day intervals. Heaviest accumulations occurred during spring and summer. Peak months of deposition were: April 1972, 31, 420 gms; July 1972, 19, 666 gms; March 1973, 14,867 gms. Average daily accumulations for the three test plots were: 80 feet, 108 gms; 120 feet, 154 gms; 160 feet, 215 gms. These data suggest that an 80 foot test plot is adequate for such sampling. Most materials collected were tars or tar-like residues that appeared to be highly weathered. There did not appear to be a consistent relationship between oil accumulation and wind speed and direction. Efforts to correlate oil deposition with shipping traffic was unsuccessful because of incomplete ship traffic data. Representative oil tar samples were analyzed periodically. Most of the samples analyzed appear to be the result of man's activities. Chromatograms of 49 samples appear to fall in five slected categories of general sources: (1) crude oil residues, 41%; (2) crude oil sludge residues (Bimodal), 20%; (3) residual fuel oil residues, 27%; (4) distillate oil residues, 2%; (5) highly weathered residues and low pariffin of indeterminate origin, 10%. The vanadium-nickel ratios of most of the samples were above 3. Thus, they are typical of some foreign crudes such as Venezuelan. (Sims-ISWS)
W75-05681

CATION EXCHANGE CHARACTERISTICS OF SOME METAL IONS IN NITRIC ACID-AMMONIUM ACETATE MEDIUM,
Allahabad Univ. (India). Chemistry Labs.
A. Mahan, A. K. Ghose, and A. K. Dey.
Separation Science, Vol 6, No 6, p 781-789, December, 1971. 2 fig, 4 ref, 3 tab.

Descriptors: *Cation exchange, *Heavy metals, *Ion exchange, *Separation techniques, Inorganic compounds, Resins, Magnesium, Aluminum, Iron, Manganese, Cobalt, Nickel, Copper, Zinc, Gold, Mercury, Lead, *Pollutant identification.

Cation exchange equilibrium distribution coefficients with Amberlite IR-120 have been determined for 20 metal ions in media consisting of mixtures of 0.1M HN03 and varying concentrations, viz., 0.01, 0.05, 0.25, and 1.2M, of ammonium acetate. The metal concentrations were so chosen that the ratio of total amount of cation to total resin capacity is approximately 0.4, sufficient to ensure exchange. The values of separation factors of various metal ion pairs have also been evaluated, and separation possibilities for ins in a number of binary and ternary mixtures have been proposed. (Jernigan-Vanderbilt)
W75-05686

DIRECT DETERMINATION OF GOLD, COBALT, AND LITHIUM IN BLOOD PLASMA USING THE MINI-MASSMANN CARBON ROD ATOMIZER,
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
F. J. M. J. Maessen, F. D. Posma, and J. Balke.
Analytical Chemistry, Vol 46, No 11, p 1445-1449, September, 1974. 10 fig, 3 tab, 18 ref.

Descriptors: *Heavy metals, *Gold, *Cobalt, *Spectroscopy, Instrumentation, Analytical techniques, Biology, Laboratory tests, Testing procedures, Automation, Statistics, *Pollutant identification.
Identifiers: *Lithium, Atomic absorption spectroscopy, Sample preparation.

Direct determination of gold, cobalt and lithium in blood plasma at the ppm level was performed by means of flameless atomic absorption using the carbon rod atomizer. The major causes of variability - viz. sample introduction and alteration of the properties of the graphite - have been experimentally investigated. A remarkable gain in precision has been obtained by means of instrumentally controlled sample introduction. Regression analysis has been applied to the calibration curves and confidence limits were calculated. Fluctuations of the absorbance signals proved to be affected not only by the reproducibility errors but also by procedural errors. A comparison of analytical results obtained with both the carbon rod atomizer and a gas stabilized dc arc is given for gold and cobalt analyses in blood plasma. (Jernigan-Vanderbilt)
W75-05702

SPECTROPOLARIMETRIC DETERMINATION OF COPPER (II), NICKEL (II) AND IRON (III) IONS WITH N-CARBOXYMETHYLPYRROLIDINE-2-CARBOXYLIC ACID,
Turin Univ. (Italy). Istituto di Chimica Analitica.
For primary bibliographic entry see Field 2K.
W75-05704

CADMIUM IN PLANTS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2I.
W75-05709

MERCURY, CADMIUM, AND CHROMIUM IN THE NETHERLANDS, (LE MERCURE, LE CADMIUM ET LE CHROME AUX PAYS-BAS),
Central Lab. TNO, Delft (Netherlands).
For primary bibliographic entry see Field 5B.
W75-05710

EXPERIMENTAL STUDY OF THE ACCUMULATION OF SILVER 110M IN VARIOUS MARINE ORGANISMS, (ETUDE EXPERIMENTALE DE L'ACCUMULATION DE L'ARGENT 110M CHEZ DIVERS ORGANISMES MARINS),
B. Pouvreau, and J-C. Amiard.
Report No CEA-R-4571, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, Department de 'Protection, April, 1974, 19 p, 10 fig, 2 tab, 21 ref.

Descriptors: *Marine algae, *Marine animals, *Radioisotopes, *Radioecology, Aquatic environment, Water pollution, Mollusks, Crustaceans, Fish, Time of concentration, *Pollutant identification.
Identifiers: *Silver.

Seawater was contamined to 3.33 microcuries/liter by silver 110M as a chloride. The different experimental species were introduced into the contaminated environment when the radioactivity of the water had stabilized (around 2 weeks). For most species, the concentration factors decreased as a function of the complexity of the organisms, a phenomena already noted for other radioactive elements. The most significant contamination of the hepato-pancreas and the liver was apparently related to the storage role of these organi. The gills of molluscs and crustaceans were also contaminated. This was perhaps due to the large surface area of this organ and to its role of trapping particles in suspension. The concentration factors of silver 110M in the edible molluscs studied were relatively high, which indicated this pollutant should not be neglected in the sanitary area. It was often observed that the concentration factors for silver 110M were of the same order of magnitude as those measured for stable silver. (Pullman-Vanderbilt)
W75-05711

METHODS FOR THE ANALYSIS AND IDENTIFICATION OF ORGANOLEPTIC SUBSTANCES IN THE TECHNOLOGICAL PROCESS OF WATER TREATMENT (RAZRABOTKA METODOV ANALIZA I IDENTIFIKATSII ORGANOLEPTICHESKIKH VESHCHEST' V TEKHNOLOGICHESKOM PROTSESSE PODGOTOVKIVODY),
L. A. Mel'nichenko, I. T. Goronovskii, and A. I. Sakevish.
Khimicheskaya Tekhnologiya, No 4, p 61-63, July/August, 1974. 2 fig, 1 tab, 15 ref.

Descriptors: *Waste water treatment, *Taste, *Odor, *Water purification, Organoleptic properties, Algae, Analytical techniques, Chromatography, Pigments, Organic acids, Phenols, Organic compounds, Taste-producing algae, Water quality, Water pollution sources, Pollutants, *Pollutant identification, Chemical analysis, Water pollution.
Identifiers: Essential oils, Fatty acids, Dnieper River(USSR).

In water purification plants, odor and taste are presently evaluated by subjective organoleptic tests. Considering the necessity of automating this part of the purification process, a study was conducted on metabolites of algae as the most common sources of objectionable water odor and taste. Column, gas, and thin-layer chromatography were used to analyze water from the Dnieper River and the algal populations collected during the period of water 'bloom'. The results of the analysis are presented and discussed. The ether extracts obtained contained pigments (usually decomposed), fatty acids, essential oils, phenols, and other compounds. The extracts contained more than 50 components, including about 34 hydrocarbon compounds. Full identification of components of these complex mixtures will help solve the deodorization problem in surface water purification plants. (Stapinski-IPC)
W75-05724

LITERATURE SURVEY OF INSTRUMENTAL MEASUREMENTS OF BIOCHEMICAL OXYGEN DEMAND FOR CONTROL APPLICATION 1960-1973,
National Environmental Research Center, Cincinnati, Ohio. Methods Development and Quality Assurance Research Lab.
For primary bibliographic entry see Field 5D.
W75-05753

SIMULTANEOUS AND AUTOMATED DETERMINATION OF TOTAL PHOSPHORUS AND TOTAL KJELDAHL NITROGEN,
National Environmental Research Center, Cincinnati, Ohio.
M. E. Gales, and R. L. Booth.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 710, $3.75 in paper copy; $2.25 in microfiche. Report No EPA-670/4-74-002, May 1974. 22 p, 3 fig, 10 tab, 8 ref, 1 append.

Descriptors: *Analytical techniques, *Phosphorus, *Nitrogen, *Measurement, *Automation, Amino acids, Chemical analysis, Water analysis, Sewage effluents, Saline water.
Identifiers: *Total phosphorus, *Total Kjeldahl nitrogen.

Milbury's method for the simultaneous determination of total phosphorus and total Kjeldahl nitrogen (TKN) in activated sludge has been modified for the automated determination of these constituents in surface waters, domestic and industrial wastes. Modifications were made to increase the sensitivity and to improve the accuracy for samples that contain amino acids. AutoAnalyzer I and II systems were developed with the helix digestion using a mixture of sulfuric acid, perchloric acid, and vanadium pentoxide as a catalyst. The applicable range is 0.10 to 10 mg N/l and 0.02 to 1.0 mg P/l. The phosphorus values obtained by this method on river water samples were comparable to those obtained by the Environmental Protection Agency Automated Single Reagent Method. The TKN values were also comparable to those obtained by the micro TKN method. This method may be used to determine phosphorus in saline waters with the addition of a dilution line on Manifold 1. However, organic nitrogen in saline waters cannot be determined by this method. (Jones-Wisconsin)
W75-05756

THE RELEASE OF PHOSPHORUS FROM POND SEDIMENTS AND ITS AVAILABILITY TO LEMNA MINOR L.,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5C.
W75-05789

HOW TO READ A FISH KILL,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
L. E. Keup.
Water and Sewage Works, Vol 121, No 7, p 48-51, July 1974. 1 fig.

Descriptors: *Fishkill, *Water pollution, Toxicity, Water conservation, Investigation, *Pollutant identification.

Teams are more effective than individuals in determining the causes and finding the solutions to fish kills. The knowledge of time required for a water mass to travel from one point to a downstream point is basic to the investigation. Information on diffusion rates of dumped materials will further the investigation, along with observations on the nature of a pollutant's entry into the river and its mixing with water mass. Seasons have considerable influence on the magnitude of fish kills. For example, less dead fish rise to the surface in cold water. Synergism and antagonism should be taken into consideration in a fish kill, as well as habitat. The history of water discharges from dams should be investigated in fish kills downstream from dams. Finally, human ignorance is often a cause of fish kills, while sophisticated poachers may sometimes use fish toxicants. (Leibowitz-FIRL)
W75-05812

AUTOMATIC WATER SAMPLER,
W. Sutherland.
U.S. Patent No. 3,853,009, 4 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 544, December 10, 1974.

Descriptors: *Patents, Water pollution, *Water sampling, *Sampling, Pollutants, Water quality, *Quality control, Equipment, *Pollutant identification.
Identifiers: *Pollution detection.

Apparatus for automatically collecting liquid samples, as for use in measuring water pollution includes a small metallic sampling cup suspended by a cable for immersion in the body of liquid to be sampled. A reversible electric motor drives a winch for the cable to raise and lower the sampling cup. There is a tilting receiver unit for dumping liquid from the full cup in its uppermost position into a collecting bucket. The motor is provided with a reversing relay which when de-energized operates the motor in a first or lowering direction for the sampling cup. The cup includes a pair of spaced electrodes, one of which is defined by the metallic bottom wall of the cup. The electrodes are conductively bridged by a predetermined level of liquid in the cup to energize the reversing relay for operation of the motor in the opposite or lifting direction. (Sinha-OEIS)
W75-05822

METHOD AND APPARATUS FOR MONITORING POLLUTION OF NATURAL WATERS,
Environmental Research Inst. of Michigan, Ann Arbor. (assignee)
R. Horvath.
U.S. Patent No. 3,852,997, 3 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 540, December 10, 1974.

Descriptors: *Patents, *Temperature, *Evaporation, *Monitoring, Water pollution, Water quality, Equipment, *Pollutant identification.
Identifiers: *Pollution detection, Wet bulb temperature, Sensors, Evaporative rates.

A method and apparatus are described which utilize means for detecting the difference in evaporative rates of two different liquids. Wet bulb temperature readings are used to determine the presence of pollutants which differ significantly in evaporative rate from that of the natural water which they pollute. Liquid from a portion of the natural water which may become polluted is used to wet one temperature sensor while natural water which cannot simultaneously be polluted is used to wet another temperature sensor. The evaporative rates are determined at or substantially at ambient temperature and means is provided for comparing any difference in these evaporative rates to indicate the presence of pollutants. (Sinha-OEIS)
W75-05823

DETERMINING VOLATILE ORGANICS AT MICROGRAM-PER-LITER LEVELS BY GAS CHROMATOGRAPHY,
National Environmental Research Center, Cincinnati, Ohio. Methods Development and Quality Assurance Research Lab.
T. A. Bellar, and J. J. Lichtenberg.
Journal of the American Water Works Association. Vol 66, No 12, p 739-744, December 1974. 7 fig, 8 tab, 15 ref.

Descriptors: *Pollutant identification, *Gas chromatography, *Instrumentation, *Analytical techniques, *Organic wastes, *Organic compounds, Chemical wastes, Oily water, Water quality, Volatility, Chromatography, Chemical analysis, Testing procedures, Water quality control, Chemistry, Solvent extractions, Organic matter.

A method was presented for the quantitative recovery of volatile organic compounds. A description was given of the apparatus and procedures employed to detect 0.5 micrograms/liter of the substances. (Henley-ISWS)
W75-05838

SOLVENTS IN SEWAGE AND INDUSTRIAL WASTE WATERS: IDENTIFICATION AND DETERMINATION,
Lancashire River Authority (England).
W. K. Ellison, and T. E. Wallbank.
Water Pollution Control, Vol 73, p 656-671, 1974. 14 fig, 1 tab, 4 ref.

Descriptors: *Industrial wastes, *Analytical technique, *Solvent extractions, *Oil wastes, Evaluation, Chemical analysis, Water analysis, Separation techniques, Water quality, Water pollution sources, Organic compounds, Instrumentation, Measurement, Sewage, Gas chromatography, Distillation, Spectroscopy, Solvents, *Pollutant identification.
Identifiers: Chlorinated hydrocarbons, Absorption spectra, Cyclohexane.

The use of the equipment adopted by the British Pharmacopoeia Commission for the determination of volatile oil in drugs was described. The application of gas chromatography and ultraviolet and infrared spectroscopy to the identification and determination of the separated solvent residue was critically assessed. The use of infrared and ul

traviolet spectroscopy in conjunction with gas chromatography is an extremely powerful technique for the detection and identification of traces of immiscible solvent residues in samples of industrial waste waters, sewages, and sludges. The presence of petroleum products will often mask the presence of traces of aromatic hydrocarbons and other solvents containing carbon-oxygen and carbon-chlorine bonds by gas chromatography. These can readily be detected and identified by infrared and ultraviolet spectroscopy is these circumstances. (Henley-ISWS)
W75-05840

NITROCHROMEAZO TITRIMETRIC DETERMINATION OF SULFATE IN IRRIGATION AND OTHER SALINE WATERS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
B. A. Rasnick, and F. S. Nakayama.
Commum Soil Sci Plant Anal. Vol 4, No 3 p 171-174. 1973.

Descriptors: *Analytical techniques, *Volumetric analysis, *Sulfates, Irrigation water, *Saline water, Effluents, Waste water(Irrigation).
Identifiers: Barium, Nitrochromeazo.

Sulfate in various types of aqueous solutions such as soil-water extracts, sewage effluents, irrigation water and well water can be determined rapidly and accurately by a volumetric technique. The indirect method is based on the formation of the barium-nitrochromeazo complex. Using a water-acetone medium sharpens the end point and adding NH4F at low pH controls interferences. -- Copyright 1974, Biological Abstracts, Inc.
W75-05848

5B. Sources Of Pollution

CHLORIDES IN LAKE ERIE BASIN,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
D. D. Meredith, R. R. Rumer, C. C. Chien, and R. P. Apmann.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 964, $4.75 in paper copy, $2.25 in microfiche. Water Resources and Environmental Engineering Research Report 74-1, October 1974. 82 p, 23 fig, 16 tab. OWRT B-044-NY(1). 14-31-0001-5095.

Descriptors: *Lake Erie, *Chlorides, Salts, Mathematical models, *New York, Runoff, *Urban runoff, Combined sewers, Drainage, Path of pollutants.
Identifiers: Deicing salts, *Buffalo(NY).

The de-icing salt runoff from Buffalo, New York and selected nearby communities has been measured in the case of Buffalo, approximately 90% of the de-icing salt applied is recovered by the combined sewer system. The Lake Erie drainage basin was subdivided into regions and a search of the literature was made to establish the historical data for chloride discharge from each region. Time-dependent equations were estimated for the annual chloride discharge from each source region and used in conjunction with a mathematical model for chloride balance in Lake Erie. It was possible to fairly reproduce the historical trend of chloride build-up in Lake Erie by this method. The calibrated model projects a chloride concentration in Lake Erie of 135 ppm by the year 2050. The effects of a few selected salt management programs on future chloride levels in Lake Erie are examined utilizing the model.
W75-05355

NITROGEN BUDGET OF A NORTH CAROLINA ESTUARY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
W. G. Harrison.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 999, $7.00 in paper copy, $2.25 in microfiche. PhD Thesis, 1974. 172 p, 32 fig, 26 tab, 93 ref, 4 append. OWRT B-052-NC(2). 14-31-0001-3917.

Descriptors: *Nitrogen cycle, *Ammonium, *Nutrients, Mass balance, *Urea, Estuaries, Eutrophication, *North Carolina, Absorption, *Path of pollutants, Water pollution effects.
Identifiers: *Pamlico River(NC).

Nitrogen concentrations in the Pamlico River estuary changed seasonally with highs occurring in winter and early spring and lows occurring in summer. Of the five forms of nitrogen measured (nitrite, nitrate, ammonium, dissolved organic and particulate nitrogen), the dissolved organic fraction was the largest. Concentrations of total inorganic nitrogen varied over distance and over time, basically reflecting nitrate fluctuations. Seasonal peaks in nitrite and nitrate concentrations occurred in winter with concentrations at barely detectable levels in summer. Concentrations were consistently higher upstream and were reduced to low levels near the mouth of the estuary during all seasons. Ammonium was present in relatively high concentrations year round and was distributed uniformly throughout the estuary. Dissolved organic nitrogen concentrations were at least equivalent to inorganic nitrogen concentrations most of the year. Biological uptake and release were the most important pathways of nitrogen transformation. The calculated annual inorganic nitrogen budget for the estuary revealed that of the total inorganic nitrogen entering the system, nearly 40% disappeared. The predominant form in the tributary inputs was nitrate, which was reduced to nearly undetectable concentrations before leaving the estuary; nitrite followed a similar pattern. In contrast, ammonium concentrations in inflowing waters increased. At present, nitrogen appears to be a major factor limiting the production of the estuary although the amounts entering have caused no noticeable ill effects. (McJunkin-North Carolina State)
W75-05357

AGRICULTURAL AND FOREST LAND RUNOFF IN UPPER SOUTH RIVER NEAR WAYNESBORO, VIRGINIA,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Environmental Sciences and Engineering.
E. V. Southerland.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 967, $5.75 in paper copy, $2.25 in microfiche. MS Thesis, September 1974. 136 p, 15 fig, 19 tab, 77 ref, append. OWRT A-053-VA(1).

Descriptors: *Path of pollutants, Chemical oxygen demand, Conductance, Phosphorus, Nitrogen, Nitrates, Iron, *Runoff, *Virginia, *Organic matter, *Nutrients, *Effluents, Drainage, Water pollution sources, *Agricultural runoff, Urban runoff, Turbidity, *Suspended solids, Organic compounds.
Identifiers: *South River(Va).

Sources and yields of organic matter, suspended solids, and nutrients in the Upper South River Basin were investigated during the summer low flow period of 1974. Parameters monitored at sampling stations in the basin included chemical oxygen demand, total suspended solids, turbidity, specific conductance, total phosphorus, total Kjeldahl nitrogen, nitrate, and iron. These data were used with flow and drainage area data to determine the relative magnitude and daily yields of materials from various sources. Sources of organic matter, suspended solids, and nutrients entering the South River included agricultural, forest and urban land drainage, as well as domestic and industrial wastewater effluents. The yields of materials from the various sources were computed during an intense storm in May, wet weather flow in June, and dry weather flow in July. During the short term period of high storm flows, land runoff was the primary source of all pollutants. On the long term basis, however, wastewater effluents were the major contributors of all parameters except total suspended solids.
W75-05358

THE THREE DIMENSIONAL HEATED SURFACE JET IN A CROSS FLOW,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
H. H. Carter, and R. Regier.
Technical Report 88, References 74-8, November 1974. 70 p, 38 fig, 4 tab, 16 ref.

Descriptors: *Model studies, *Thermal powerplants, *Thermal pollution, *Cooling water, *Heat exchange, Water pollution effects, Environmental effects, *Chesapeake Bay, Bodies of water, Nuclear powerplants, *Sites, Coastal structures, Seawater, Geothermal studies, Discharge(Water), Movement, Dispersion, Estuaries.

The overall goals are to develop improved analytical and numerical models having general applicability for the prediction of the temperature distribution in the thermal plume from a condenser cooling water discharge; to develop design criteria for siting powerplants on estuarine and coastal waters; and to develop field techniques for quantitating the distribution of excess heat from an operating generating station. Although this research has emphasized problems associated with nuclear powerplant siting on the Chesapeake Bay, results have application to other marine environments, as well as to large fresh water bodies such as the Great Lakes. Investigations have supplied knowledge concerning: (a) the rate of initial mechanical dilution in a plume of heated water discharged as a surface or subsurface horizontal jet into natural water bodies; (b) the physical processes of loss of excess heat to the atmosphere across the air-sea boundary. A numerical model has been developed known as the Pritchard model. (Houser-ORNL)
W75-05360

SHIPPING CONTAINER FOR PLUTONIUM-238 AS FISSILE MATERIAL CLASS 1,
Los Alamos Scientific Lab., N.M.
For primary bibliographic entry see Field 5G.
W75-05364

ANALYTICAL MODELING OF THERMAL DISCHARGES: A REVIEW OF THE STATE OF THE ART,
Vanderbilt Univ., Nashville, Tenn.
B. A. Benedict, J. L. Anderson, and E. L. Yandell, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT. No. ANL/ES-18, $7.60 in paper copy, $2.25 in microfiche. Report ANL/ES-18, April 1974. 321 p, 105 fig, 23 tab, 148 ref.

Descriptors: *Reviews, *Water pollution, *Water pollution sources, *Nuclear powerplants, *Model studies, *Thermal pollution, Pollution abatement, Technology, Mathematics, Heated water, Rivers, Lakes, Ponds, Discharge(Water), Measurement, Outflow, Heat budget, Evaporation, Behavior, Analysis, Evaluation.

Available techniques are described for mathematical modeling for discharges of heated waters into rivers and lakes and for the operation of cooling ponds. General factors affecting heated-water discharges are discussed, including entrainment and diffusion, receiving-water stratification and flow rate, among others. The general elements of the heat budget are also reviewed. For all models presented, assumptions and model limitations are included, along with the basic theory, necessary equations, available verification, and numerical

examples. Solutions are included for important cases of the warm-water wedge. Four models for surface discharges of heated water are reviewed in depth. Several others are referenced. Submerged discharges, both single and multiple port, are covered. Both round and slot jets are included, and the availability of models for stratified and nonstratified receiving waters, and for stagnant or flowing receiving waters, is considered. For the single-port discharges, as well as the surface-discharge models, means of estimating times of exposure are presented. Cooling-pond analysis emphasizes idealized pond behavior, with discussion on the behavior and analysis of real ponds. The effect of choice of evaporation formula on pond design is assessed. (Houser-ORNL)
W75-05370

SIGNIFICANCE OF STABLE IODINE-127 IN MILK,
New York State Dept. of Environmental Conservation Albany.
W. J. Kelleher, and H. R. Prins.
Available from Sup Doc, Print. Office, Wash, D.C. as REPT. No. RDDRA4 15(9) 1974. Radiation Data and Reports, Vol 15, No 9, p 567-573, September 1974. 3 tab, 16 ref.

Descriptors: *Iodine, *Fallout, *Radioactivity, *Radioisotopes, *Path of Pollutants, Food chains, Milk, Public health, Human population, Biology, Absorption.
Identifiers: *Thyroid, Radiation source, Fuel reprocessing.

The unexpected high concentrations of stable iodine in milk found when studying the specific acitivty concept for iodine-129 around a nuclear fuels reprocessing plant led to an evaluation of the use of iodine-129 to iodine ratio in milk samples to calculate population doses. In oder to use specific activity to calculate thyroid dose, it will be necessary to establish values for the concentration of iodine in thyroids. If a constant concentration of iodine in the thyroid is assumed and there is a high enough concentration of iodine in the milk to be able to assume that milk is the only source of iodine in the thyroid, a relationship between thyroid dose and iodine-129 to iodine or iodine-131 to iodine ratios can be developed. The use of specific activity in milk to determine dose will have the greatest application in evaluating the man-rem dose from the discharges of iodine-129 from fuel processing plants. (Houser-ORNL)
W75-05373

RADIATION DATA: SECTION II. WATER.
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-05374

ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION ISTALLATION,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-05375

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES, 1973,
Naval Ship Systems Command, Washington, D.C. Nuclear Propulsion Directorate.
M. E. Miles, G. L. Sjoblom, and J. D. Eagles.
Available from Sup Doc, U.S. Gov. Print. Office, Wash. D.C. as REPT No. RDDRA4, 15(10) (1974). In: Radiation Data and Reports, Vol 15, No 10, p 625-646, October 1974. 26 fig, 5 tab, 28 ref.

Descriptors: *Ships, *Naval architecture, *Water pollution sources, *Radioactivity, Assessment, Monitoring, Sampling, Radioactive waste disposal, Liquids, Sediment, Oceans, Harbors, Analytical techniques, Cobalt, Tritium.
Identifiers: *Nucelar submarines, Shipyards.

The ships and support facilities include 103 U.S. naval nuclear-powered submarines and 4 nuclear-powered surface ships, 9 shipyards, 11 tenders, and 2 submarine bases. The environmental effect of disposal of radioactive wastes originating from U.S. Naval nuclear propulsion plants and their support facilities is assessed. The total radioactivity, less tritium discharged to all ports and harbors from the more than 100 Naval nuclear-powered ships and supporting tenders, Naval bases and shipyards was less than 0.002 curie in 1973. This report confirms that procedures used by the Navy to control releases of radioactivity from U.S. nuclear-powered ships and their support facilities are effective in protecting the environment and the health and safety of the general public. (Houser-ORNL)
W75-05376

RADIATION DATA. SECTION II. WATER,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-05377

RADIATION DATA. SECTION IV. OTHER DATA. ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION INSTALLATIONS,
Goodyear Atomic Corp., Piketon, Ohio.
For primary bibliographic entry see Field 5A.
W75-05378

CONTAMINATION LIMITS FOR REAL AND PERSONAL PROPERTY, PROGRESS REPORT, JULY-DECEMBER 1973,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5A.
W75-05379

ANNUAL REPORT ON PROJECT ANO115A, FISCAL YEAR 1974,
Argonne National Lab., Ill.
S. M. Fried, A. M. Friedman, and L. A. Quarterman.
Available from NTIS, Springfield, Va. as REPT No. ANL-8115, $4.00 in paper copy, $2.25 in microfiche. Report ANL-8115, July 1974. 12 p, 10 fig.

Descriptors: *Radioactivity, *Dispersion, *Groundwater, *Petrology, Transport, *Computer programs, Absorption, Plutonium, Migration, *Path of pollutants.
Identifiers: *Actinides, *Lithosphere.

Three types of measurements relating to the migration of actinide elements in the lithosphere have been performed. These were studies of surface-absorption coefficients, migration coefficients, and transport along the surfaces of fissures. A computer analysis of the fissure experiments indicates that all these phenomena are related and can be understood in terms of surface absorption. In addition, it has been found that at least two migratory forms of plutonium are present. (Houser-ORNL)
W75-05382

NUMERICAL STUDIES OF CRATERING IN BEARPAW SHALE: TWO-DIMENSIONAL RESULTS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 8H.
W75-05385

REVIEW OF THE ENGINEERING ASPECTS OF POWER PLANT DISCHARGES,
Hydronautics, Inc., Laurel, Md.
S. J. Daugard, and T. R. Sundaram.
Available from NTIS, Springfield, Va. as REPT No. PB-235 783. $5.25 in paper copy, $2.25 in microfiche. Maryland State Dept. of Natural Resources, Annapolis, Power Plant Siting Program, Report PPSP-MP-12, October 1973. 113 p, 44 fig, 5 tab, 69 ref.

Descriptors: *Water pollution, *Thermal pollution, *Thermal capacity, Chemical properties, Chemical reactions, *Waste disposal, *Wastewater treatment, *Powerplants, Coolants, Cooling water, Technology, Assessment, Economics, Engineering, *Review, *Maryland.

A necessary prerequisite to making assessments of the ecological impact of power plant discharges is a delineation of the engineering factors affecting these discharges. A comprehensive inventory of discharges and treatment techniques of fifteen fossil-fueled power plants in the Maryland region. The inventory covers thermal effluents, chemical discharges from cooling and boiler water treatment systems as well as discharges from auxiliary systems. The acquired data are used to assess various control strategies and trade-offs. Improvements required in the state-of-the-art are given also. (Houser-ORNL)
W75-05386

SOME ASPECTS OF THE EFFECTS OF ELEVATED WATER TEMPERATURE ON THE RAMSHORN SNAIL,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5C.
W75-05387

A PROPOSED RAINOUT HAZARD MODEL FOR SYSTEMS ANALYSIS STUDIES,
California Univ., Livermore. Lawrence Livermore Lab.
T. F. Harvey.
Available from NTIS, Springfield, Va. as REPT. No. UCRL-51658. $4.00 in paper copy, $2.25 in microfiche. Report UCRL-51658, September 1974. 10 p, 4 fig, 13 ref.

Descriptors: *Nuclear explosions, *Civil defense, *Hazards, Analysis, *Fallout, *Wet seasons, *Model studies, Damages, Radioactivity effects, Meteorology, Human population, Density, Mortality, System analysis.
Identifiers: Weapons, Demography.

Rainout from nuclear airbursts presents a potential residual radiation hazard to civilian populations. A rainout hazar model for use in nuclear weapon system studies is proposed. The model includes a summer synoptic weather system, a large-cloud diffusion code, and a simple demographic distribution of a heavily populated industrialized area. A primitive estimate of the number of casualties that might be expected from a 1-kt airburst weapon is calculated. (Houser-ORNL)
W75-05388

MINERALOGY AND ION EXCHANGE CHARACTERISTICS OF SAVANNAH RIVER PLANT STREAMBED SEDIMENTS,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
R. H. Hawkins.
Available from NTIS, Springfield, Va. as REPT. No. DPST-71-332. Report DPST-71-332, 1971. 14 p, 5 fig, 1 tab, 21 ref.

Descriptors: *Sediments, *Sediment transport, *Silting, *Water quality, *Soils, Sampling, Analytical techniques, Analysis, Soil analysis, Clays, Organic matter, Cation exchange, Minerology, Sands, Silts, *South Carolina.
Identifiers: *Savannah River(So Car), *Bottom sediments.

The objective was to characterize the bottom sediments of Savannah River Plant (SRP) streams to gain a better understanding of their capacity to influence water quality. Samples were collected of bottom sediments from three SRP streams and of soils from the source areas of the sediments. The samples were analyzed for clay and organic matter contents, cation exchange capacity (CEC), and mineralogy of the sand, silt, and clay fractions. Quartz is the dominant mineral in the sand and silt fractions; kaolinite is the dominant mineral in the clay fractions; and no illits, chlorite, vermiculite, or montmorillonite minerals are present. The average clay content of the sediments is 32% by weight; the average organic matter content of the sediments is 1.267 by weight; the average CEC of the sediments is 2.61 meq per 100 g; the highest sorptive capacity is in the downstream sediments near and in the Savannah River swamp. (Houser-ORNL)
W75-05389

MICROBIOLOGY OF WATER, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
E. E. Geldreich.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1355-1372, June, 1974. 123 ref.

Descriptors: *Water pollution, *Microbiology, *Microorganisms, Coliforms, E. coli, Waste water, Chlorination, Rivers, Streams, Lakes, Ponds, Reservoirs, Potable water, Groundwater effluents, *Reviews, *Bibliographies, *Pollutant identification, *Path of pollutants.
Identifiers: Fecal streptococci, Anaerobic lactobacilli, Natural waters, Indicator bacteria, Waterborne pathogens, Bacterial count, Receiving streams.

Findings of several studies made regarding microbial pollution indicators are presented. Particular attention is focused on distribution of coliforms, E. coli, fecal streptococci, and anaerobic lactobacilli in water sources. Various methods and materials used in determining counts of indicator bacteria and waterborne pathogens are considered in detail, including rapid techniques for detection of bacterial populations in water sources. Research done with respect to the microbiology of rivers, lakes, ponds, and reservoirs is discussed. The microbiology of potable water and groundwater is examined. (Nelson-FIRL)
W75-05400

TRACE METAL ASSOCIATIONS IN SUB-ARCTIC FJORD ENVIRONMENTS, PROGRESS REPORT MAY 1972-MARCH 1974,
Alaska Univ., College. Inst. of Marine Science.
D. C. Burrell.
Progress Report, RLO-2229-TI-27, May, 1972-March, 1974, 147 pages, 5 fig, 26 ref. (6 reprints, 5 abstracts, 12 cruise reports).

Descriptors: *Fjords, *Oceans, *Trace elements, *Metals, *Analytical techniques, *Alaska, Glaciers, Spectrophotometry, Estuaries, Saline water-freshwater interfaces, Sedimentation, Hydrography, Oceanography, Movement, *Pollutant identification, *Path of pollutants.
Identifiers: Prince Williams Sound(Alas), Resurrection Bay(Alas).

This report summarized the work in progress under this study. It also contained collection publication reprints and abstracts of papers read for the period covered by the report, and also cruise reports for September, 1972 to December, 1973. The work in progress encompassed the areas of (1) fjord studies, (2) inorganic soluble chemical species, and (3) trace analysis. Hydrographic and sedimentation surveys were conducted throughout Blue Fjord in Prince Williams Sound in conjunction with trace metal sampling. Another fjord field site, Resurrection Bay, enabled year round monitoring of conditions and analysis in some detail of physical circulation patterns and some aspects of biota cycling in the water column. An initial attempt was made to describe the distribution of oxygen in the deep basin waters of Resurrection Bay in late oceanographic winter. The special characteristics of the fjords were noted to offer unrivaled opportunities to study inorganic metal complexes, which should aid in the understanding of the pathways and kinetics between the major solid phase reservoirs. Due to more stringent analytical requirements, the study has had to also work on developing analytical techniques for trace heavy metals in sea water. The study has concentrated on the use of flameless atomic absorption and anodic stripping voltammetric analysis. (See W75-05404 W75-05405 and W72-13973) (Pulliam-Vanderbilt)
W75-05403

EXTRACTION OF COBALT, IRON, INDIUM AND ZINC FROM SEAWATER BY MEANS OF THE TRIFLUOROACETYLACETONE TOLUENE SYSTEM,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W75-05404

DETERMINATION OF HEAVY METALS IN SEAWATER BY CARBON FILAMENT ATOMIC SPECTROMETRY,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5A.
W75-05405

DETERMINATION OF BUDGETS OF HEAVY METAL WASTES IN LONG ISLAND SOUND, ANNUAL REPORT, PART I,
Connecticut Univ., Groton. Marine Sciences Inst.
P. Dehlinger, W. F. Fitzgerald, S. Y. Feng, D. F. Paskausky, and R. W. Garvine.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-73-11735, $5.25 in paper copy, $2.25 in microfiche. First Annual Report, June, 1973. 103 p, 17 fig, 14 tab, 22 ref, 3 append.

Descriptors: *Trace elements, *Water pollution, *Heavy metals, *Path of pollutants, Ocean currents, Coasts, Mercury, Lead, Cadmium, Zinc, Circulation, Absorption, Shellfish, Oysters, Estuaries, Sediment transport, Rivers, Copper, Nickel.
Identifiers: *Long Island Sound.

This study consisted of five integrated research projects with the objective of determining budgets of heavy metal wastes in Long Island Sound. The projects concern: (1) the fates and concentrations of heavy metals in the water column; (2) the concentrations and effects of these metals in oysters; (3) the water circulation patterns which control water renewal times and flushing rates; (4) the structure and motion of the outflow of the Connecticut River into Long Island Sound; and (5) the transport of suspended materials in the Sound. Emphasis during the first year was on the eastern area of the Sound. The study was presented in two parts. This volume contains the first three projects. (See also W75-05411) (Jernigan-Vanderbilt)
W75-05410

DETERMINATION OF BUDGETS OF HEAVY METAL WASTES IN LONG ISLAND SOUND, ANNUAL REPORT, PART II,
Connecticut Univ., Groton. Marine Sciences Inst.
P. Dehlinger, W. F. Fitzgerald, S. Y. Feng, F. Paskausky, and R. W. Garvine.
Available from the National Technical Information Service, Springfield, Va. 22161 as COM-73 11736, $4.75 in paper copy, $2.25 in microfiche. First Annual Report, June, 1973. p 79, 33 fig, 3 tab, 2 append.

Descriptors: *Trace elements, *Water pollution, *Rivers, *Sediment transport, *Currents(Water), Aerial photography, Discharge(Water), Salinity.
Identifiers: *Long Island Sound.

This study consisted of five integrated research projects with the objective of determining budgets of heavy metal wastes in Long Island Sound. The projects concern: (1) the fates and concentrations of heavy metals in the water column; (2) the concentrations and effects of these metals in oysters; (3) the water circulation patterns which control water renewal times and flushing rates; (4) the structure and motion of the outflow of the Connecticut River into Long Island Sound; and (5) the transport of suspended materials in the Sound. Emphasis in the first year was on the eastern area of the Sound. The study was presented in two parts. This volume contains reports on projects 4 and 5. (See also W75-05410) (Jernigan-Vanderbilt)
W75-05411

CALCULATED DISTRIBUTION OF THE CHEMICAL SPECIES OF COPPER, ZINC, CADMIUM AND LEAD IN 16 LAKES OF NORTHERN ITALY,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
M. F. Baudouin, and P. Scoppa.
Available from the National Technical Information Service, Springfield, Va. 22161 as EVR-5052E, $6.50 in paper copy, $2.25 in microfiche. Report No EUR 5052e, Commission of the European Communities, Luxembourg, February, 1074. p 88, 64 fig, 66 tab, 4 ref.

Descriptors: *Distribution, *Copper, *Zinc, *Cadmium, *Lead, Hydrogen ion concentration, Ionization, Heavy metals, Anions, Chemical reactions, Cations, Freshwater, Lakes, Model studies, Analytical techniques.
Identifiers: *Italy.

An ion association model was used to estimate the short range interactions between some heavy metal ions and the major anions present in freshwater. In addition, the effect of pH changes on the distribution of the chemical species of each metal was taken into consideration. The pH dependent model for seawater was adapted to the speciation of Cu, Zn, Cd, and Pb in freshwaters. The anions considered were C1(-), SO4(2-), HCO3(-), CO3(2-), and OH(-). The results were presented in graphic and tabular form. The calculations showed that the metals examined can be complexed to a considerable extent and that the distribution of the chemical species of the metals varies greatly with changes of pH and water composition. A few examples of the implications of this approach in biological studies on freshwater organisms were also given. (Pulliam-Vanderbilt)
W75-05413

MERCURY: ASPECTS OF ITS ECOLOGY AND ENVIRONMENTAL TOXICITY,
Hawaii Univ., Honolulu. Dept. of Botany.
S. M. Siegel.
Available from the National Technical Information Service, Springfield, Va. 22161 as N74-22960, $4.25 in paper copy, $2.25 in microfiche. Semi-Annual report, Hawaii Botanical Science Paper No 33, p 58. 6 fig, 5 tab, 58 ref.

Descriptors: *Mercury, *Toxicity, *Environmental effects, *Ecology, *Path of pollutants, Fish, *Hawaii, Industrial wastes, Pollution, Volcanoes, Gases, Soil analysis, Sediments, Fossil fuels, Water pollution sources, Soil contamination, Air pollution effects, Public health.

The first part of this report was a historical review of the development of uses of and awareness of the toxicity of mercury. Minamata disease and organic mercury poisoning, biological alkylation, the mercury in fish scale and mercury in the environment were some of the topics covered in this

review, which concluded the extent of man's contribution to the overall amounts of Hg in the environment is unclear. The second part of the report attempted to summarize the available data on Hg in the Hawaiian environment and assess the relative importance of natural and industrial sources. Some of the principal findings supporting the conclusion that Hg enters the Hawaiian environment as a natural product were listed. No major industrial source of Hg could be identified in Hawaii. There was a suggestion that some mercury sediments in the Ala Wai Canal are associated with boating, probably due to the use of mercury-containing anti-fouling paints. Fumarole gases in volcanic areas of Hawaii were found to contain 2.2 - 40.5 micrograms Hg/cu m. Atmospheric transport from geothermal areas on Hawaii as well as the general volcanic history of the island chain appeared to offer the best explanation for the presence of Hg in various materials in the Hawaiian environment. (Pulliam-Vanderbilt)
W75-05414

TRANSPORT FATE AND GEOCHEMICAL INTERACTIONS OF MERCURY, CADMIUM AND OTHER INORGANIC POLLUTANTS IN THE COASTAL LITTORAL-SALT MARSH ENVIRONMENT OF THE SOUTHEASTERN UNITED STATES.
Skidaway Inst. of Oceanography, Savannah, Ga.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-227 035, $5.75 in paper copy, $2.25 in microfiche. Skidaway Institute of Oceanography, Savannah, Georgia, Progress Report, May, 1973. 130 p, 45 fig, 14 tab, 12 ref.

Descriptors: *Estuaries, *Path of pollutants, *Heavy metals, *Seasonal, *Organic matter, On-site tests, Iron, Copper, Manganese, Mercury, Cadmium, Lead, Rivers, Inorganic compounds, Organic compounds, Flocculation, Coasts, Distribution, *Salt marshes, *Southeast U.S.

Iron, manganese, copper, mercury, cadmium and lead concentrations in estuaries of eight rivers of the southeastern Atlantic coast were determined on a bi-monthly basis between May and December, 1972. In addition, SO4, NH4, NO3 and PO4 concentrations were also obtained for the same estuaries during that period, although no seasonal patterns were apparent. Of the metals only mercury and cadmium showed seasonal patterns in concentration in solution. Observations of metal concentrations in particulate phases suggested that copper and possibly lead are related to total organic carbon. In salt marsh sediments mercury concentrations were related to total organic carbon. The rate of accumulation of all the metals studied was obtained with Fe greater than Mn greater than Pb greater than Cu greater than Cd greater than Hg. Preliminary results of studies of dissolved organic matter characteristics and flocculation were presented. The design of studies to determine characteristics of metal complexing with organic acids was also presented. A tentative model for metal transport to and fate in the coastal littoral-salt marsh system was discussed in relation to preliminary data. (Jernigan-Vanderbilt)
W75-05416

INVESTIGATION OF SOME FACTORS IN THE BIOCHEMICAL CONVERSION OF MERCURY POLLUTANTS TO TOXIC METHYLMERCURY EFFECTED BY MICRO-ORGANISMS IN A MARINE SEDIMENT,
Naval Academy, Annapolis, Md.
M. McKinney.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-749 674, $4.75 in paper copy, $2.25 in microfiche. Trident Scholar Project Report No. 32, U.S. Naval Academy, May, 1972 89 p, 15 fig, 1 tab, 148 ref.

Descriptors: *Mercury, *Path of pollutants, *Biochemistry, *Microorganisms, *Sediments, Toxicity, Organic compounds, Inorganic compounds, Experimental models, Analytical techniques, Chelation, Oxygen, Model studies.
Identifiers: *Methylmercury.

Some of the factors involved in the conversion of mercury pollutants to toxic methyl-mercury by micro-organisms in marine sediments were investigated. Research resulted in the definition of the two primary problems: modeling and analysis. A successful modeling technique was developed, after restrictions in design were found desirable. A successful analytical technique, which had not been applied as such to biological samples, was developed and used with good results. The two techniques (model and analytical technique) were then combined in an investigation of the conversion factors: (1) pollutant type and level; (2) conversion time; (3) movement of water over the sediment (removal of Me-Hg produced); (4) chelation; (5) eutrophication; (6) oxygen content of the water above the sediment. The investigation showed that long-term mercury pollution results primarily from slow conversion of large Hg(+2) deposits to toxic methyl-mercury by methanogenic micro-organisms found largely in marine sediments. The investigation into the biochemical reactions showed that many pathways of conversion are possible under varying environmental conditions. (Jernigan-Vanderbilt)
W75-05417

THE ENVIRONMENTAL FLOW OF CADMIUM AND OTHER TRACE METALS: VOLUME I,
Purdue Univ., Lafayette, Ind.
K. J. Yost, W. Bruns, J. E. Christian, F. M. Clikeman, and R. B. Jacko.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-229 478, $11.25 in paper copy, $2.25 in microfiche. Progress Report, July 1, 1972 to June 30, 1973. 440 p, 151 fig, 140 tab, 34 ref.

Descriptors: *Path of pollutants, *Cadmium, *Trace elements, *Heavy metals, *Industrial wastes, Zinc, Lead, Water pollution, Waste disposal, Agronomy, Soil science, Aquatic environment, Meteorological data, Wildlife habitats, Industrial plants, Environmental effects, Ecology, Indiana, Great Lakes region.

The project was composed of two basic components; (a) collaborative research with industrial and waste processing facilities whose process streams contain significant amounts of cadmium, zinc, lead and other heavy metals, and (b) environmental studies to identify translocation mechanisms, distribution and fate of cadmium, lead and zinc in theurbanized, heavily industrialized Chicago-East Chicago-Gary area bodering the southern rim of Lake Michigan. The objectives for the first year of the present study with respect to (a) were to identify, enlist the cooperation of, and initiate sampling programs in pertinent industrial and waste processing facilities. Objectives for component (b) were to evaluate the scope of metal contamination in the Chicago-East Chicago-Gary study area and to choose specific ecosystems and metal transport mechanisms for subsequent, more intensive study. Volume I includes reports on (1) industrial/waste disposal studies in zinc smelting, steelmaking, electroplating, and municipal waste incineration; (2) agronomic aspects of cadmium and other trace metals in N.W. Indiana cropland and non-agricultural soils, in phosphate fertilizers, and in sewage sludge; (3) aquatic ecology in separate studies of a borrow pit, lake and river; (4) meteorological studies; and (5) metal levels in N.W. Indiana wildlife species. (See also W75-05432) (Pulliam-Vanderbilt)
W75-05431

THE ENVIRONMENTAL FLOW OF CADMIUM AND OTHER TRACE METALS: VOLUME II,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 7C.
W75-05432

THE INFLUENCE OF BIG CYPRESS LAND DEVELOPMENT IN THE DISTRIBUTION OF HEAVY METALS IN EVERGLADES ESTUARIES,
Florida State Univ., Tallahassee. Marine Lab.
G. J. Horvath.
Available from the National Technical Information Service as PB-231 941, $6.25 in paper copy, $2.25 in microfiche. South Florida Environmental Project, Ecological Report No. DI-SFEP-74-11, March 1973. 174 p, 19 fig, 60 tab, 86 ref.

Descriptors: *Land development, *Heavy metals, *Estuaries, *Path of pollutants, *Agriculture, Trace elements, Water pollution, *Florida, Agricultural runoff, Rainfall-runoff relationships, Saline water-freshwater interfaces, Environmental effects, Manganese, Iron, Copper, Zinc, Cadmium, Lead, Salinity, Drainage.
Identifiers: *Big Cypress Swamp(Fla).

To make a quantitative assessment of the effects of agricultural utilization of drained land in the Big Cypress Swamp on the estuaries of the northwestern Everglades, the distribution, chemical fractionation, and flux rates of Mn, Fe, Co, Cu, Zn, Cd, and Pb were determined along with certain environmental parameters. An intensive study was conducted in an area consisting of active and dormant farm lands drained by the Barrow River Canal system and Chokoloskee Bay, which receives the discharge of this canal. Dissolved iron concentrations decreased sharply over the salinity gradient during both seasons, while other metals showed a net increase in concentration particularly during the wet period. Concentration levels of heavy metals in Chokoloskee Bay were 1.5 to 3 times higher than those present in other everglades estuaries receiving natural drainage and the dgree of enrichment increased during the wet season. Although metal concentrations in the Barron River Canal and Chokoloskee Bay were above natural levels, only iron and lead exceeded recommended maximum values of the federal water quality criteria. It was reported the concentration levels of Cu, Zn, Cd, and Pb may have adverse effects on some organisms. (Pulliam-Vanderbilt)
W75-05434

NITRATE MOVEMENT IN SOIL UNDER EARLY SPRING CONDITIONS,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
M. F. Walter.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 094, $6.25 in paper copy; $2.25 in microfiche. PhD Thesis, 1974. 147 p, 16 tab, 35 fig, 108 ref, append. OWRT B-076-WIS(1). 14-31-0001-3946.

Descriptors: *Farm wastes, Water pollution sources, *Frozen soils, *Fertilizers, *Leaching, *Path of pollutants, Farm management, *Nitrates, Nitrogen, Soil profiles, *Soil water movement, Dispersion, Absorption, Computer models.
Identifiers: *Pasture management.

Physical transport mechanisms and chemical transformations of nitrogen were investigated and a quantitative mathematical model was developed of manurial nitrogen movement through soil profiles under typical early spring conditions. Nitrogen transformation studies were conducted with batch systems of Plainfield sand and anaerobic dairy waste. Laboratory soil columns were used to investigate flow and transport processes. The specific conditions studied were temperatures from 0 to 20C, soil moisture from 5 to 20 percent by dry soil weight, soil pH from 6 to 8, and aerobic soil environment. The quantity of nitrate in an incremental volume of soil depended upon its movement in or out of the soil volume due to mass flow of water and to the net production of nitrate within the volume of soil due to mineralization of organic nitrogen and nitrification of ammonium. Nitrate accumulation as predicted by the computer model

was based on nitrification of added manurial ammonium and soil nitrogen mineralization. Estimates of solute dispersion were made based on the movement of the soil water after infiltration. Laboratory soil columns incubated at different temperatures and with differing volumes of infiltration were used to simulate field soil conditions resulting after heavy land applications of anaerobic liquid dairy waste. Nitrogen measurements from these soil columns were compared with predictions from the computer model.
W75-05457

ADSORPTION OF PHOSPHORUS BY UNSATURATED SYNTHETIC SOIL,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
E. D. Millette.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 116, $7.25 in paper copy; $2.25 in microfiche. PhD Thesis, May 1974. 180 p, 54 fig, 21 tab, 224 ref, 10 append. OWRT A-021-IND(4).

Descriptors: *Phosphorus, *Unsaturated flow, *Anion adsorption, *Soil water movement, *Waste water treatment, Moisture tension, Surfaces, Adsorption, Phosphorus radioisotopes, Water pollution sources.
Identifiers: Langmuir isotherm, Freundlich equation.

Various concentrations of potassium phosphate solution were admitted to short soil columns in a reaction chamber. The phosphate solution contained a tracer which was chemically the same as the main solute. After reaction, the effluent was collected and the amounts of phosphate removed determined. The removal was a function of the soil water tension as well as the inlet concentration of phosphorus and the relative presence of clay in the soil. The higher the soil water tension, the higher the inlet concentration and the greater the clay fraction, the greater were the amounts of phosphate adsorbed by the soil. Of the four adsorption equations examined, the Langmuir and the Freundlich equilibrium adsorption isotherms gave the best prediction of uptake. Not enough data were available to differentiate between the efficiency of each curve. Purely chemical considerations tend to favor the Langmuir curve as the better predictor. However, none of the equations served as valid prediction of observed concentration effects when soil water pressure changes occur. An expression designed to account for pressure changes is proposed.
W75-05463

THE RELATIONSHIP BETWEEN WATERFOWL AND NITROGEN SPECIES IN THE WATERS OF THE BOSQUE DEL APACHE,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
D. W. Davies.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 182, $4.25 in paper copy; $2.25 in microfiche. Master of Science Thesis, 1973. 51 p, 9 tab, 17 fig, 25 ref. OWRT A-038-NMEX(3).

Descriptors: *Rio Grande River, *Migratory birds, *Nitrogen compounds, Ducks, Geese, Nitrates, Nitrites, Ureas, Aerobic bacteria, Anaerobic bacteria, Shallow water, *New Mexico, Seasonal, Eutrophication, Ions, Ammonium compounds, Waterfowl.
Identifiers: *Bosque Del Apache National Wildlife Refuge(NMex), Seasonal fluctuations.

A two year study of nitrogen in the waters of the Bosque Del Apache National Wildlife Refuge, New Mexico, has been conducted. Conclusions were: (1) Nitrogen levels in deep waters were higher than surface water levels. Kjeldahl, nitrate and nitrite) and ammonium ions, uric acid and urea accumulated in deep water. Attachment to soil particles and settling to the pond-bed were the main reasons for this accumulation. (2) Differences in breakdown rates of uric acid in clear water and in turbid water suggested that microbes were associated in some way with the particles in the water. Surface waters had lower microbial activity than bottom waters. Anaerobic bacteria were in greater numbers in bottom water. Bacteria were sediment-bound and accumulated in the pond-bed. The rapid degradation of uric acid in sediment-high water was attributed to the increased numbers of bacteria in sediment. (3) The insolubility of uric acid, at the pH values found in Bosque waters, was one explanation that only trace amounts of uric acid were found in water. It is suspected that any uric acid released adhered to particles which sank to the pond-bed causing accumulation of uric acid in sediment. (4) Heavy population concentrations of waterfowl add significant nitrogen to water systems. Water leaving the Bosque contains higher levels of nitrogen than that which enters the refuge. The major part of the nitrogen from waterfowl is in the form of uric acid which is insoluble and is apparently retained in the Refuge. (Hain-New Mexico State)
W75-05469

TRANSPORT MECHANISMS OF LEAD INDUSTRY WASTES,
Missouri Univ., Rolla. Dept. of Civil Engineering.
Presented at 28th Annual Purdue Industrial Waste Conference, May 1-3; Lafayette, Indiana, 1973. 19 p, 6 fig, 2 tab, 11 ref. NSF(RANN) Lead Study Program.

Descriptors: *Lead, *Industrial wastes, *Water quality, *Mining, *Pollution abatement, Mine water, Heavy metals, Flotation, Surface runoff, Analytical techniques, Spectroscopy, Effluents, *Missouri, *Path of pollutants.
Identifiers: New Lead Belt(Mo).

The lead pollution problems encountered from mining what is called the 'New Lead Belt' in S.E. Missouri were studied with special emphasis on transport mechanisms of heavy metals through the ecosystem, the changes in the water quality due to mining operations, and the techniques used to abate these changes. The mining activities of the region have produced several sources of water pollution: (1) mine water pumped from the subsurface operations which contains finely crushed rock, oils, and dissolved minerals (2) water from the milling process containing heavy metals and organic flotation reagents and (3) surface runoff rich in heavy metal particulates blown from mill and smelter concentrate piles or tailings onto the forest floor of Clark National Forest. Another major problem has been the biological transport of heavy metals where mine and mill effluents have stimulated excessive algal growths in receiving streams. The concentration of heavy metals by these benthic growth is environmentally undesirable because: (1) phytoplankton serve as a flood source for consumer forms which may concentrate the heavy metals at a higher trophic level in the food chain and (2) algae are only temporary accumulators and the materials will float into another ecosystem. The study indicated that the mining operations should continue: (1) separation of mine and mill water; (2) treatment of the minewater by one or more retention ponds, and (3) recycle the mill wastewaters. (Jernigan-Vanderbilt)
W75-05486

INFLUENCE OF ENDRIN ON SOIL MICROBIAL POPULATIONS AND THEIR ACTIVITY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
W. B. Bollen, and C. M. Tu.
Research Paper, PNW-114, 1971. 4 p, 3 tab, 80 ref. PNW-1602.

Descriptors: *Endrin, *Soil microbiology, *Pesticides, Application methods, *Path of pollutants, Water pollution effects.

Endrin applied to soil at rates of more than three times the maximum that might be expected from application of endrin-treated tree seed had no appreciable effect on numbers of soil organisms or on ammonification, nitrification, or sulfur oxidation. Decomposition of soil organic matter increased significantly in the presence of endrin. (Forest Service)
W75-05497

DISSOLVED ORGANIC CARBON (DOC), AN INDEX OF ORGANIC CONTAMINATION IN GROUND WATER NEAR BARSTOW, CALIFORNIA,
Geological Survey, Garden Grove, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W75-05502

HEAVY METAL CONCENTRATIONS AND DEPOSITION IN BULK PRECIPITATION IN MONTANE ECOSYSTEMS OF NEW HAMPSHIRE,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
W. H. Schlesinger, W. A. Reiners, and D. S. Knopman.
Environ Pollut. Vol 6, No 1, p 39-47. 1974 Illus.
Identifiers: *Air pollution, California, Deposition, Ecosystems, *Heavy metals, Montane areas, *New Hampshire, Pollution, *Precipitation(Atmospheric), Lead, Mercury, Cadminum, Pollutant identification, *Path of pollutants.

Concentrations of Pb, Hg and Cd in bulk precipitation were measured at 4 heights along an 886 m elevational gradient in New England during 4 mo. of 1971. Weighted average concentration of Pb, determined by atomic absorption spectrophotometry, was 13.4 micro g/1. The mean deposition rate was 54 micro g/m2/day and an extrapolated value for mean annual deposition was 20 mg/m2, 18 times higher than that reported as derived from marine air in the mountains of California, but lower than that reported in urban areas where airborne heavy metals are released in high concentrations by human acitivities. These values suggest that New England receives a relatively high deposition of Pb due to its continental downwind position. Much of this Pb probably originates from human activities. Cd and Hg concentrations averaged 0.6 and 0.06 micro g/1 and deposition rates averaged 2.4 and 0.2 micro g/m2/day, respectively. These bulk precipitation measurements probably underestimate the total deposition at high elevations since they do not account for cloud water condensation and aerosol impaction.--Copyright 1974, Biological Abstracts, Inc.
W75-05509

A PROCEDURE FOR PLACING LARGE UNDISTRUBED MONOLITHS IN LYSIMETERS,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 2G.
W75-05517

MINERALOGY OF SUSPENDED SEDIMENT AND CONCENTRATION OF FE, MN, NI, ZN, CU, AND PB IN WATER AND FE, MN, AND PB IN SUSPENDED LOAD OF SELECTED KANSAS STREAMS,
Kansas Univ., Lawrence. Dept. of Geology; and Kansas Univ., Lawrence. Dept. of Civil Engineering.
E. E. Angino, L. M. Magnuson, and T. C. Waugh.
Water Resources Research, Vol 10, No 6, p 1187-1191, December 1974. 1 fig, 3 tab, 13 ref. OWRR A-030-KAN (2), 14-31-0001-3016.

Descriptors: *Suspended load, Streams, *Mineralogy, Hydrogeology, Geochemistry,

Geologic control, Sediment load, *Trace elements, Clay minerals, Quartz, X-ray diffraction, Correlation analysis, Iron, Manganese, Nickel, Zinc, Copper, Lead, *Kansas, Path of pollutants, Pollutant identification.
Identifiers: Arkansas River(Kan), Kansas River(Kan), Prairie Dog Creek(Kan), Little Arkansas River(Kan), Walnut River(Kan), Solomon River(Kan), Big Blue River(Kan), Republican River(Kan).

When concentration levels of the elements studied in the suspended sediment were compared to average reported values for shales, they showed Fe to be low. The other elements were higher. Values for these elements in the dissolved portion were variable, reflecting in some cases possibly lithologic differences. The dissolved trace element composition of the water was not reflected in the chemistry of the detrital load. X-ray diffraction study of the mineralogical content of the suspended sediment indicated that montmorillonite was the clay mineral present in all cases. Other minerals present in almost all the samples were calcite and quartz. Gypsum, dolomite, feldspar, illite, and kaolinite were present in lesser amounts in some of the samples. Some question of the source of specific trace elements in these stream waters exists. For Ni and Pb, however, pollution is a possible source. The iron and manganese levels in the suspended sediments of all streams were not unusual. Significant correlations of the Pb with Mn and Fe were strongly suggestive of coprecipitation with Fe and Mn oxides. (Visocky-ISWS)
W75-05521

TRANSPIRATION DRYING OF SANITARY LANDFILLS,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W75-05523

INSTREAM AERATION AND PARAMETERS OF STREAM AND ESTUARINE NITRIFICATION,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
For primary bibliographic entry see Field 5A.
W75-05530

ENVIRONMENTAL CONTROLS ON GROUNDWATER CHEMISTRY IN NEW MEXICO. I. THE EFFECT OF PHREATOPHYTES,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
For primary bibliographic entry see Field 2D.
W75-05531

CHARACTERIZATION OF FRUIT AND VEGETABLE PROCESSING WASTEWATERS,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
M. R. Soderquist.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 175, $7.00 in paper copy, $2.25 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report WRRI-28, January 31, 1975. 190 p, 34 fig, 46 tab, 11 ref, 6 append. OWRT A-006-ORE(3).

Descriptors: *Food processing industry, *Canneries, *Industrial wastes, *Oregon, Water pollution sources, *Waste identification, *Effluents, Waste water treatment, *Biological treatment.
Identifiers: Vegetable processing, Fruit processing, Wastewater characterization.

A three-year study of the wastewaters generated in Oregon fruit and vegetable processing plants yielded comprehensive information relating to several major commodities. Characteristics and volumes of effluents emanating from plants processing sweet corn, red beets, snap beans, Royal Anne cherries, Lambert cherries, Barlett pears and evergreen blackberries were monitored. Wastewaters from the following in-plant unit operations were isolated and monitored: (1) green bean washers, graders, snippers, blanchers, coolers, and clean-up operations; (2) Barlett pear contour peelers, Ewald peelers, brine tanks, trimming lines, rinse tanks, and chopping operations; (3) cherry stemmers, graders and pitters; (4) sweet corn desilkers, blanchers, washers, coolers, flumes, and clean-up operations; and (4) evergreen blackberry crate washers, product washers, and belt washers. The resultant data are presented on both concentration and production bases. Data variations attributable to processing plant differences, commodity differences, variety differences and equipment design differences are discussed. Next, the amenability of these wastewaters to biological treatment is evaluated. Finally, the expected influence of PL 92-500 on this industry and the relationship of this study to that impact are presented.
W75-05534

ANALYSIS OF GROUND-WATER REGIMES BY USE OF NATURAL URANIUM ISOTOPE VARIATIONS,
Florida State Univ., Tallahassee. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05535

A CLOSE LOOK AT LONDON'S WATERS,
For primary bibliographic entry see Field 5G.
W75-05550

TRI-UNIVERSITY REPORT ON THE STATUS OF ENVIRONMENTAL CONTAMINATION BY LEAD,
Missouri Univ., Rolla.
B. G. Wixson.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tennessee, Publ. by U.S. Atomic Energy Commission Office of Information Services, Technical Information Center, Oak Ridge, Tennessee, March, 1974, p 1-5.

Descriptors: *Lead, *Contamination, *Environmental effects, Research and development, Mining, Mills, Air pollution, Toxicity, Conferences, Public Health, *Path of pollutants, Water pollution effects.

The progress of studies of the various aspects of environmental lead by research teams at Colorado State University, The University of Illinois, and the University of Missouri was discussed. The projects dealt with terrestrial, aquatic, and atmospheric dispersion of this toxic substance, as well as with effects of lead mining, milling, and smelting in a previously virgin forest ecosystem. The objectives of this paper were: (1) to integrate recent research findings of the three lead projects, and (2) to evaluate jointly the nature, extent, significance, and strategy for control of contamination of the environment by lead. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05567

PROBLEMS WITH MODELING TRANSPORT AND BIOLOGICAL TRANSLOCATION,
Colorado State Univ., Fort Collins.
E. R. Reiter.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tennessee, Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn, March, 1974, p 7-11. 1 fig.

Descriptors: *Model studies, *Analytical techniques, Design, Estimating, Research and development, Testing, Theoretical analysis, *Path of pollutants, Trace elements.

New techniques in constructing environmental models which describe the path of trace metals were discussed. The shortcomings of these box models were considered to be their complexity and limited scope. Most models set the input and output automatically at steady-state conditions. The author argues that nature is not stationary nor is it as linear as these restricted models tend to be. The author's personal preference is for simple models which can claim some physical or chemical laws as their foundation, rather than models that include everything but the kitchen sink, yet at the same time leave a wide-open gap of uncertainties and degress of freedom of interpretation. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05568

OVERVIEW OF A UNIFIED TRANSPORT MODEL,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
M. R. Patterson, J. B. Mankin, and A. A. Brooks.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tennessee, Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn, March, 1974, p 12-23. 5 fig, 5 ref.

Descriptors: *Model studies, *Computer models, *Trace elements, Toxicity, Biology, Absorption, Computer programs, *Path of pollutants, *Computer models.

A computer model was developed which couples atmospheric deposition of trace contaminants to hydrologic transport mode. Physical transport, chemical exchange processes, and coupling of toxicant transport to biological uptake and food chain processes are actively being modeled. A brief summary of the programming considerations, coupling of the submodels, and the capabilities of the unified model were presented. A summary of model validation studies was given along with a projection of the modeling effort during the next year. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05569

A MULTI-SOURCE ATMOSPHERIC TRANSPORT MODEL FOR DEPOSITION OF TRACE CONTAMINANTS,
Union Carbide Corp., Oak Ridge, Tenn. Computer Science Div.
M. T. Mills, and M. Reeves.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn, March 1974, p 24-36. 3 fig, 9 ref.

Descriptors: *Model studies, *Computer models, *Trace elements, *Depositions(Sediments), Toxicity, Pollutants, Watersheds(Basins), *Path of pollutants, Water pollution sources.

A computer model has been developed to predict the deposition rates within a watershed of toxic materials emitted from different types of sources. At present the following source categories are included in the model: point (steam plant or incinerator), area (city or industrial development), line (auto, rail, or air traffic) and particulate resuspension (windblown mine tailings). The dispersal of pollutants from each of these sources is described in terms of the Gaussian plume model, modified to account for source depletion due to fallout and washout. A seasonal frequency table of wind speed, wind direction, and atmospheric stability together with a plume rise calculation determine the spatial characteristics of the deposition p

tern. The particulate resuspension source strengths also depend upon the wind speed frequency distribution. To simplify the calculation, the area sources, as seen from a given receptor gauge, are transformed to equivalent polar areas. After specifying the geographical coordinates and strengths of each source, their contributions are summed to give the deposition rate for each pollutant at a particular gauge. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05570

PHYSICAL MODELING OF ATMOSPHERIC DIFFUSION,
Colorado State Univ., Fort Collins. Fluid Mechanics Program.
J. E. Cermak, D. J. Lombardi, and R. S. Thompson.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 37-72, 20 fig, 15 ref.

Descriptors: *Model studies, *Physical properties, *Winds, *Diffusion, *Cities, Pollutants, Meteorology, Topography, Gases, Sampling, Data collections, Anayltical techniques, Tracers, *Air pollution, *Path of pollutants.

The use of wind tunnels in modeling the atmospheric boundary layer over urban areas to determine the pollutant transport characteristics was discussed. The effects of city geometry upon contaminant dispersion in city streets was the object of this particular study. The distribution of pollutant concentrations downwind of a specific source for a range of meteorological conditions in Fort Wayne, Indiana was determined by the construction of a topographical model of the urban features, development of the appropriate approach flow conditions, installation of sources for a tracer gas, sampling of gases over an array of points, analysis of gas samples for tracer concentrations, and measurement of the wind velocities and temperature distributions. This model was then placed in the wind tunnel. Motion in the atmospheric boundary layer could be simulated with sufficient accuracy to make laboratory studies of air pollutant transport useful for planning air-pollution control measures. Satisfactory agreement between diffusion characteristics in the simulated and real atmosphere has been found whenever field data have been available for making comparisons. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05571

ANALYSIS OF CADMIUM PATHS IN ZINC SMELTER OPERATIONS,
Purdue Univ., Lafayette, Ind.
M. B. Triplett, R. H. Spitzer, A. A. B. Pritsker, and K. J. Yost.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tennessee, Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 73-88, 5 fig, 2 tab, 2 ref.

Descriptors: *Cadmium, *Zinc, *Model studies, *Analytical techniques, *Industrial wastes, Computer models, *Path of pollutants.

The main purpose of this study was to model the flow of cadmium in zinc-smelting operations. The other two main objectives were: (1) to analyze the model results in order to learn more about the release of cadmium, and (2) to use the model and the analysis of it to design further sampling locations and procedures. The modeling technique used for cadmium flow was the Exclusive - or Graphical Evaluation and Review Technique Program (GERT). The network approach allowed the clear identification of the processes by which cadmium is transported throughout smelter operations. The standard GERT computer program was used to obtain estimates of the percentages of the cadmium that would result at the sink nodes of the network. Empirical data concerning cadmium losses were obtained from a zinc company and these data were used to develop the parameters of the network model. The sensitivity of the results of the model to changes in the parameter values was investigated. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05572

MODELING CADMIUM DISCHARGE FROM AN ELECTROPLATING LINE WITH THE GASP IV SIMULATION LANGUAGE,
Purdue Univ., Lafayette, Ind. School of Industrial Engineering.
C. E. Sigal.
In: Proceedings of the First Annual NSF Trace Contaminants Conference, August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 89-107, 6 fig, 8 ref.

Descriptors: *Cadmium, *Model studies, Effluents, *Industrial wastes, Pollutants, *Path of pollutants, Computer models, *Computer programs, *Simulation analysis.

A Cd barrel plating line was modeled for the purpose of achieving a greater understanding of the rinsing operation with regard to Cd pollution. A simulation program was developed to serve as a basis for evaluating production and cost aspects of various recovery schemes designed to reduce Cd discharge. The GASP IV simulation language was chosen as the modeling vehicle because of the combined continuous/discrete nature of the process. The general procedure used in modeling the plating line was discussed and an example of the use of GASP IV in evaluating recovery schemes was presented. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05573

THE RATE OF MERCURY LOSS FROM CONTAMINATED ESTUARINE SEDIMENTS IN BELLINGHAM BAY, WASHINGTON,
Washington Univ., Seattle. Dept. of Oceanography.
M. H. Bothner, and R. Carpenter.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974 p 198-210, 5 fig, 18 ref.

Descriptors: *Mercury, *Estuaries, *Sediments, Data collections, Effluents, Oxidation, Laboratory tests, Organic compounds, Inorganic compounds, Toxicity, Trace elements, *Washington, *Path of pollutants.
Identifiers: *Bellingham Bay(Wash).

An estimated 10-20 lbs. of mercury were discharged daily from a chlor-alkali plant at the head of Bellingham Bay, in northern Puget Sound, between 1965 and 1970. Sediment cores collected periodically at the same stations from 1970 until 1973 show that the level of mercury in the sediments is decreasing with time since the high discharge of mercury was stopped. The rate of mercury decrease appears to follow first order kinetics, with a half-life of about 1.3 years, in sediments which are generally oxidizing, with 2-3 per cent carbon and which had initial mercury concentrations of 2-10 ppm. There are a few short-term laboratory experiments in the literature in which the evolution of methylmercury or elemental mercury has been measured under apparently similar conditions. The rates we observe in the field in Bellingham Bay appear to be 2-10 times faster than the rates obtained in the laboratory experiments. The higher rates observed in the field samples may mean that other forms or processes are important in the loss of mercury. Suggested additional mechanisms are removal of volatile forms of mercury with bubbles released from the sediment and/or sediment transport enhanced by benthic organisms and wave-induced currents which may resuspend sediment. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05578

A SOIL AND GROUND-WATER POLLUTANT TRANSPORT MODEL,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
M. Reeves, and J. O. Duguid.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 266-272, 4 fig, 5 ref.

Descriptors: *Model studies, *Computer models, *Soils, *Groundwater movement, *Pollutants, Watersheds, Chromium, Seepage, Seepage control, *Path of pollutants.

The transport equations for moisture flow and hydrodynamic dispersion of a dissolved constituent were solved in two dimensions by a finite-element-Galerkin numerical technique. Applications to a small watershed and a seepage pit were presented. Two computer programs were written - one for moisture infiltration and redistribution and the other for movement of dissolved material. Finite elements were used for the geometrical assembly, linear Galerkin methods for the spatial integration and Gaussian elimination for solution of the resulting matrix equations. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05581

ANALYSIS OF TRACE METAL MASS BALANCE FOR AQUEOUS SYSTEMS,
Colorado Univ., Denver. Dept. of Biometrics.
F. W. Briese, and R. M. Jorden.
In: Proceedings of the First Annual NSF Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974 p 273-283, 6 fig, 1 tab.

Descriptors: *Molybdenum, *Trace elements, Aquatic environment, *Water pollution, Reservoirs, Discharge(Water), Potable water, On-site tests, *Colorado, Path of pollutants.
Identifiers: *Dillon Reservoir(Colo).

A mass balance for molybdenum inputs-outputs around Dillon Reservoir, Colorado was estimated for the period from November, 1971 to November, 1972. A unique characteristic of this system is the annual single-pulse input resulting from man-related activities. The estimated flux is 250,000 pounds per year. The sensitivity of the flux estimates to measurement errors in volumetric flow rate and mass concentration was examined to put in perspective the apparent error of closure. On November 9, 1971, Dillon Reservoir contained 181,200 pounds of molybdeum in solution. Between that time and November 12, 1972, 252,700 pounds of molybdenum entered the reservoir, primarily during May and June, 1972 from Ten-Mile Creek. This massive slug input during the spring runoff resulted from the need to discharge waters from the tailings ponds of Climax Molybdenum Company in order to avoid washout. The flow of some 250,000 pounds molybdenum through the reservoir masked the apparent internal cycling which was indicated in 1970. For 1971-1972 the indication from this study is that 43,200-12,100 = 30,100 pounds of molybdenum entered the reservoir by release from bottom sediments. (See alwo W75-05277) (Jernigan-Vanderbilt)
W75-05582

COMPUTER MODEL FOR CHEMICAL EXCHANGE IN THE STREAM SYSTEM,
Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.
R. J. Raridon, M. T. Mills, and J. W. Huckabee.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 284-291, 4 fig, 5 ref.

Descriptors: *Model studies, *Computer models, *Streams, Chemicals, *Mercury, Trace elements, Toxicity, Sorption, Laboratory tests, Watersheds(Basins), Tracers, *Tennessee.
Identifiers: Walker Branch watershed(Tenn).

A computer model for chemical exchange was developed in order to trace the flow of toxic contaminants downstream from the point of injection. The model was similar to that developed at the University of Texas, but was modified to give a more complete and realistic treatment of the sorption-desorption mechanism. In addition, the model was able to treat variations in stream velocity and exchange parameters as a function of distance downstream. The model was validated using data from a mrcury stream tagging experiment on the Walker Branch watershed at ORNL. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05583

MODELING ATMOSPHERIC DISPERSION OF LEAD FROM AUTOMOTIVE SOURCES,
Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
P. C. Katen.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 298-313, 9 fig, 9 ref.

Descriptors: *Model studies, *Lead, *On-site data collections, *Air pollution, Filters, Analytical techniques, Particle size, *Path of pollutants, *Pollutant identification.

Several experimental programs were conducted for the purpose of studying and parameterizing the atmospheric transport of lead from atmospheric sources. Short-range diffusion from an isolated, divided highway was described with a Gaussian plume model, and evaluated by a scheme to account for vertical wind profiles, yielding a non-Gaussian vertical concentration profile. Several of the modeling problems for particulate diffusion were discussed. An extensive field program was conducted to measure vertical lead concentration in a city street caynon. A sampling network of 19 stations was established in and around Fort Collins, Colorado, covering an area of 120 sq km. Graphite emission spectrometer cups were used as the filtering media, with filters being changes three times daily. Simple diffusion models were complicated by having to estimate source strengths and particulate settling. The results showed some very strong vertical concentration gradients and complex flow patterns which vary significantly with wind direction. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05584

NORMALIZATION AND INTERPRETATION OF ATMOSPHERIC TRACE ELEMENT CONCENTRATION PATTERNS,
Maryland Univ., College Park. Dept. of Chemistry.
G. E. Gordon, and W. H. Zoller.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 314-325, 4 fig, 12 ref.

Descriptors: *Trace elements, *Atmosphere, *Air pollution, *Data collections, Particle size, Aluminum, Laboratory tests, Testing procedures, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Standards, Zinc, Arsenic compounds, Lead Mercury, *Path of pollutants.

A double normalization of elemental concentration patterns, consisting of normalization to a major non-volatile element and then to its crustal abundance patterns, was discussed. This procedure revealed large enrichments of some elements in atmosphere relative to the crustal pattern. The authors suggested that possible sources of these enriched elements could be identified by performing similar normalizations of elemental concentrations in particles released by major air pollution activities. The enrichment factors for the following sources were given: (1) elements on particles collected in the atmospheres of Boston, northwest Indiana, and San Francisco; (2) municipal incinerator fly ash and the EPA-NBS coal standard; (3) coal and suspended particles in the stacks of coal-fired power plants; and (4) the EPA-NBS standard fuel oil. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05585

MODELING OF PARTICULATES IN GARY, INDIANA AREA,
Battelle Columbus Labs., Ohio.
T. J. Thomas, and W. J. Davis.
In: Proceedings of the First Annual NSF Trace Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 326-350, 11 fig, 1 tab, 4 ref. NSF (GI-35106).

Descriptors: *Model studies, *Cadmium, *Air pollution, *Lakes, Gases, Pollutants, Data collections, *Lake Michigan, *Indiana, Winds, *Path of pollutants.
Identifiers: Gary(Ind).

A transport model for the airborne transport of cadmium was developed for the Gary region. The model included the effects of Lake Michigan and dustfall. For this study an upgraded version of the Air Quality Display Model was used. The adaptations of AQDM included the addition of dustfall equations to model particulate settling and mass depletion of the plume and the addition of a curvilinear wind field to account for lake breezes. Preliminary results of the model, using total particulates as the pollutant, demonstrated that dustfall is a highly important consideration, very probably accounting for the calibration slope necessary, but unexplainable, in transport models that treat particulates as a gas. The effects of Lake Michigan previously assumed to be large, were quite the opposite. The effects of a lake breeze must be essentially self-canceling. (See also W75-05277) (Jernigan-Vanderbilt)
W75-05586

THE PORE WATER CHEMISTRY OF RECENT SEDIMENTS IN THE WESTERN MEDITERRANEAN BASIN,
Institut de Physique de Globe, Paris (France).
G. Michard, T. M. Church, and M. Bernat.
Journal of Geophysical Research, Vol 79, No 6, p 817-824, February, 1974. 8 fig, 3 tab, 37 ref.

Descriptors: *Sediments, *Magnesium, *Calcium, *Pore water, *Diffusion, Ions, Sampling, Sea water, Analytical techniques, Spectroscopy, On-site data collections, Sedimentation rates, Movement, Water pollution sources.
Identifiers: *Mediterranean Basin(Western area).

A 9-m core was recovered from sediments overlying a salt dome in the western Mediterranean basin (2560 m) and was found to have marked pore water gradients of alkaline-earth metals and sulphate ions, and an unsupported Th-230 sedimentation rate of 8cm/1000 yr. The increasing concentrations of interstitial Mg, Ca, Sr, and Ba ions (without marked variation in Na, K, and Cl ions) probably arise from mobilization of constituents in the underlying evaporites and subsequent diffusion and reaction in the overlying sediment column. The magnesium, strontium, and to some extent calcium concentration gradients can be described as a model of interstitial diffusion without reaction and apparent coefficients of the minus 7th power sq cm/s, whereas barium and probably calcium ions are regulated by both diffusion and solubility reactions with the barite and calcite phases. Interstitial sulphate decreased monotonically owing to bacterial organic reduction and at depth the sulphate and barium ion activity product is in saturated equilium with barite. (Jernigan-Vanderbilt)
W75-05587

REMOVAL OF CATIONS FROM LEACHATE BY INTERACTION WITH SUBSURFACE SOILS,
Environmental Protection Agency, Boston, Mass. Solid Waste Management Branch.
For primary bibliographic entry see Field 5G.
W75-05589

EFFECTS OF STRIP MINING ON THE HYDROLOGY OF SMALL MOUNTAIN WATERSHEDS IN APPALACHIA,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05593

ENDRIN IN FOREST STREAMS AFTER AERIAL SEEDING WITH ENDRIN-COATED DOUGLAS-FIR SEED,
Forest Service (USDA). Corvallis Oreg. Pacific Northwest Forest and Range Experiment Station.
D. G. Moore, J. D. Hall, and W. L. Hug.
Research Note, PNW 219, 1974. 14 p, 1 fig, 2 tab, 22 ref. PNW-1602.

Descriptors: *Repellents, *Animal control, *Water quality, *Endrin, *Planting management, *Douglas fir trees, Water pollution sources, *Pesticide residues.

Extent and duration of endrin contamination in streamwater were determined after aerial seeding of two western Oregon watersheds with treated Douglas-fir seed. Detectable residues of endrin were found in a steep gradient stream for a period of less than 5 hours and in a slower flowing stream for 11 days. Endrin was again detected in the low gradient stream during the high flow of a winter storm 23 days after seeding. Maximum concentrations measured were well below reported 96-hour median tolerance limits for important fish species. (Forest Service)
W75-05602

EFFECTS OF SURFACE IRRIGATION WITH DAIRY MANURE SLURRIES ON THE QUALITY OF GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. C. Barker, and J. Sewell.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 804-807, July-August, 1973. 1 fig, 4 tab, 9 ref. OWRT A-021-TN(5).

Descriptors: *Irrigation, *Dairy industry, *Farm wastes, *Slurries, *Water quality, Groundwater, Surface runoff, Bacteria, Nitrates, Water pollution sources, *Path of pollutants, Pollutant identification, Dissolved solids.

The major objectives were to determine the effects of slurry irrigation on surface runoff and

groundwater quality and to develop techniques for irrigating with dairy manure slurry. One acre of concrete lot, loafing area, and building roofs at a dairy with about 125 milking cows was served by a slurry irrigation system where manure slurry, rainfall runoff, and wastewater were collected into drains and delivered by gravity flow into a 75,000-gallon concrete storage tank. The slurry was delivered through 4-in. portable aluminum irrigation pipeline to the field sprinkler. Grab samples of surface and groundwater were collected and analyses were made for bacteria, biochemical oxygen demand, dissolved solids content, nitrate nitrogen, orthophosphate, chloride, and residues. All median surface runoff nitrate nitrogen concentrations were within the permissible criteria for raw water for public supplies. All surface runoff chloride concentrations were well within the permissible criteria. The dissolved solids content of the manure-saturated surface runoff generally exceeded acceptable standards. The coliform bacteria concentrations for the surface runoff from both the manure-saturated and the conventional pasture exceeded the standard. (Cartmell-East Central)
W75-05606

CHEMICAL HYDROGEOLOGY OF THE CARBONATE PENINSULAS OF FLORIDA AND YUCATAN,
Nevada Univ., Reno.
For primary bibliographic entry see Field 2F.
W75-05614

CHANGES IN CONCENTRATION OF CERTAIN CONSTITUENTS OF TREATED WASTE WATER DURING MOVEMENT THROUGH THE MAGOTHY AQUIFER, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
H. F. H. Ku, J. Vecchioli, and S. E. Ragone.
Available from the Superintendent of Documents GOP, Washington, DC 20402, $3.15. Journal of Research of the US Geological Survey, Vol 3, No 1, p 89-92, January-February 1975. 2 fig, 2 tab, 12 ref.

Descriptors: *Path of pollutants, *Waste disposal wells, *Artificial recharge, *Groundwater movement, *New York, Aquifers, Waste water treatment, Water reuse, Tertiary treatment, Injection wells.
Identifiers: *Long Island(NY).

Approximately 7 million gallons of tertiary-treated sewage (reclaimed water) was injected by well into the Magothy aquifer, Long Island, New York, and was subsequently pumped out. As the reclaimed water moved through the aquifer, concentrations of certain dissolved constituents decreased: total nitrogen, 7 percent; methylene blue active substances, 49 percent; chemical oxygen demand, 50 percent; and phosphate, more than 93 percent. (Knapp-USGS)
W75-05625

MOBILIZATION OF IRON IN WATER IN THE MAGOTHY AQUIFER DURING LONG-TERM RECHARGE WITH TERTIARY-TREATED SEWAGE, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
S. E. Ragone, H. F. H. Ku, and J. Vecchioli.
Available from the Superintendent of Documents, GPO Washington, DC 20402, $3.15. Journal of Research of the US Geological Survey, Vol 3, No 1, p 93-98, January-February 1975. 2 fig, 3 tab, 8 ref.

Descriptors: *Water pollution sources, *Iron, *Pyrite, *Waste disposal wells, *New York, Tertiary treatment, Water chemistry, Artificial recharge, Aquifers, *Path of pollutants, Injection wells, Groundwater movement, Water reuse.
Identifiers: *Long Island(NY).

Tertiary-treated sewage (reclaimed water) has been recharged by well into the Magothy aquifer at Bay Park, N.Y., intermittently since 1968. The longest of 13 recharge tests lasted 84.5 days. This was sufficient time for the reclaimed water to reach and observation well 200 ft from the recharge well. Although the iron concentrations of the reclaimed water and the native water were less than 0.4 mg/litre, the iron concentrations of samples from observation wells 20, 100, and 200 ft from the recharge well at times approached 3 mg/litre. Source of the iron is pyrite that is native to the aquifer. (Knapp-USGS)
W75-05626

WATER-QUALITY CHANGES DURING A SALMON RUN IN AN INTERIOR ALASKAN STREAM,
Geological Survey, Anchorage, Alaska.
J. W. Nauman, and D. R. Kernodle.
Available from the Superintendent of Documents, GPO Washington, DC 20402, $3.15. Journal of Research of the US Geological Survey, Vol 3, No 1, p 103-106, January-February 1975. 2 fig, 1 tab, 12 ref.

Descriptors: *Water quality, *Salmon, *Alaska, Turbidity, Dissolved oxygen, Fish, Carbon dioxide, Chlorophyll, Invertebrates, Littoral drift.
Identifiers: *Fish Creek(Alaska).

Increased activity at sunset of sockeye (red) salmon (Oncorhynchus nerka) in an Alaskan stream resulted in increases in carbon dioxide, turbidity, suspended chlorophyll, and drift invertebrates, and a decrease in pH and dissolved oxygen. Some of the water-quality changes occurring on Fish Creek near sunset were as great as measured seasonal changes. (Knapp-USGS)
W75-05628

PYRROLIDONE-A NEW SOLVENT FOR THE METHYLATION OF HUMIC ACID,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5A.
W75-05631

CHEMICAL AND PHYSICAL DATA FOR DISPOSAL WELLS, EASTERN SNAKE RIVER PLAIN, IDAHO,
Geological Survey, Boise, Idaho.
R. L. Whitehead.
Idaho Department of Water Resources Boise, Water Information Bulletin No 39, October 1974. 31 p, 8 fig, 7 tab, 13 ref.

Descriptors: *Waste disposal wells, *Idaho, *Water quality, *Water pollution sources, Return flow, Artificial recharge, Irrigation water, Pesticides.
Identifiers: *Snake River Plain(Idaho).

From May 1972 to April 1973, 119 disposal wells on the eastern Snake River Plain, Idaho, were studied. Depths of the disposal wells ranged from 35 to 488 feet and averaged 102 feet. Most of these wells were so shallow as to not extend to the underlying water table. Flow rates into the wells ranged from less than 0.01 to 3.7 cubic feet per second and averaged about 0.48 cfs. Water samples were collected from 55 irrigation-disposal wells, 14 city-street drain wells, 5 canals, 1 diversion ditch, 2 sites, on the Snake River, and 1 domestic well. Of four samples analyzed for pesticides, two contained detectable concentrations of some constituents. One of these samples contained traces (0.01 to 0.04 microgram per liter) of DDE, DDT, dieldrin, chlordane, diazinon, and silvex, as well as 0.26 microgram per liter of 2,4-D; the other sample contained 0.01 and 0.02 microgram per liter of DDT and DDE respectively. Oil and grease concentrations in 10 city-street drain samples ranged from 11 to 4,000 milligrams per liter and dissolved-lead concentrations ranged from 19 to 1,600 micrograms per liter. One sample of irrigation-runoff water contained 4 milligrams per liter of oil and grease and less than 100 micrograms per liter of dissolved lead. Analyses of water samples from irrigation-disposal wells and city-street drains showed a wide range of values for sediment, turbidity, total and fecal coliform bacteria, and fecal streptococci bacteria. (Knapp-USGS)
W75-05632

EVALUATION OF HYDRAULIC CHARACTERISTICS OF A DEEP ARTESIAN AQUIFER FROM NATURAL WATER-LEVEL FLUCTUATIONS, MIAMI, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W75-05633

CHEMICAL AND BIOLOGICAL CONDITIONS OF LAKE OKEECHOBEE, FLORIDA, 1969-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5C.
W75-05634

WATER-QUALITY DATA OF THE SACRAMENTO RIVER, CALIFORNIA, MAY 1972 TO APRIL 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W75-05635

SIMULATED EFFECTS OF OIL-SHALE DEVELOPMENT ON THE HYDROLOGY PICEANCE BASIN, COLORADO,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4C.
W75-05637

MID-1971 GROUND-WATER CONDITIONS AT YANKEETOWN WELL FIELD, LEVY COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W75-05649

THE SCAVENGING OF SILVER BY MANGANESE AND IRON OXIDES IN STREAM SEDIMENTS COLLECTED FROM TWO DRAINAGE AREAS OF COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2J.
W75-05652

PESTICIDES IN SELECTED WESTERN STREAMS--1968-71,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 5A.
W75-05653

CHEMICAL INTERACTION DURING DEEP WELL RECHARGE, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y. Water Resources Div.
S. E. Ragone, and J. Vecchioli.
Ground Water, Vol 13, No 1, p 17-24, January-February 1975. 7 fig, 3 tab, 14 ref.

Descriptors: *Path of pollutants, *Artificial recharge, *New York, *Waste disposal wells, Iron, Injection wells, Water chemistry, Water quality, Water pollution sources, Ion exchange.
Identifiers: *Long Island(NY).

Tertiary-treated sewage (reclaimed water) was recharged into the Magothy aquifer in 13 recharge experiments in Long Island, N. Y., between 1968 and 1973. The recharge resulted in a degradation in water quality with respect to iron concentration and pH. Iron concentration increased from the

range 0.14 to 0.30 milligrams per litre to as much as 3 mg per litre at the 20-, 100-, and 200-foot or 6.1-, 30-, and 61-metre observation wells as the reclaimed water displaced native water. The increase was probably a result of pyrite dissolution. The pH of the water decreased from the range 5.22 to 5.72 to a low of about 4.50, predominantly as a result of cation-exchange reactions. (Knapp-USGS)
W75-05656

TRANSVERSE MIXING OF HEATED EFFLUENTS IN OPEN-CHANNEL FLOW,
State Univ. of Iowa, Iowa City. Dept. of Mechanics and Hydraulics.
T-P. Yeh.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 302, $7.00 in paper copy, $2.25 in microfiche. PhD thesis, May 1974. 180 p, 38 fig, 2 tab, 28 ref, 2 append. OWRT A-040-IA(4) and C-3140(No. 3692)(1).

Descriptors: *Open channel flow, *Energy equation, *Laboratory tests, *Thermal pollution, *Distribution, Mixing, Analysis, Temperature, Velocity, Turbulence, Vortices, Profiles, Froude number, Diffusion, Statistics, Heat budget, Heat transfer, Hydraulics.
Identifiers: Buoyancy.

Laboratory flume experiments covered a range of flows from rapidly mixing to nearly stratified. A heated effluent was introduced continuously into the flume from a source located at either the centerline or one side. Temperature distributions were measured at several cross sections. For selected flow conditions, velocity profiles of longitudinal and lateral components were also measured. Results showed that the mixing process was related to the development and decay of buoyancy-generated secondary flow. This secondary flow was the dominant mechanism in the near field, where the transverse temperature distribution was commonly bimodal. In the far field region, transverse mixing was mainly due to turbulent diffusion. Analyses showed that the influence of buoyancy on the transverse mixing process could be described in terms of the excess mean, absolute transverse displacement from the source, the excess variance, and the distance between the two modes. These parameters were related to each other and to an initial densimetric Froude number based on the shear velocity. Computed predictions of transverse profiles of depth-averaged temperature based on these relationships gave good agreement with experimental results. A finite-difference representation of the three-dimensional, steady-state convection-diffusion equation was solved numerically. The buoyancy-induced secondary circulation was simulated by a vortex function. For selected experiments, reasonable agreement between computed and experimental temperature profiles was found. (Adams-ISWS)
W75-05657

THE WATER QUALITY AND BOTTOM SEDIMENT CHARACTERISTICS OF NEW JERSEY LAGOON DEVELOPMENTS,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
E. H. Thurlow.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 281, $10.00 in paper copy, $2.25 in microfiche. Doctoral Thesis, 344 p, 18 fig, 101 tab, 3 append. OWRT B-040-NJ(4). 14-31-0001-3614.

Descriptors: *Wetlands, *Lagoons, *Water quality, *Bottom sediments, Baseline studies, Water pollution sources, *New Jersey, Nitrogen compounds, Cations, Organic matter, Heavy metals, Ammonium compounds, Phosphates, Chlorides, Sulfates.

A study was conducted in four lagoon systems located in Ocean County, New Jersey, to determine both water quality and bottom sediment characteristics in these systems. Depth was found to have a major influence on water quality. The shallowest area of a lagoon system is usually at the mouth with increasing depth toward remote points. Lagoon systems are generally deeper than the adjacent bay creating a 'sill-effect' which hinders the exchange of water between the two. Accumulations of NH4(N), NO3(N), NO2(N), PO4, Cl, SO4 and some heavy metals, especially Fe, Mn, Pb and Cu, were found in excessively deep areas of lagoon systems. Anaerobic conditions were also present in these waters. Also, the lagoon waters contained higher concentrations of NH4(N), NO2(N) and PO4 than adjacent bay waters. Lagoon sediments were found to be black mucks having a strong odor of H2S. The sediments were generally high in organic matter content, total N content, CEC and exchangeable cations. The sediments in the lagoons were higher in organic matter content than the adjacent bay sediments. (Nieswand-Rutgers)
W75-05658

NITRIFICATION EFFECTS IN WASTE TREATMENT PROCESSES,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-05661

PHOTOSYNTHETIC REAERATION IN THE UPPER PASSAIC RIVER,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
T. J. Tuffey.
Master Thesis, January 1972. 146 p, 3 append. OWRT B-010-NJ (2).

Descriptors: *Photosynthesis, *Biochemical oxygen demand, *Eutrophication, *Photosynthetic oxygen, Water quality, Nutrients, Water pollution sources, *New Jersey, *Reaeration.
Identifiers: *Passaic River(NJ).

Investigations were made of photosynthesis upon a small polluted river, the Passaic River in New Jersey, including effects upon the general oxygen regimen of the river. Data obtained showed variation of photosynthesic oxygen with water depth, time of day, and with the seasons. Attempts were made to develop a method of mathematically modelling net photosynthesis effect based on water quality and environmental characteristics; but results were not sufficiently satisfactory to be definitive. A comparison of oxygenation effects due to photosynthesis and the natural atmospheric reaeration, respectively, showed that photosynthesis contributed about 20% of the total oxygen added; the proportion being independent of the stream discharge. Moreover, if the dissolved oxygen concentration of the river were at a higher level this proportion would rise, up to possibly 45% of the total. Nutrient levels in the water were high. The phosphate levels in particular were many times that necessary to maintain algae growth.
W75-05662

DISTRIBUTION OF AUTOTROPHIC NITRIFYING BACTERIA IN THE PASSAIC RIVER,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
V. A. Matulewich.
Available from the National Technical Information Service, Springfield, Va. 22161, as, PB-240 292, $7.00 in paper copy, $2.25 in microfiche. M.S. Thesis, October 1974. 181 p, 21 fig, 27 tab, 120 ref, append. OWRT A-030-NJ(3). 14-01-0001-3230.

Descriptors: *Nitrification, *Water pollution effects, *Microbial degradation, Environmental effects, Nitrates, Microorganisms, Oxygen demand, *New Jersey, Ecology, Distribution patterns, *Path of pollutants.
Identifiers: *Nitrosomonas, *Nitrobacter, *Nitrogenous oxygen demand, *Nitrifying bacteria, *Passaic River(NJ), Environmental surfaces, Microbial ecology.

The nitrogenous oxygen demand exerted by sewage and secondarily treated effluent may seriously lower the water quality of receiving streams. Comprehensive stream management requires the ability to predict where this component of the oxygen demand will be exerted, and at what rate. Efforts to include nitrification in stream models are unlikely to be highly successful without some understanding of the ecology of the responsible organisms. This investigation was undertaken to provide such information. The distribution of nitrifying bacteria in bulk waters, on surfaces, and in muds at 11 Passaic River sites was studied using most-probably-number procedures. In mud samples taken from the mud-water interface, nitrifiers were from 21 to 140,000 (average 515) times more abundant (volumetrically) than in the overlying waters. Nitrifiers were found throughout a 21 cm profile of mud, the highest densities occuring in the topmost levels. Large numbers of these bacteria were associated with aquatic plants, algae, and slimes on rocks. There was no correlation between nitrifier density and river flow. Ammonium-oxidizers outnumbered nitrite-oxidizers in all but one of the 112 samples examined by a factor from 1.7 to 5310 (average 20.9). These data suggest that high river velocities may bring into suspension substantial numbers of nitrifiers. The relative scarcity of nitrifying bacteria in bulk waters and their abundance at surfaces is suggestive that surfaces may be the more important site of nitrification in rivers. (Whipple-Rutgers)
W75-05663

TAR POLLUTION SURVEY AT GOLDEN BEACH, FLORIDA,
Coast Guard, Goton, Conn. Research and Development Center.
M. Curtis, and W. Saner.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-786 632, $3.75 in paper copy, $2.25 in microfiche. Report No. CG-D-3-75, May 1974. 25 p, 6 fig, 3 tab, 7 ref, 4 append.

Descriptors: *Oil pollution, *Sampling, Beaches, Surveys, Seashores, Winds, *Florida.
Identifiers: *Tar pollution, Tar deposition, Golden Beach(Fla).

A beach area on the southeast Florida coast was systematically sampled in order to measure ambient levels of coastal tar pollution, to evaluate the effect of sampling zones of varying sizes, and to determine the effect of tar buildup on the beach with time. In addition, the effect of wind on tar deposition was also determined. Results demonstrate that a sampling zone as small as 20 feet in length produced tar loading data as reliable as a zone 160 feet in length. There was a proportionately heavier deposition of tar on the most northerly situated zones whenever the wind blew from either east or west. This disproportionate tar deposition was not effected, however, until 2 hours later. A southerly wind, on the other hand caused no disproportionate tar stranding. Most tar came ashore whenever the wind blew from the northeast during the 24-hour periods prior to sampling. The beach time constant, that is, the time necessary for the beach to accumulate 50% of the maximum amount of tar it will carry at infinite time (having started with an initially tar-free beach) was calculated to be 14.3 hours; the ultimate tar load was 1073 gm tar per 100 linear feet of beach. Twenty-one samplings generated an inaccurate average tar density on the beach, whereas 35 samplings produced an accurate average tar loading value. (Sims-ISWS)
W75-05667

A TECHNIQUE FOR PREDICTING THE MOVEMENT OF OIL SPILLS IN NEW YORK HARBOR,
Coast Guard, Groton, Conn. Research and Development Center.
I. M. Lissauer.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-786 627, $4.25 in paper copy, $2.25 in microfiche. Report No CG-D-6-75, February 1974. 53 p, 19 fig, 16 tab, 5 ref, 2 append.

Descriptors: *Oil spills, *Oil pollution, *Forecasting, Boundaries(Surfaces), New York, On-site data collections, Movement, Hudson River, Freshwater, Flow, Winds, Tides.
Identifiers: Oil transport, *New York Harbor.

The major factors involved in the transport of an oil slick in New York Bay are winds, tides, and freshwater flow from the Hudson River. Computations were made to quantify the effect of each of these factors on the movement of an oil slick. Quantification of each effect resulted in a simple method of forecasting the movement of an oil slick within the harbor. In addition, a method of predicting the boundaries within which a slick is most likely to move was presented. Extensive tabulations of the experimental data were contained in an appendix. (Sims-ISWS)
W75-05668

EVALUATION TEST OF A SMALL HARBOR OIL SPILL RETRIEVAL SYSTEM,
Harding Pollution Control Corp., West Hempstead, N.Y.
D. J. Graham, and L. Somers.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-782 667, $3.75 in paper copy, $2.25 in microfiche. July 1974. 32 p, 23 fig, 3 tab. N00024-73-C-0273.

Descriptors: *Oil spills, *Oil pollution, Harbors, Separation techniques, Evaluation, *Testing, Harbors.
Identifiers: Oil spill retrieval, Oil spill cleanup.

An evaluation test was conducted to obtain performance data and develop an acceptance test procedure for a small oil spill retrieval system requiring no more than two men for its deployment and operation. The use of a simple, floating gravity separator provides a 6.8 to 1 reduction in fluid volume recovered by the simple weir-type SLURP skimmer. This reduction of oil-water volume allows the use of a compact, collapsible, 300-gallon storage bag in the bed of a standard 3/4 ton pickup truck for recovery of small harbor oil spills. The present combination of a SLURP skimmer, single diaphram pump, floating separator, and collapsible storage bag can be effectively deployed by two men from a single pickup truck. A reproducible test procedure was delineated for use as a first article acceptance test for this type of equipment. (Sims-ISWS)
W75-05669

QUANTITATIVE AND QUALITATIVE SURVEY OF OILS AND TARS STRANDED ON GALVESTON ISLAND BEACHES,
Texas A and M Univ., Galveston. Center for Marine Resources.
For primary bibliographic entry see Field 5A.
W75-05681

MANGANESE NODULES (II): PROSPECTS FOR DEEP SEA MINING,
J. L. Hammond.
Science, Vol 183, No 4125, p 644-646, February 15, 1974. 1 fig.

Descriptors: *Mining, *Mining wastes, Manganese, *Oceans, Sediments, Water pollution, Metals, Copper, Nickel, Cobalt.
Identifiers: Ocean mining.

The feasibility of deep sea mining of manganese, nickel, copper, and cobalt is being studied by several industrial and governmental groups. Several systems for recovering the ore nodules from the ocean floor are being tested. Usual physical means and smelting have not proved successful for separating the metals. Chemical separation methods being investigated in industry are discussed. Environmental concerns include the distribution of sediment particles - some of which may remain suspended for a year- throughout the water column. Also second-generation processing plants may be built to operate at sea, where disposal of millions of tons of residues that contain manganese and other toxic metals in oxide form will be a problem. (Pulliam-Vanderbilt)
W75-05690

ORIGIN OF METALLIFEROUS SEDIMENTS FROM THE PACIFIC OCEAN,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2J.
W75-05701

CADMIUM IN PLANTS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2I.
W75-05709

MERCURY, CADMIUM, AND CHROMIUM IN THE NETHERLANDS, (LE MERCURE, LE CADMIUM ET LE CHROME AUX PAYS-BAS),
Central Lab. TNO, Delft (Netherlands).
W. H. J. M. Wientjens.
Report No EUR 5006 F, Commission des Communautes Europeennes. (1973). 29 p, 11 tab, 1 fig, 47 ref.

Descriptors: *Mercury, *Cadmium, *Chromium, Heavy metals, Import, Export, Industrial production, Environment, Environmental effects.
Identifiers: *Netherlands.

At the request of the Commission of European Communities, data were collected on the use in the Netherlands of mercury, cadmium, and chromium, as well as their derivatives. Presented are: (1) import and export figures; (2) areas of use, and (3) the presence of these metals in the environment. Also included are data that were considered of interest from other countries. For mercury, which plays a large role in the Netherlands, the data were mostly gathered from the quantitative domain. The data from different sources appeared very divergent at times. Cadmium was of less importance but on the increase, in the Netherlands. From a qualitative viewpoint, the status of this metal was somewhat clarified, but the quantitative data were inadequate. The data confirmed that there was little interest in chromium at that time. (Pulliam-Vanderbilt)
W75-05710

WATERSHED VALUES IMPORTANT IN LAND USE PLANNING ON SOUTHERN FORESTS,
Forest Service (USDA), Franklin, N.C. Coweeta Hyrologic Lab.
For primary bibliographic entry see Field 4D.
W75-05716

DETERMINATION OF POLLUTION PARAMETERS (CONCEPTO DE POLUCION, PARAMETROS A DETERMINAR),
For primary bibliographic entry see Field 5C.
W75-05725

DERIVATION OF A THREE DIMENSIONAL NUMERICAL WATER QUALITY MODEL FOR ESTUARY AND CONTINENTAL SHELF APPLICATION,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
M. Spaulding.
Available from the National Technical Information Service, Springfield Va, 22161, as N74-20974, $3.25 in paper copy, $2.25 in microfiche. NASA TM X-71930 (Undated). 22 p. 3 fig, 28 ref.

Descriptors: *Hydrologic equation, *Mathematical models, *Water quality, *Mass, Estuaries, Continental shelf, Waste water(Pollution), Numerical analysis, Advection, Hydrodynamics, Degradation(Decomposition), Dispersion.
Identifiers: *Mass transport model.

One-dimensional approximations normally assume that the vertical and cross stream structure of a given water quality parameter is of secondary importance while the main axis of flow directions is of primary interest. Two-dimensional models eliminate either the vertical or lateral structure while maintaining the other two. This integral or averaging approach has normally been taken, since, as spatial dimension numbers increase, computational difficulties, and computer time and storage requirements to solve the resulting equations, increase markedly. There are regions where a useful representation of the actual water quality distribution can only be obtained from a three-dimensional picture. A derivation is given for a three-dimensional mass transport equation, appropriate for numerical modeling of estuary and continental shelf water quality variations for both time dependent and steady state cases. A stable and accurate finite differences approximation to the derived equation is presented an a solution scheme for the resulting equations outlined. Preliminary results are obtained using the model for extremely simple problems which have analytical solutions. Results indicate that the numerical model as presented will provide a fruitful scheme to study water quality problems in coastal waters for both steady state and time dependent cases. (Jones-Wisconsin)
W75-05738

RUNOFF WATER QUALITY OF THREE TUCSON WATERSHEDS.
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 4C.
W75-05768

COMBINED BUOYANCY AND BOUNDARY EFFECTS ON THE TRAJECTORY OF A TWO-DIMENSIONAL JET,
Connecticut Univ., Storrs.
M. H. Stenhouse.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 475, $6.25 in paper copy, $2.25 in microfiche. Ph.D. Dissertation, 1974. 146 p, 2 tab, 45 fig, 2 append, 23 ref. OWRT A-050-CONN(4). 14-31-0001-3507.

Descriptors: *Hydrodynamics, *Flow system, *Jets, *Buoyancy, *Thermal pollution, Reynolds number, Aquiculture, *Boundaries(Surfaces).
Identifiers: *Two-dimensional jets, Boundary effects, Jet trajectory, Recirculation region, Waste heat disposal.

New experimental data on a two-dimensional jet issuing parallel to an offset surface are presented. The experimental results are used as the basis for an analytical method to predict the jet centerline trajectory, reattachment point, recirculation region pressure distribution, and offset surface pressure distribution. For the experimental investigation, a two-dimensional water jet issuing horizontally in the proximity of a free (air-water interface) offset surface was studied. Hot film anemometry was used to determine the speed distribution in the jet and recirculation regions for a non-heated jet. Streamlines, jet centerline, reattachment point, and surface deflection for both non-heated and heated jets were recorded photographically using a microbubble flow visualization technique.

Thermistor sensor temperature probes were used to record the temperature history of the heated jets. The recirculation region was found to be a forced vortex centered between the jet and the offset (free) surface with jet structure identical for both non-heated and equilibrium heated jets. Comparison with existing data for air jets with a rigid offset boundary showed the effects of Reynolds number to be negligible. The surface deflection for a free offset surface was found to be analogous to the surface pressure distribution for a fixed offset surface. The analysis used the pressure field of the forced vortex to predict the jet characteristics. The agreement with present and previously existing data, encompassing data for air and water, fixed and free offset surfaces, was quite good for a wide range of submergences. The analysis exhibited the expected asymtotic behavior for deeply submerged jets. (de Lara-Connecticut)
W75-05780

DENITRIFICATION IN INDIANA LAKE, RESERVOIR, AND POND SEDIMENTS,
Purdue Univ., Lafayette, Ind.
R. E. Terry.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 473, $4.75 in paper copy, $2.25 in microfiche. Master of Science Thesis, May 1974. 71 p, 5 fig, 21 tab, 36 ref, append. OWRR A-019-IND(4).

Descriptors: *Denitrification, *Sediments, *Lake sediments, *Sediment-water interface, *Anaerobic conditions, Chemical reactions, Bottom sediments, Mud-water interface, Calcium carbonate, Nitrates, Nitrites, *Indiana, Lakes, Ponds, Reservoirs, Kinetics.
Identifiers: Reservoir sediments, Pond sediments.

This study was undertaken: (1) to determine the influence of environmental and experimental factors on denitrification in incubated sediments, (2) to determine the potential rates of denitrification in a variety of Indiana lake, pond, and reservoir sediments, (3) to determine relationships between denitrification rates in sediments and other sediment properties, and (4) to study the kinetics and the activation energy of denitrification in sediments. Sediments were sufficiently anaerobic for rapid denitrification. Denitrification rates of 51 to 171 micro g nitrate-N per g of sediment per day were observed in five lake samples. Simple correlation techniques revealed that only calcium carbonate content of sediments was related to the denitrification rate. Denitrification followed zero order kinetics at high concentrations of nitrate, whereas, first order kinetics were followed at low concentrations. The activation energy of denitrification was determined to be at 11.2 to 14.2 kcal per mole. The findings indicated that denitrification in sediments may be an important factor in the nitrogen budget of lakes, ponds and reservoirs.
W75-05785

TRANSIENT THREE DIMENSIONAL MODELING OF TEMPERATURE DISTRIBUTIONS IN RIVERS WITH AND WITHOUT THERMAL DISCHARGES,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
R. G. Hills.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 521, $5.75 in paper copy, $2.25 in microfiche. M.S. Thesis, May 1974. 127 p, 42 fig, 6 tab, 62 ref, 4 append. OWRR A-029-IND(6).

Descriptors: *Thermal radiation, *Thermal stratification, *Radiation, *Solar radiation, Rivers, Reservoirs, Distribution patterns, Reflectance, *Thermal pollution, Model studies, Channels.
Identifiers: *Thermal discharges, *Thermal instability, Alternating direction implicit, Radiation scattering, *Temperature distribution.

An analytical model was developed for predicting the transient three-dimensional temperature distribution in a thermally stratified channel simulating a river. The effects of thermal discharges and various meteorological conditions and channel parameters on the thermal structure in water are analyzed and discussed. The model considers the diurnal cycle in which the incoming solar and atmospheric radiation are functions of time. The reflections from the air-water interface and the bottom of the channel are accounted for. Since the interaction of solar radiation with water is not a surface but a volume phenomenon, internal absorption and scattering of radiation are considered and the volumetric solar heating is determined. The effects of thermal stratification on turbulence are included in the model. The energy equation is nonlinear and of complex form, therefore an A.D.I. (alternating direction implicit) finite difference technique is used to predict the temperature distribution for a realistic range of parameters and boundary conditions of interest. The analytical results indicate that in relatively clear rivers without thermal discharges, the radiation absorbed by the bottom causes a thermal instability. The rivers without thermal discharges were also well mixed at night due to the thermal instability caused by surface cooling.
W75-05786

ENVIRONMENTAL FACTORS AFFECTING THE PROPERTIES AND PRECIPITATION OF COLORING COLLOIDS IN AQUATIC HABITATS,
Louisiana State Univ., New Orleans. Dept. of Biological Sciences.
B. R. Bordelon.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 483, $5.25 in paper copy, $2.25 in microfiche. M.S. Thesis, August 1973. 113 p, 17 fig, 10 tab, 43 ref, 3 append. OWRT A-028-LA(3).

Descriptors: *Color, *Colloids, Water analysis, *Chemical reactions, *Humic acids, Water pollution sources, *Louisiana, Chemical precipitation, Water pollution effects.
Identifiers: *Humic substances.

Coloring colloids of aquatic habitats from southeastern Louisiana are polymeric aromatic hydroxy-carboxylic acids, which are fulvic, hymatomelanic, and humic. Color in the area ranges from 0 to 5150 units. Ferric iron is associated with the colloidal complex which, along with their negative charge, assists in stabilizing the complex. Percentage of ferric hydroxide in the colloidal complex varied from 0.2 to 97.3%. Particle size has a range of 5-35 m micro. In freshwater habitats fulvic acid is dominant followed by hymatomelanic then humic acids. In brackish-water to sea-water habitats the fulvic acid component precipitates. At these habitats, hymatomelanic acid is dominant followed by humic acid. Infrared analysis of fulvic acid demonstrates that the functional groups associated with this acid have a high adsorptive capacity and are easily ionizable. Color varies with both habitat and seasonal differences. Precipitation of color is accomplished by redox shifts and salinity increase. The coloring colloids are responsible for many ecological ramifications, such as altering chemical parameters, pollutant transport along with pollution bio-accumulation, in aquatic habitats.
W75-05787

FOULING OF HEAT EXCHANGERS FROM COOLING WATER AND PROCESS MATERIALS,
Dearborn Chemicals Ltd., Widnes (England).
C. B. Capper.
Effluent and Water Treatment Journal, Vol 14, No 6, p 309-314, June 1974.

Descriptors: *Fouling, *Heat exchangers, Flow patterns, Heat transfer, Corrosion, Scaling, Feeds, Cooling water.
Identifiers: Particulate deposition, Waterside fouling, Process materials.

Fouling is defined as any deposit on heat exchange surfaces which affects the flow patern through the heat exchanger, the efficiency of the heat transfer process or both. Fouling on the waterside can be the result of scale, corrosion, particulate deposition, microbiological growths or process materials having entered the waterside. Fouling on the process side can be caused by deposition of the primary process product itself, materials caused by side reactions, impurities present in the feedstock or other deposits caused in a similar way to those from the waterside. (Leibowitz-FIRL)
W75-05810

ESTUARIAL AND COASTAL POLLUTION,
A. D. Buckley.
Water Pollution Control, Vol 73, No 3, p 307-314, 1974. 3 ref.

Descriptors: *Water pollution sources, *Estuaries, *Coastal waters, Sewage, Bacteria, Detergents, Industrial wastes, Domestic wastes, Zinc, DDT, Chemical fertilizer, Legal aspects, Legislation.
Identifiers: The Royal Commission of 1865, The River Pollution Prevention Act of 1876, United Kingdom.

The three main sources of pollution in estuaries are domestic sewage, industrial waste waters and the detrimental quality of the rivers entering the estuaries. Chemical fertilizers being used in rural areas and run-off from roads and other non-permeable surfaces also contribute to contamination. DDT usage has a long range effect. Metaliferous mining waste has effective sterilized many streams downstream from industries, where, as in Wales, examples of such pollution are evident in adjacent coastal waters. Disinfectants, detergents, nutrients from human waste, zinc-based ointments and facial creams, and the bacteria found in biological filters in an activated sludge plant are more sources of estuarial and coastal pollution. Diversion of sewage downstream to an outfall into the sea is one remedy, along with biological treatment and removal of solids by screening. (Leibowitz-FIRL)
W75-05811

NEW PRIORITIES FOR GROUND-WATER QUALITY PROTECTION,
Geraghty and Miller, Port Washington, N.Y.
D. W. Miller, and M. R. Scalf.
Ground Water, Vol 12, No 6, p 335-347, November-December 1974. 3 tab, 4 ref.

Descriptors: Water pollution, *Water pollution sources, *Water pollution control, *Groundwater, Septic tanks, Cesspools, Flooding, Landfills, Irrigation, Sewage effluents, Lagoons, *Regional analysis, Pollutants, *Water quality, *Priorities, Reviews, Comprehensive planning, Path of pollutants.

Four regional studies of the status of groundwater pollution problems in 26 states involved comprehensive reviews of the literature and contact with public officials and others involved in water supply, so that individual case histories of groundwater contamination problems could be evaluated. Septic tanks and cesspools, petroleum exploration and development, landfills, irrigation return flow and surface discharges, impoundments, and spills are the principal sources leading to degradation of groundwater quality. Only a very small percentage of the instances of groundwater contamination that probably exist has been discovered to date, and almost all the reported cases were only discovered after a water-supply source had been noticeably affected by one or more pollutants. In the vast majority of cases inventoried, the problem has not been corrected and will become more troublesome in the future. A prime need in all four regions is a greater effort toward locati

and evaluating as many additional cases of groundwater contamination as possible. (Gibb-ISWS)
W75-05827

TRANSPORT OF SUSPENDED SOLIDS ALONG THE VISTULA RIVER,
Panstwowy Instytut Hydrologiczno-Meteorologiczny, Warsaw (Poland).
For primary bibliographic entry see Field 2J.
W75-05828

SOLVENTS IN SEWAGE AND INDUSTRIAL WASTE WATERS: IDENTIFICATION AND DETERMINATION,
Lancashire River Authority (England).
For primary bibliographic entry see Field 5A.
W75-05840

5C. Effects Of Pollution

THE RESPONSE OF NEARSHORE PERIPHYTON IN WESTERN LAKE SUPERIOR TO THERMAL ADDITIONS,
Minnesota Univ., Minneapolis. School of Public Health.
D. B. Drown, T. A. Olson, and T. O. Odlaug.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 963, $6.25 in paper copy, $2.25 in microfiche. University of Minnesota Water Resources Research Center, Minneapolis, Bulletin No. 77, October 1974. 159 p, 77 fig, 3 plates. OWRT B-020-MINN(4). 14-31-0001-3095.

Descriptors: *Periphyton, *Nutrients, *Lake Superior, Productivity, *Minnesota, Algae, Phosphates, Nitrates, *Thermal pollution, Water pollution effects.
Identifiers: Complete nutrient media, Control pool, Test pool.

The intent was to ascertain what effects a temperature increase in the order of 10 to 12C would have on the near-shore periphyton assemblage of Western Lake Superior. A field station, complete with holding tanks and a hot water source, was constructed on a rock ledge of the Lake Superior shore near Castle Danger, Minnesota. During the summer and fall of 1971 and 1972 periphyton covered rocks from the local area of the lake were placed in the experimental holding tanks where they were exposed to a continuous flow of lake water. Denuded rocks were included as part of a regrowth study. One system provided a flow-through of unheated lake water while in the other the temperature was raised above ambient. Growth patterns were followed under both sets of conditions. Periphyton samples were collected on a weekly basis from the ambient control and heated water tanks and were analyzed for photosynthetic pigment, qualitative examination of the phyletic distribution of algae from the two systems was emphasized. While a great deal more needs to be learned of the effects of thermal-additions on Lake Superior, this study indicates that, if near-shore areas of the lake were warmed to the extent that could occur as the result of a thermal-electric generating station discharge, changes in the phyletic composition of the local periphyton community could be expected. The change from diatoms to greens could have serious repercussions on benthic grazers and on the entire foodweb of the affected area. (Waelti-Minnesota)
W75-05354

NITROGEN BUDGET OF A NORTH CAROLINA ESTUARY,
North Carolina State Univ., Raleigh. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-05357

THE THREE DIMENSIONAL HEATED SURFACE JET IN A CROSS FLOW,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W75-05360

ENVIRONMENTAL EFFECTS OF A TRITIUM GAS RELEASE FROM THE SAVANNAH RIVER PLANT ON MAY 2, 1974,
Du Pont deNemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
W. L. Marter.
Available from NTIS, Springfield, Va 22161 as Rept. No. DP-1369. Report DP-1369, November 1974. 29 p, 11 fig, 8 ref.

Descriptors: *Radioactivity, *Tritium, *Accidents, Air pollution, Meteorology, Fallout, Sampling, Analysis, Water pollution, Hazards, Respiration, Absorption, Food chains, Environmental effect, Public health, *South Carolina.
Identifiers: Dose, *Savannah River Plant(So Car).

On May 2, 1974, 479,000 Ci of tritium gas was released from a Savannah River Plant exhaust stack to the atmosphere over a period of about four minutes. The release resulted from a metallurgical failure of a process valve in a tritium processing facility. Light winds of 4 to 6 mph carried the tritium in a northeasterly direction. Calculations indicate it passed out to sea from the southern half of the North Carolina coast about 36 hours after the release. Measurements of tritium offplant indicated that less than 1% of the tritium was in the oxide form. A maximum potential dose to a person (from inhalation and skin absorption) at the puff centerline on the plant boundary was calculated to be 0.14 mrem, less than 1% of the annual dose received from natural radioactivity. The population dose was calculated to be 8 man-rem before the tritium passed out to sea. An extensive environmental sampling program was conducted after the release to verify the predicted trajectory of the tritium and to determine potential individual dose commitment. Potential individual doses via the food chain were less than 1 mrem. (Houser-ORNL)
W75-05361

ENVIRONMENTAL SURVEILLANCE AT LOS ALAMOS DURING 1973,
Los Alamos Scientific Lab., N.M.
For primary bibliographic entry see Field 5A.
W75-05362

BIBLIOGRAPHY OF PUBLISHED PAPERS OF THE ATOMIC BOMB CASUALTY COMMISSION,
Atomic Bomb Casualty Commission, Hiroshima (Japan); and Atomic Bomb Casualty Commission, Nagasaki (Japan).
Available from the National Technical Information Service, Springfield Va. 22161, as REPT. No. ABCC TR 0-72, $4.00 in paper copy, $2.25 in microfiche. Report ABCC TR 0-72, 1972. 8 p, 59 ref.

Descriptors: *Bibliographies, *Pathology, *Nuclear explosions, *Civil defense, *Radioactivity effects, *Human population, Cytological studies, Human diseases, Monitoring, Measurement, Assessment, Assay, Public health.
Identifiers: *Japan.

This bibliography contains 59 references of pathologic studies related to the Atomic Bomb Casualty Commission (ABCC) effort in Japan. The ABCC Technical Reports provide the official bilingual statements required to meet the needs of Japanese and American staff members, consultants, advisory groups, and affiliated government and private organizations. The Technical Report Series is in no way intended to supplant regular journal publication. (Houser-ORNL)
W75-05366

BIBLIOGRAPHY ON PUBLISHED PAPERS OF THE ATOMIC BOMB CASUALTY COMMISSION.
Atomic Bomb Casualty Commission, Hiroshima (Japan); and Atomic Bobm Casualty Commission, Nagasaki (Japan).

Descriptors: *Bibliographies, *Pathology, *Nuclear explosions, *Civil defense, *Radioactivity effects, Human population, Cytological studies, Human diseases, Monitoring, Measurement, Assessment, Assay, Public health.
Identifiers: *Japan.

This bibliography contains 51 references of pathologic studies related to the Atomic Bomb Casualty Commission(ABCC) effort in Japan. The ABCC Technical Reports provide the official bilingual statements required to meet the needs of Japanese and American staff members, consultants, advisory groups, and affiliated government and private organizations. The Technical Report Series is in no way intended to supplant regular journal publication. (Houser-ORNL)
W75-05367

FISH PROTECTION AT INTAKE STRUCTURES AND DAMS: GUIDANCE, SCREENS AND COLLECTION DEVICES. A SELECTED BIBLIOGRAPHY WITH ABSTRACTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8I.
W75-05372

SIGNIFICANCE OF STABLE IODINE-127 IN MILK,
New York State Dept. of Environmental Conservation Albany.
For primary bibliographic entry see Field 5B.
W75-05373

ELECTRONIC IDENTIFICATION AND TEMPERATURE MONITORING,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 7B.
W75-05381

SOME ASPECTS OF THE EFFECTS OF ELEVATED WATER TEMPERATURE ON THE RAMSHORN SNAIL,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
G. B. Johnson.
Available from NTIS, Springfield, Va. as REPT. No. DP-MS-73-69. $4.00 in paper copy, $2.25 in microfiche. Report DP-MS-73-69, 1974. 12 p, 6 fig, 2 tab, 7 ref. CONF-740433-1)

Descriptors: *Cooling water, *Nuclear powerplants, *Thermal pollution, Pollutants, Temperature, *Snails, Reservoirs, Geothermal studies, Ponds, Resistance, Respiration, Ecology, Ecosystems, Water pollution effects, Distribution, Density, Life cycles, Growth rates, Growth stages, Behavior, effects, *South Carolina.
Identifiers: Par Pond(So Car).

The effects of location in relation to a thermal gradient on two abundantly distributed species of ramshorn snails, Helisoma trivolvis and Helisoma anceps, are being investigated ata a 2500-acre reactor cooling reservoir (Par Pond) on the Savannah River Plant. Observations and results of ongoing experiments related to the thermal tolerance, respiratory rates, distribution and density, life cycles and growth, and behavioral patterns of Helisoma in Par Pond are discussed. (Houser-ORNL)
W75-05387

A PROPOSED RAINOUT HAZARD MODEL FOR SYSTEMS ANALYSIS STUDIES,
California Univ., Livermore. Lawrence Livermore Lab.

For primary bibliographic entry see Field 5B.
W75-05388

PHYTOPLANKTON PRODUCTION IN CHAR LAKE, A NATURAL POLAR LAKE, AND IN MERETTA LAKE, A POLLUTED POLAR LAKE, CORNWALLIS ISLAND, NORTHWEST TERRITORIES,
McGill Univ., Montreal (Quebec). Dept. of Biology.
J. Kalff, and H. E. Welch.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 621-636, May, 1974. 16 fig, 5 tab, 18 ref.

Descriptors: *Phtoplankton, *Photosynthesis, *Chlorophyll, Sewage, Snow cover, Productivity, Comparative productivity, Ecology, Oligotrophy, *Canada, Lakes, Primary productivity.
Identifiers: Ultraoligotrophic, Polluted, Nutrient deficiencies, Benthic production.

Between 1969 and 1972, the phytoplankton production of ultraoligotrophic Char Lake and polluted Meretta Lake were studied, and findings are presented. In Char Lake, the most oligotrophic lake existing, photosynthesis occurs during the entire nine months that the sun is above the horizon. The production rate is much more constant than would be suggested by the light input (on which snow cover has a considerable effect) because of changes in depth of maximum photosynthesis, in efficiency of low light utilization, and in optimal light flux. Meretta Lake has a greater phytoplankton production and chlorophyll consentration twenty times greater than Char Lake. Nutrient deficiencies are most likely responsible for low production in Char Lake. In both lakes benthic production is of major significance. (Nelson-FIRL)
W75-05396

TISSUE DISTRIBUTION OF (14C)DDT IN THE LOBSTER AFTER ADMINISTRATION VIA INTRAVASCULAR OR ORAL ROUTES OR AFTER EXPOSURE FROM AMBIENT SEA WATER,
National Cancer Inst., Bethesda, Md. Lab. of Toxicology.
A. M. Guarino, J. B. Pritchard, J. B. Anderson, and D. P. Rall.
Toxicology and Applied Pharmacology, Vol 29, p 277-288, 1974. 1 fig, 5 tab, 11 ref.

Descriptors: *DDT, *Lobsters, *Pesticides, Water pollution effects, Insectisides, Pollutants, Chlorinated hydrocarbon pesticides, Bioassay, Carbon radioisotopes, Radioactivity, Aquatic life.
Identifiers: Carbon 14.

A pharmacokinetic approach to studying the fate and distribution of carbon 14 labeled DDT was employed using the lobster. The radioactive pesticide was administered intravascularly, orally and by exposure from the ambient water. After injection, there was rapid removal of (14C)DDT from the plasma and a persistent increase in the amount of radioactivity in the hepatopancreas. Seven days after injection about 90 percent of the administered radioactivity was found in the hepatopancreas. When the DDT was administered to the lobster from the ambient water or from food, again more than 90 percent of the radioactivity was found in the hepatopancreas seven days after treatment. Studies concerning the levels of DDT metabolites in the organs of untreated lobsters indicated that the egg masses contained the largest amount followed by the hepatopancreas and then by the carcass (muscle). These studies suggest that the lobster may protect itself from DDT toxicity by sequestering DDT in the hepatopancreas and in egg masses but that the bioconcentration in these tissues could be harmful to organisms which eat these parts of the lobster. (Orr-FIRL)
W75-05401

DISTRIBUTION AND METABOLISM OF DDT IN THE CATFISH HETEROPNEUSTES FOSSILIS IN RELATION TO THE SIGNS OF POISONING,
Delhi Univ. (India). Dept. of Zoology.
H. C. Agarwal, and B. Gupta.
Toxicology and Applied Pharmacology, Vol 29, p 204-209, 1974. 2 tab, 22 ref.

Descriptors: *DDT, *Pesticide toxicity, *Water pollution effects, *Fish, Pesticides, Insecticides, DDE, Pollutants, Chlorinated hydrocarbon pesticides, Food chains, *Catfishes.
Identifiers: Heteropneustes fossilis.

The extensive use of DDT has resulted in its widespread occurrence in the environment. DDT is known to be concentrated as it moves up the food chain. Since fish are an important part of the food chain, it is necessary to know the form in which DDT is accumulated and whether any detoxication occurs in fish. Adult male catfish were given a lethal dose of 800 mg DDT/kg. The metabolites of DDT in different tissues were studied after 24 hours. DDE was the only metabolite found. The major percentage of the DDE was found in the kidney and lesser amounts were found in the liver and fat bodies. The concentration of DDT increased with time and severity of poisoining. The brain and spinal cord has the lowest DDT content. The DDT content in the fat rose steadily and was highest in fish which had recovered. It was indicated that the signs of poisoning in catfish were directly related to the concentration of DDT in the brain and spinal cord. (Orr-FIRL)
W75-05402

THE PHYSIOLOGICAL STATE WITH RESPECT TO PHOSPHORUS OF CAYUGA LAKE PHYTOPLANKTON,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Ecology and Systematics Section.
B. J. Peterson, J. P. Barlow, and A. E. Savage.
Limnology and Oceanography, Vol 19, No 3, p 396-408, 1974. 7 fig, 3 tab, 34 ref. GWRRA-035-NY(2).

Descriptors: *Plant physiology, *Phosphorus, *Phytoplankton, *New York, Nutrients, Limiting factors, Carbon, Growth rates, Equilibrium, Water pollution effects.
Identifiers: *Cayuga Lake(N.Y.).

The nutrient status of Cayuga Lake, New York phytoplankton was estimated by maintaining the mixed populations under a variety of controlled nutrient conditions in laboratory continuous flow cultures. Valves of parameters describing these laboratory cultures are compared to those of fresh lake samples to estimate the nutrient status of the in situ populations. Rates of carbon assimilation were determined by C-14 uptake and available carbon was estimated from pH and alklalinity. Changes in the C:P ratio rate of carbon uptake per unit carbon, and species composition were followed in nutrient limited and nutrient sufficient cultures. Rates of change of relative abundance and final values for the C:P ratio and rates of carbon uptake per unit carbon are related to parameters describing the lake populations. These comparisons suggest that these phytoplankton are limited by phosphorus but are rarely phosphorus deficient. Which species are capable of rapid increases during periods of nutrient surplus are known. Determinations of in situ rates of division of important species would allow significant further advances in understanding the values related to species growth in unialgal and mixed cultures to further elucidate the effects of nutrients on the abundance and composition of natural phytoplankton assemblages. (Jones-Wisconsin)
W75-05406

CALCULATED DISTRIBUTION OF THE CHEMICAL SPECIES OF COPPER, ZINC, CADMIUM AND LEAD IN 16 LAKES OF NORTHERN ITALY,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 5B.
W75-05413

MERCURY: ASPECTS OF ITS ECOLOGY AND ENVIRONMENTAL TOXICITY,
Hawaii Univ., Honolulu. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W75-05414

MEASUREMENTS OF MERCURY SORPTION BY ALGAE,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
For primary bibliographic entry see Field 5A.
W75-05415

INVESTIGATION OF SOME FACTORS IN THE BIOCHEMICAL CONVERSION OF MERCURY POLLUTANTS TO TOXIC METHYLMERCURY EFFECTED BY MICRO-ORGANISMS IN A MARINE SEDIMENT,
Naval Academy, Annapolis, Md.
For primary bibliographic entry see Field 5B.
W75-05417

THE RELATION BETWEEN PRIMARY PRODUCTIVITY, NUTRIENTS, AND THE TROUT ENVIRONMENT IN SOME NEW ZEALAND LAKES,
Marine Dept., Wellington (New Zealand). Fisheries Research Div.
A. M. R. Burnet, and Denise A. Wallace.
N Z Fish Res Div Fish Res Bull. 10. 1-18. Illus. 1973.
Identifiers: *Carbon-14 technique, Environmental Eutrophication, Fishery, Lakes, *New Zealand, *Nutrients, Phytoplankton, *Primary productivity, Respiration, Trout.

The trophic levels of 15 lakes in both islands of New Zealand were measured by the carbon-14 technique. The lakes ranged from an ultraoligotrophic South Island high country lake (Lake Coleridge) to highly eutrophic lakes (Forsyth and Orakai). Relationships were established between the assimilation rate (P max) and the levels of chlorophyll a, soluble P, reactive nitrate, 02 absorbed by phytoplankton respiration and the transparency of the water. Low 02 levels and low transparency of the water are the 2 direct effects of eutrophication on a trout fishery and both are directly related to high P max values. The correlation between P max and the P and N levels enables us to relate them to the O2 balance and the transparency of the lake waters. Amounts of inorganic P in excess of 0.01 ppm can lead to nuisance conditions.--Copyright 1974, Biological Abstracts, Inc.
W75-05419

INFLUENCE OF SALINITY AND TEMPERATURE ON THE TOXICITY OF MERCURY TO MARINE AND BRACKISH WATER ISOPOD (CRUSTACEA),
Liverpool Univ., Port Erin (England). Dept. Marine Biology.
M. B. Jones.
Estuarine Coastal Mar Sci. 1(4): 425-431. Illus. 1973.
Identifiers: Brackish water, Crustacea, Idotea Emarginata, Idotea-Neglecta, Jaera-Albifrons, Jaera-Nordmanni, *Mercury, Pollution, *Salinity, *Toxicity, *Water temperature, *Water isopod, Marine water, Water pollution effects.

Under optimum conditions of salinity (100% water 34%) and temperatuer (10C) marine (Ido

emarginata and Idotea neglecta) and estuarine (Faera nordmanni and Faera albifrons sensu stricto) species of isopods can tolerate concentrations of 1 and 0.1 ppm Hg (mercuric chloride) for 5 days without achieving 50% mortality (median lethal concentration, LC50>120h). A decrease in salinity and an increase in temperature caused a dramatic increase in the toxicity of Hg and shortened LC 50 values. Species adapted to a fluctuating estuarine environment are more influenced by the extra stresses of heavy metal pollution than marine forms for which environmental variables are relatively more stable.--Copyright 1974, Biological Abstracts, Inc.
W75-05420

THE EFFECT OF A MUNICIPAL EFFLUENT ON THE MICROBIAL POPULATIONS OF THE WILLIMANTIC/SHETUCKET RIVERS,
Connecticut Univ., Storrs.
S. G. Hornor.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 029, $5.75 in paper copy, $2.25 in microfiche. Master of Science Thesis, 1974. 117 p, 28 fig, 8 tab, 90 ref, append. OWRR A-052-CONN(3), 14-31-0001-4007.

Descriptors: Aquatic microorganisms, *Municipal wastes, *Water pollution effects, Effluents, River flow, *Coliforms, *Aquatic bacteria, *Yeasts, Algae, Bioindicators, Water quality, Wastewater treatment, *Connecticut.
Identifiers: River microflora, *Microbial populations, Fecal coliforms, *Willimantic/Shetucket Rivers(Connecticut).

The distribution and relative numbers of bacteria, yeast and algae in a river system in central Connecticut receiving primarily treated municipal effluent was examined over a 15 month period. With respect to selected chemical and microbial variables, including total coliform/fecal coliform ratios, the impact of the municipal effluent was minimal a short distance downstream from the study area. Rather, the single most important factor determining the annual distribution of river microflora was river flow. A high correlation was found between the yeast populations and other microbial and environmental variables, suggesting that these organisms may be significant indicators of water quality. (de Lara-Connecticut)
W75-05438

THE RELATIONSHIP BETWEEN WATERFOWL AND NITROGEN SPECIES IN THE WATERS OF THE BOSQUE DEL APACHE,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-05469

CADMIUM AND ZINC BINDING IN MAMMALIAN LIVER AND KIDNEYS,
Dalhousie Univ. Halifax, (Nova Scotia). Dept. of Biochemistry.
For primary bibliographic entry see Field 5A.
W75-05485

RELATIVE TOXICITIES OF SELENITE AND SELENATE IN THE DRINKING WATER OF RATS,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
Journal of Nutrition, Vol 104, No 3, p 306-314, March, 1974. 6 tab, 10 ref.

Descriptors: *Metals, *Rodents, *Potable water, Toxicity, Inorganic compounds, Animal pathology, Laboratory tests, Testing procedures, Water pollution effects.
Identifiers: *Selenium.

Several levels of sodium selenite or sodium selenate were administered in the drinking water of Sprague-Dawley rats (21 days of age) receiving a corn or rye-based diet to determine the relative toxicities of the two forms of selenium. Levels of selenium of 2 or 3 ppm produced a small decrease in weight in 4 or 6 weeks as compared with the control, but no mortality occurred. There was no significant difference between the effects of the two forms of selenium with respect to weight gains. When rats were exposed to water containing 6 or 9 ppm of selenium as either ion, considerable mortality occurred. More rats receiving selenite died than did rats that received selenate. Overall, the toxicities of the two forms of selenium were similar. (Jernigan-Vanderbilt)
W75-05490

PATHOLOGICAL CHANGES PRODUCED IN JAPANESE QUAIL BY INGESTION OF CADMIUM,
Environmental Protection Agency, Washington, D.C. Office of Pesticide Programs.
M. E. Richardson, M. R. S. Fox, and B. E. Fry, Jr.
Journal of Nutrition, Vol 104, No 3, p 323-338, March, 1974. 4 tab, 22 fig, 40 ref.

Descriptors: *Cadmium, Zinc, Iron, *Animal pathology, *Toxicity, Animal physiology, Birds, Laboratory tests, Testing procedures, Water pollution effects.
Identifiers: *Japanese quail.

Histological sequelae of feeding 75 mg cadmium/kg of diet from hatching to 4 or 6 weeks of age were studied in Japanese quail (Esturnix coturnix japonica). Effects of cadmium were compared with those of zinc and iron deficiencies at 4 weeks, and the protective effects of ascorbic acid against cadmium were investigated at 4 and 6 weeks. Testicular hypoplasia and growth retardation occurred in 4-week-old quail fed either cadmium-containing or zinc-deficient diets. Severe anemia and bone marrow hyperplasia were present in birds fed either cadmium-containing or iron-deficient diets. The morphological appearance in circulating erythrocytes was not the same with both treatments. Both heart ventricles were hypertrophied in response to cadmium at 6 weeks, whereas hypertrophy was not microscopically at 4 weeks, even though the weight was significantly increased in relation to body weight. Enteropathy of the small intestine was more severe after 6 weeks of cadmium feeding than after 4 weeks. Ascorbic acid added to the cadmium-containing diet significantly alleviated or prevented almost all aspects of cadmium toxicity in quail at 4 and/or 6 weeks of age. It protected against some changes that were not observed in either zinc or iron-deficient birds. (Jernigan-Vanderbilt)
W75-05491

INFLUENCE OF ENDRIN ON SOIL MICROBIAL POPULATIONS AND THEIR ACTIVITY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05497

AN ANNOTATED BIBLIOGRAPHY OF THE EFFECTS OF LOGGING ON FISH OF THE WESTERN UNITED STATES AND CANADA,
Washington Univ., Seattle. Coll. of Fisheries.
D. R. Gibbons, and E. O. Salo.
USDA Forest Service General Technical Report PNW-10, 1973. 145 p. PNW-1602.

Descriptors: *Lumbering, *Fish, *Erosion, Sedimentation, Water quality, Streamflow, Stream stabilization, Stream improvement, Water pollution effects, *Bibliographies.
Identifiers: Multiple use management, Streamside vegetation.

An annotated bibliography is presented of literature published on the effects of logging on fish and aquatic habitat of the Western United States and Canada. Included are 278 annotations with a total of 317 references. Subject areas include erosion and sedimentation, water quality, related influences upon salmonids, multiple logging effects, alteration of streamflow, stream protection, multiple-use management, streamside vegetation, stream improvement, and studies on effects of logging. A review of the literature, a narrative on the state of the art, and a list of research needs determined by questionnaires are included. (Forest Service)
W75-05500

OHIO BIOLOGICAL SURVEY BIOLOGICAL NOTES NO. 6. EFFECTS OF ECOLOGICAL CHANGES ON BUCKEYE LAKE, OHIO, WITH EMPHASIS ON LARGEMOUTH BASS AND AQUATIC VASCULAR PLANTS,
Ohio State Univ., Columbus.
J. B. Judd, and S. H. Taub.
1973. 51 p, Illus, Maps. In cooperation with the Ohio Cooperative Fishery Unit: Columbus, Ohio.
Identifiers: *Aquatic plants, Biological studies, *Buckeye Lake(Ohio), Ecological studies, Fishes, Iowa, Lakes, *Largemouth bass, Micropterus-salmoides-salmoides, *Ohio, Parasites, Lake Erie, Lake Okoboji(Iowa), Surveys.

Results of investigation on the effects of ecological changes in Buckeye Lake, Ohio, are reported. The changes were evaluated by field and laboratory studies by literature search, with emphasis on the effects of the changes on the status of the largemouth bass, Micropterus salmoides salmoides and the higher aquatic plants. Historical background and a description of the study area are presented. Tables on aquatic vegetation give data on: comparison of those species present in Buckeye Lake in 1906 and 1970; those continuing to survive in Buckeye Lake, Put-In-Bay Harbor (Lake Erie), and Lake Okoboji (Iowa); and, those which have disappeared from these locations. Species composition of fishes in Buckeye Lake was examined. Data are presented on the largemouth bass's age, growth and parasites. The parasites are listed by scientific name and identified by location in the fish, total number, and percent incidence of infection and percent incidence of infection is compared for 1930 and 1970. A summary lists conclusions reached by the studies. Additional tables in the appendix enumerate the number and incidence of infection of parasites and in immature and mature largemouth bass in Buckeye Lake in 1970. A reference list concludes the text.--Copyright 1974, Biological Abstracts, Inc.
W75-05505

STRESS OF FORMALIN TREATMENT IN JUVENILE SPRING CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) AND STEELHEAD TROUT (SALMO GAIRDNERI),
Bureau of Sport Fisheries and Wildlife, Seattle, Wash. Western Fish Disease Lab.
G. Wedemeyer, and W. T. Yasutake.
J Fish Res Board Can. Vol 31, No 2, p 179-184, 1974, Illus.
Identifiers: Alkalosis, *Chinook salmon, *Formalin, Gills, Juveniles, Oncorhynchus-tshawytscha, *Parasite control, Salmon, *Steelhead trout, Treatment, Respiration.

The physiological stress of 200 ppm formalin treatments (used in fish husbandry to control external parasites) in 10C is more severe in the juvenile steelhead trout (S. gairdneri) than in the spring chinook salmon (O. tshawytscha). In the steelhead, a marked hypochloremia follows a 1-h treatment and recovery requires about 24 h. During longer treatments, hypercholesterolemia together with reduced regulatory precision, hypercortisolemia, alkaline reserve depletion, and hypocapnia unaccompanied by a fall in blood pH occur, suggestive of compensated respiratory al-

kalosis. In the spring chinook, hypochloremia and reduced plasma cholesterol regulatory precision are the significant treatment side effects but recovery requires only a few hours. Formalin treatments also cause epithelial separation, hypertrophy, and necrosis in the gills of both fishes but again, consistent with the physiological dysfunctions, these are more severe in the steelhead.--Copyright 1974, Biological Abstracts, Inc.
W75-05506

THE VITAL ROLE OF PROTOZOA IN MOBILE BAY,
Organization University of South Alabama, Mobile. Dept. of Biological Sciences.
For primary bibliographic entry see Field 2L.
W75-05525

THE RELATIONSHIP OF ELECTRIC POWER STATION THERMAL CIRCULATION TO BIOLOGICAL PRODUCTIVITY: PHASE II - CONTROL OF THERMAL POLLUTION BY BIOLOGICAL SYSTEMS,
Baylor Univ., Waco, Tex. Inst. of Environmental Studies.
O. T. Lind, and T. C. Franklin.
Available from the National Tec'nical Information Service, Springfield, Va. 22161, as PB-240 184, $3.25 in paper copy, $2.25 in microfiche. Completion Report, February 1975, 16 p, 6 fig, 2 tab, 4 ref. OWRT B-135-TEX(1), 14-31-0001-3937.

Descriptors: *Thermal pollution, *Metabolism, *Algae, *Bacteria, *Fungi, Beneficial use, Productivity, Water pollution control, Water pollution effects, Inhibition, Heated water, Cooling water.

This project studied the feasibility of utilizing biological systems in controlling thermal pollution by absorbing heat from their surroundings during metabolic processes. Cooling and/or warming slopes were compared on ten algal, eleven bacterial, and three fungal species that were active or killed or metabolically inhibited. Results of 318 experiments failed to conclusively demonstrate that any active system was capable of metabolically using heat energy. The very slight differentials detected on certain species, though of theoretical interest, were considered too small for practical application.
W75-05533

CADMIUM ACCURAL IN A COMBINED WASTEWATER TREATMENT-AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, Mass.
W. B. Kerfoot, and S. A. Jacobs.
In: Proceedings of the First Annual Contaminants Conference August 8-10, 1973, Oak Ridge, Tenn., Publ. by U.S. Atomic Energy Commission, Office of Information Services, Technical Information Center, Oak Ridge, Tenn., March, 1974, p 225-244, 2 fig, 2 tab, 23 ref.

Descriptors: *Cadmium, *Waste water treatment, *Aquatic environment, *Tertiary treatment, Algae, Oysters, Adsorption, Absorption, Seawater, Toxicity, Food chains, Human physiology, Public health, Effluents, Foods, *Trace elements, Clams.

Cadmium was introduced as CdI2 in graded concentrations from .006 to .10 ppm into isolated units of a tertiary treatment - marine aquaculture system which cultured algae, oysters, and clams. The cadmium was readily taken up or absorbed to algae, reaching equilbrium levels after two or three days exposure. The absorption of cadmium by shellfish was linear with time and no equilibrium was reached or decline in uptake rate observed after exposure for more than one month. Following removal from the cadmium exposure, the shellfish did not lose any of the accumulated cadmium after exposure to uncontaminated seawater for one month. Shellfish fed contaminated algae picked up the metal from their food, but the assimilation of cadmium via the food-chain concentration was small, averaging 10% of the cadmium content of the algae. The rate of accumulation of cadmium by humans feeding on a daily diet of 40 gm shellfish was calculated to obtain permissible levels of cadmium in the effluent and dilution seawater. The suggested safe level of cadmium in dilution seawater for culture of oysters was .0002 ppm, .0015 ppm for culture of clams (Mercenaria mercenaria), and in effluent, was between .001 and .005 ppm cadmium, the exact concentration depending on the algae and shellfish species cultured. (See also W75-05277) (Jerigan-Vanderbilt)
W75-05580

TOXICITY OF ACID COAL-MINE SPOIL TO PLANTS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. A. Berg, and W. G. Vogel.
In: Ecology and Reclamation of Devastated Land. Vol. 1. R. J. Hutnik, and G. Davis, editors. Gordon and Breach, New York, p 57-68, 1973. 3 fig, 4 tab, 26 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Toxicity, *Soil chemical properties, Mulching, Leaching, Evaporation, Pine trees, Legumes, Plant physiology.

Toxicity of extremely acid coal-mine spoils to plants is caused primarily by excess soluble Mn and other metals, most probably Al. Manganese toxicity, expressed by chlorosis on the margins of legume leaves, and Al toxicity, expressed by stubby roots without laterals, was observed on herbaceous legumes, shrub lespedezas, and black locust grown from seed in extremely acid spoils. Spoil pH was useful in predicting Mn toxicity to the legumes, but water-soluble Mn extracted from the spoils was not. One year after extremely acid spoils were mulched with hardwood chips, the pH of the top 30 cm of spoil was raised while total soluble salts and water-soluble Al were reduced. Mulch is effective in enhancing the leaching of soluble toxic metals and acidic material by reducing the rate of evaporation. (Forest Service)
W75-05591

EFFECTS OF STRIP MINING ON SMALL-STREAM FISHES IN EAST-CENTRAL KENTUCKY,
Eastern Kentucky Univ., Richmond. Dept. of Biology.
B. A. Branson, and D. L. Batch.
Proceedings of the Biological Society of Washington, Vol 84, No 59, p 507-518, February 1972. 4 fig, 28 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Sedimentation, *Fish reproduction, *Fish food organisms, Streams, Silting, Turbidity, Fish eggs, Minnows, Darters, *Kentucky, Water pollution effects.

A study was conducted on small mountain watersheds in eastern Kentucky to determine the effects of strip mining and subsequent sedimentation on fishes and bottom fauna. Following surface mining, fishes were found to be progressively eliminated from headwaters downstream. Benthic food organisms were reduced in numbers and kinds by at least 90%. Reproduction in darters and minnows was curtailed by siltation, either by the prevention of mating or by kill-off of fry and eggs. One species of fish was found to be able to tolerate increased silt and turbidity. (Curtis-Forest Service)
W75-05598

STRIP-MINING, EROSION AND SEDIMENTATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 14, No 3, p 434-436, 1971. 3 fig, 1 tab, 11 ref.

Descriptors: *Strip mines, *Appalachian Mountain region, *Erosion, *Sediment yield, *Streams, *Bed load, Weathering.

In Appalachia, land is being disturbed by strip mining at an alarming rate. The spoils left by strip mining represent a heterogeneous mixture of sandstone, shale, and soil. This freshly exposed unprotected material is subject to rapid weathering and erosion. Maximum sediment yields occur during active mining operations and also during large storms thereafter. Suspended sediment yields of over 46,000 ppm were observed from one watershed. Bedload amounted to 66,500 cubic feet per square mile of drainage area over a two-year period from another mined watershed. (Forest Service)
W75-05600

ENDRIN IN FOREST STREAMS AFTER AERIAL SEEDING WITH ENDRIN-COATED DOUGLAS-FIR SEED,
Forest Service (USDA). Corvallis Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05602

SOME ECOLOGICAL EFFECTS OF ARTIFICIAL CIRCULATION ON A SMALL EUTROPHIC LAKE WITH PARTICULAR EMPHASIS ON PHYTOPLANKTON. 1. KEZAR LAKE EXPERIMENT, 1968,
New Hampshire Univ., Durham. Dept. of Zoology.
R. C. Haynes.
Hydrobiologia, Vol 43, No 3-4, p 463-504, 1973. 7 fig, 5 tab, 96 ref. OWRR A-004-NH(7). FWPCA F1-WP-26, 461-01, 461-02.

Descriptors: *Algal control, *Mixing, *Eutrophication, *Lakes, Phytoplankton, *New Hampshire, Stratification, Heat budget, Optical properties, Nutrients, Secchi disks, Carbonates, Carbon dioxide, Hydrogen ion concentration, Conductivity, Nitrogen, Chlorophyll, Primary productivity, Phosphorus, Chlorophyta.
Identifiers: *Destratification, *Kezar Lake(NH), Aphanizomenon flos-aquae.

Summer blooms of filamentous blue-green algae occurred at the small eutrophic Kezar Lake, New Hampshire. A dense population of Aphanizomenon flos-aquae survived application of copper sulfate. After repetition of copper sulfate application, causing a fish kill, Aphanizomenon persisted in dense concentrations. Seeking other methods of control, it was decided to modify the existing tertiary sewage treatment facility, but as an immediate step, to destratify the lake to increase water clarity. On the basis of data from the 1968 experiment, several conclusions are stated concerning the ecological effects of artificial circulation on Kezar Lake. The entire lake became isothermal due to warming and redistribution of cold bottom water, causing an increase in the heat budget. The stability of stratification was reduced to zero. Transparency increased after mixing. Artificial circulation ameliorated strong inverse clinograde distributions of Fe, Mn, and ammonia-N. A uniform, vertical distribution of the bloom-forming Aphanizomenon flos-aquae occurred. The large population of this alga began to die two weeks after the commencement of artificial circulation. After the bloom subsided the phytoplankton became dominated by chlorophycean taxa. Effects of artificial circulation on the physical, chemical, and biological aspects of Kezar Lake are discussed. (Jones-Wisconsin)
W75-05609

CHEMICAL AND BIOLOGICAL CONDITIONS OF LAKE OKEECHOBEE, FLORIDA, 1969-72,
Geological Survey, Tallahassee, Fla.
J. F. Joyner.
Florida Bureau of Geology, Tallahassee, Report of Investigations No 71, 1974. 94 p, 8 fig, 19 tab, 36 ref, append.

Descriptors: *Limnology, *Eutrophication, Lakes, *Florida, Algae, Nutrients, Water quality, Water pollution sources, Water pollution effects.
Identifiers: *Lake Okeechobee(Fla).

Nutrients were adequate in water in Lake Okeechobee, Florida, 1969-1972, for algal growth. Organic nitrogen averaged 1.3 mg/litre and accounted for approximately 86% of the total nitrogen; total phosphorus averaged 0.05 mg/litre. The average dissolved-solids content of the lake water was 288 mg/litre in 1969-72 compared to 190 mg/litre in 1940-41. Dilution and flushing from greater-than-average rainfall and use by algae decreased dissolved solids from 309 mg/litre in January 1969 to 210 mg/litre in April 1970, near the average value for the 1940-41 sampling. Rainfall contributes significant amounts of nutrients to the lake, and concentrations in rain are at times similar to concentrations in both the lake and its major tributaries. Rainfall contributes 30% of the total nitrogen and 21% of the total phosphorus load. Twenty-two percent of the nitrogen and 36% of the phosphorus entering Lake Okeechobee is retained within the bottom sediments and biota. Water from agricultural areas to the southeast is generally the poorest in quality of all water entering the lake. Trace elements in the lake water are of low concentrations, but are usually adequate for sustaining healthy algal growth. Low concentrations of nitrite and ammonia indicate an absence of significant organic pollution. The number and variety of benthic organisms were well below levels normally considered indicative of highly eutrophic waters. Numbers of nuisance species were generally low. Algal growth may be inhibited by the relatively high turbidity of the lake. (Knapp-USGS)
W75-05634

ANNUAL DYNAMICS OF VERTICAL DISTRIBUTION OF THE NUMBER OF HETEROTROPHIC BACTERIA IN SOUTHERN BAIKAL, (IN RUSSIAN),
T. A. Maksimova.
Mikrobiologiya. Vol 42 No 3, p 530-536. 1973 Illus. English summary).

Descriptors: *Bacteria, Lakes, Distribution.
Identifiers: *USSR(Lake Baikal), *Heterotrophic bacteria.

The distribution of heterotrophic microorganisms in the layer of 0-700 m was studied during 1970 year in the region of the Baikal (USSR) biological station in the point located 3 km from the shore over the depth 700-800 m. Three layers in the distribution of the heterotrophic bacteria were registered in the winter due to stable ecological conditions. The uniform distribution of the heterotrophic bacteria (4 cells/ml) throughout 700 m during the spring homothermy was detected. The maximal content of the heterotrophic bacteria during the year was registered in Nov. (72 cells/ml) in the depth of 200-500 m. A clear correlation was established between the maximal growth of the heterotrophic bacteria, dying off of the phytoplankton and the turbulence of waters. The heterotrophic bacteria of the pelagic and littoral zones of Baikal are represented by the values of the same order typical for oligotrophic lakes.--Copyright 1974, Biological Abstracts, Inc.
W75-05636

THE DETECTION AND STUDY OF NITRIFICATION IN STREAMS AND ESTUARIES,
Rutgers-the State Univ., New Brunswick, N.J. Dept. of Environmental Services.
For primary bibliographic entry see Field 5A.
W75-05659

DISTRIBUTION OF AUTOTROPHIC NITRIFYING BACTERIA IN THE PASSAIC RIVER,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W75-05663

A STUDY OF BENTHIC INVERTEBRATES IN LAGOON SYSTEMS IN THE SALT MARSHES OF NEW JERSEY,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Zoology.
For primary bibliographic entry see Field 2L.
W75-05664

THE INFLUENCE OF EUTROPHIC LAKE SEDIMENTS ON THE GROWTH OF DIFFERENT PLANKTONIC ALGAE,
Ceskoslovenska Akademie Ved, Prague. Hydrobiologicka Laborator.
For primary bibliographic entry see Field 2H.
W75-05689

LIFE-TERM EFFECTS OF NICKEL IN RATS: SURVIVAL, TUMORS, INTERACTIONS WITH TRACE ELEMENTS AND TISSUE LEVELS,
Dartmouth Coll., Hanover, N.H. Dept. of Physiology.
H. A. Schroeder, M. Mitchener, and A. P. Nason.
Journal of Nutrition, Vol 104, No 2, p 239-243, February, 1974. 4 tab, 14 ref.

Descriptors: *Potable water, *Trace elements, *Nickel, *Rodents, *Animal metabolism, Animal physiology, Toxicity, Laboratory tests, Zinc, Manganese, Copper, Chromium, Cobalt, Distribution patterns.

In order to evaluate recondite toxicity of nickel, rats of both sexes were exposed to 5 ppm nickel in drinking water for life. The 104 rats given nickel and a control group containing 104 rats each received the following essential metals in water (ppm); zinc 50, manganese 10, copper 5, chromium 5, cobalt 1, molybdenum 1. There was some increased growth in the nickel-fed rats, but the metal was virtually innocuous, not affecting survival, longevity, incidence of tumors or specific lesions. Five organs were analyzed for zinc, copper, manganese, chromium, molybdenum and nickel by atomic absorption spectrophotometry. The feeding of nickel was associated with increased concentrations of chromium in heart and spleen, and manganese in kidney, and decreased copper in lung and spleen, zinc in lung, and manganese in spleen. Nickel did not accumulate in tissues. Uric acid levels in serum were unaffected. Nickel appeared to interact with all four of the essential trace metals studied. (Jernigan-Vanderbilt)
W75-05691

GENETIC INFLUENCE ON RESPONSE TO DIETARY MANGANESE DEFICIENCY IN MICE,
California Univ., Davis. Dept. of Nutrition.
L. S. Hurley, and L. T. Bell.
Journal of Nutrition, Vol 104, No 1, p 133-137, January, 1974. 3 tab, 18 ref.

Descriptors: *Manganese, *Diets, *Rodents, *Genetics, Biology, Laboratory animals, Laboratory tests, Animal pathology, Testing procedures, Microscopy, Nutrition.

The influence of the genetic background of mice on their response to manganese deficiency during prenatal development was investigated. Inbred strains of mice were used in addition to a mutant, pallid, and a four-way hybrid cross . Mice whose mothers were fed a purified diet containing various levels of manganese from the beginning of pregnancy were used as breeding females and their offspring were examined at birth for degree of otolith development. The results clearly showed that the genetic constitution of the animals affected their response to dietary deficiencies of manganese. Although in all genetic groups (except the mutant) there was a normal development of otoliths when the diet contained the normal control level of manganese, the response to low levels of the element varied considerably among the strains. Litter size was also increased when otolith development was improved. The findings suggest that at low or borderline levels of dietary intake of essential nutrients the responses of individuals may vary greatly depending in part on their genetic background. (Jernigan-Vanderbilt)
W75-05692

SEASONAL CHANGES IN CALCIUM, MAGNESIUM, COPPER AND ZINC CONTENT IN THE LIVER OF THE COMMON FROG, RANA TEMPORARIA L.,
Oulu Univ. (Finland). Dept. of Anatomy.
S. Pasanen, and P. Koskela.
Comparative Biochemistry and Physiology, Vol 48A, No 1A, p 27-36, May, 1974. 1 fig, 2 tab, 20 ref.

Descriptors: *Frogs, *Seasonal, *Metals, *Metabolism, *Distribution, Animal physiology, Calcium, Magnesium, Copper, Zinc, Spring, Summer, Autumn, Winter, Analytical techniques.

The values for calcium, magnesium, copper and zinc content calculated per unit weight were lowest during wintering and highest during the spring and summer, partly as a result of seasonal changes in the weight and water content of the liver. The total calcium, magnesium and zinc figures were highest during the summer and autumn due to feeding and rapid metabolism. Total copper remained practically constant throughout the year in the liver of the male, but in the female there is a clear spring maximum connected with egg-laying. Sex differences were found in the dry weight liver calcium and magnesium content during the summer, apparently due to the development of the ovaries. (Jernigan-Vanderbilt)
W75-05693

NUTRITIONAL IRON DEFICIENCY AS A DETERMINANT OF HOST RESISTANCE IN THE RAT,
Harvard Medical School, Southboro, Mass. New England Regional Primate Research Center.
R. B. Baggs, and S. A. Miller.
Journal of Nutrition, Vol 103, No 11, p 1554-1560, November, 1973. 5 fig, 4 tab, 30 ref.

Descriptors: *Iron, *Diets, *Rodents, *Animal pathology, Laboratory animals, Laboratory tests, Toxicity, Bacteria, Animal physiology.

The response to infection with Salmonella typhimurium was studied at 42 days in rats fed various levels of dietary iron. Rats fed iron-deficient diets after weaning were more susceptible to challenge with S. typhimurium, with the greatest morbidity and mortality observed in the marginally deficient animals. Preweaning iron deficiency decreased the rats' ability to resist the stress of infection, even if a period of nutritional rehabilitation intervened. The iron-deficient rats had fewer myeloperoxidase (MPO)-containing cells in the lamina propria and submucosa. Phagocytes isolated from the peritoneal cavity of iron-deficient rats were as capable of exerting a bactericidal influence on Salmonella in vitro as are cells isolated from iron-adequate animals. Iron-deficient rats appear unable to produce MPO-containing cells in sufficient quantity to withstand the stress of infection. (Jernigan-Vanderbilt)
W75-05696

EFFECT OF DIETARY SELENIUM ON ERYTHROCYTE AND LIVER GLUTATHIONE PEROXIDASE IN THE RAT,
Wisconsin Univ., Madison. Dept. of Biochemistry.
D. G. Hafeman, R. A. Sunde, and W. G. Hoekstra.
Journal of Nutrition, Vol 104, No 5, p 580-587, May, 1974. 3 fig, 2 tab, 25 ref.

Descriptors: *Trace elements, *Diets, *Rodents, *Animal physiology, Enzymes, Laboratory animals, Laboratory tests, Vitamins.
Identifiers: *Selenium.

Experiments were conducted with male rats to quantitate the relationship between dietary selenium intake and the amount of the enzyme glutathione peroxidase (GSH-Px) in erythrocytes and liver. Weanling male rats were fed torula yeast-based diets with 0, 0.05, 0.1, 0.5, 1.0, or 5.0 ppm Se supplement as sodium selenite. Liver GSH-Px fell to undetectable levels (less than 1% of that found in the weanling rats) within 24 days in the 0 ppm Se group; feeding 0.1 ppm Se or greater caused liver GSH-Px to increase above that found in the weanling rats. The erythrocyte GSH-Px response to lack of dietary Se was somewhat smaller in magnitude and more gradual; however, only 21% of initial erythrocyte GSH-Px activity remained in the unsupplemented group after 66 days. Increased dietary Se resulted in corresponding increases of erythrocyte GSH-PX activity. Resupplementation with 0.1, 0.5, or 5.0 ppm Se elevated th depressed erythrocyte GSH-Px levels of the deficient rats. Increased dietary Se provided for both faster elevation and higher maximal GSH-Px activity within 60 to 90 days after resupplementation. (Jernigan-Vanderbilt)
W75-05697

A PHYTOPLANKTON BLOOM IN THE LAGOON OF VENICE,
Istituto di Biologia del Mare, Venice (Italy).
For primary bibliographic entry see Field 2L.
W75-05699

RESPONSE IN VITAMIN B-12 PRODUCTION AND ABSORPTION TO INCREASING COBALT INTAKE IN THE SHEEP,
Cornell Univ., Ithaca, N.Y. Dept. of Animal Science.
M. F. Hedrich, J. M. Elliot, and J. E. Lowe.
Journal of Nutrition, Vol 103, No 12, p 1646-1651, December, 1973. 4 tab, 19 ref. USPHS (AM 14165).

Descriptors: *Cobalt, *Vitamins, *Mammals, *Absorption, *Diets, Laboratory animals, Animal physiology, Laboratory tests, Spectroscopy.
Identifiers: Sheep.

Three sheep, fitted with intestinal reentrant and rumen cannulas, were used to estimate ruminal production of vitamin B-12 when fed diets differing in cobalt concentrations. The basal diet contained 30% ground corn, 69% ground hay and 1% sodium chloride. At daily cobalt intakes averaging 0.047, 0.41 and 0.83 mg, mean estimates of vitamin B-12 production were 37, 1006, 1553 micrograms, respectively a significant (P less than 0.05) treatment effect. Multiple regression analysis of the data from this and other experiments employing the same techniques indicated that more than one-half of the observed variation in vitamin B-12 production estimates was accounted for by variations in the cobalt intake, percentage roughage in diet and digestable dry matter intake. The multiple regression was highly significant (P less than 0.01). Data from two sheep on apparent absorption from the small intestine were combined with data from other trials to study the effects of duodenal B-12 flow (production), rate of ileal digesta flow, and relative proportion of Ochromonas-active B-12 in duodenal B-12 activity as measured by radioassay. A highly significant (P less than 0.01) multiple regression equation accounting for 57% of the observed variation in apparent absorption was computed. (Jernigan-Vanderbilt)
W75-05700

RELATIONSHIP OF CALCIUM TO REPRODUCTIVE ABNORMALITIES IN THE LAYING HEN (GALLUS DOMESTICUS),
Florida Univ., Gainesville. Dept. of Poultry Science.
D. A. Roland, Sr., D. R. Sloan, H. R. Wilson, and R. H. Harms.
Journal of Nutrition, Vol 104, No 8, p 1079-1085, August, 1974. 9 tab, 23 ref.

Descriptors: *Calcium, *Poultry, *Reproduction, Diets, Laboratory tests, Laboratory animals, Animal physiology, Testing procedures, Nutrition.

A reduction in weight of ovary, oviduct and body and a decrease in egg production and feed consumption were observed in hens fed a diet containing 0.05% calcium. Adenohypophyses of calcium-deficient hens had increased amounts of periodic acid-Schiff-positive material (secretory in nature) indicating that hormones were produced but not released. Luteinizing hormone and adenohypophysis extract increased soft-shell egg production of calcium-deficient hens approximately 200 to 300% compared to that of calcium-deficient hens injected with physiological saline. The injection of hypothalamus extracts into birds fed a diet containing 0.05% calcium increased soft-shell egg production approximately 300 to 400% and also significantly increased ovary and oviduct weight and significantly decreased bone ash. Hormonal injections had no significant influence on soft-shell egg production in birds fed a diet containing 3.00% calcium. The results suggest that the secretion or production of production of gonadotropic hormones was reduced with prolonged calcium deficiency resulting in adverse effects on the reproductive system of laying hens. The ability of hypothalamus extract to stimulate the reproductive system suggests that calcium is involved in the production or release of releasing factors from the hypothalamus. (Jernigan-Vanderbilt)
W75-05703

WORKERS' DEATHS POINT TO EXPOSURE TO ARSENICS,
Chemical and Engineering News, Vol 52, No 36, p 4, September 9, 1974.

Descriptors: *Arsenic compounds, *Toxicity, *Public health, Human pathology, Salts, Inorganic compounds, Pesticides, Industrial wastes.
Identifiers: Cancer.

The effects of arsenic to exposed workers at various chemical producing plants were discussed. Dow Chemical and Allied Chemical reported to the Occupational Safety and Health Administration high rate of death due to cancer among workers exposed to arsenic and its inorganic salts. Epidemiological studies conducted by both companies on deaths of persons employed in two pesticide plants revealed a greater than normal incidence of cancers involving the lung and lymphatic systems. Although about 14 companies make inorganic arsenics, government sources estimate that as many as 1.5 million U.S. workers may be exposed to varying amounts of the chemicals. Public hearings have been scheduled by OSHA to obtain further information on the toxicity of inorganic arsenics, their carcinogenic properties, and the number of workers potentially or actually exposed to them. (Jernigan-Vanderbilt)
W75-05705

IRON ABSORPTION BY HUMANS FROM VEAL LIVER,
Instituto Venezolano de Investigaciones Cientificas , Caracas.
C. Martinez-Torres, I. Leets, M. Renzi, and M. Layrisse.
Journal of Nutrition, Vol 104, No 8, p 983-993, August, 1974. 1 fig, 7 tab, 28 ref.

Descriptors: *Iron, *Absorption, *Human pathology, *Foods, Laboratory tests, Chelation, Chemical reactions, Public health.

Iron absorption from veal liver was tested in 74 human subjects. The geometrical mean absorption was 11% in normal subjects, but increased up to 20% in subjects with moderate iron deficiency and to 30% in subjects with marked iron deficiency. The total geometrical mean absorption in both normal and iron-deficient subjects was 20%. Veal liver iron absorption was not affected by ascorbic acid but there was a marked reduction in absorption when the food was administered with desferrioxamine. This chelating agent may affect the absorption of ferritin and perhaps hemosiderin. Interaction of veal liver and maize in the lumen of the gut results in an enhancement of the absorption of vegetable iron and a reduction of the absorption of liver iron. Liver is the best food in terms of nutritive iron value because of its high iron content, its high absorbability and its effect on the absorption of vegetal iron. With the exception of meat, its absorption is higher than the iron absorption from vegetal and other animal foods even when it is administered with vegetables. (Jernigan-Vanderbilt)
W75-05706

AVAILABILITY OF ZINC FROM PEA SEEDS TO RATS,
Agricultural Research Service, Ithaca, N.Y. Plant Soil and Nutrition Lab.
R. M. Welch, W. A. House, and W. H. Allaway.
Journal of Nutrition, Vol 104, No 6, p 733-740, June, 1974. 2 fig, 5 tab, 39 ref.

Descriptors: *Zinc, *Seeds, *Rodents, Laboratory tests, Laboratory animals, Tracers, Radioisotopes, Absorption, Foods, Diets, Plant physiology, Seed treatment.

Experiments were conducted to determine the effects of endogenous phytic acid in pea seeds on the availability of Zn-65 in the seeds to Zn-depleted rats. Seeds were harvested at two stages of maturation from plants supplied with either 0.066 or 0.262 ppm Zn. Increasing Zn supply to growing plants increased the amount of Zn in the seeds. The phytic acid content of immature and mature seeds was 0.17 and 1.23% dry weight respectively. Most of the Zn in the seeds was in the form of a soluble, small anionic complex (less than 1000 mol wt) and did not appear to be present as a Zn-phytate complex. When rats were fed seeds at the same stage of development, the efficiency of Zn absorption by rats was not influenced significantly by the level of Zn in the seed. Although the absorption by rats of Zn from mature seeds was significantly lower than that from immature seeds, both seed types appeared to be good dietary sources of Zn. In addition, cooking the seeds did not affect the availability of Zn to rats. It was concluded that phytic acid in mature pea seeds was not solely responsible for the decreased availability of Zn in seeds to Zn-depleted rats. (Jernigan-Vanderbilt)
W75-05707

EFFECT OF ZINC REPLETION LATE IN GESTATION ON PARTURITION IN THE ZINC-DEFICIENT RAT,
Agricultural Research Service, Ithaca, N.Y. Plant Soil and Nutrition Lab.
J. Apgar.
Journal of Nutrition, Vol 103, No 7, p 973-979, July, 1973. 3 fig, 5 tab, 11 ref.

Descriptors: *Zinc, *Rodents, *Laboratory animals, *Laboratory tests, Animal physiology, Toxicity, Stress, Nutrition, Distribution pattern.

Experiments were done to determine how late gestation zinc could be given to Zn deficient female rats and result in normal parturition. A zinc diet (less than 1 ppm) was given adult fem

eginning day one of pregnancy. Late in pregnan-
y, a single dose of either 15 or 30 mg zinc acetate
as given by stomach tube. Females were killed
x hours after the birth of the first pup; and organ
eights, tissue zinc concentrations, and adrenal
olesterol were determined. Repletion with zinc
n day 15, 18 or 19 resulted in essentially normal
arturition although many of the females given
nc day 18 or 19 eventually ate the pups. Adminis-
ation of zinc on day 20 or 21 enabled some, but
ot all, of the females to deliver reasonably nor-
ally. Females given zinc on day 22 were as
essed as the zinc-deficient controls. Concentra-
ons of zinc in maternal liver and in the pup were
nerally higher the later repletion was begun.
erum and liver zinc levels after parturition in
males given a single dose of zinc on day 18 were
ot significantly different from levels in zinc-defi-
ent females. These experiments indicated that
e critical time for administering zinc in order to
event stressful parturition in the zinc-deficient
t is between day 19 and 21. (Jernigan-Vanderbilt)
75-05708

XPERIMENTAL STUDY OF THE ACCUMU-
ATION OF SILVER 110M IN VARIOUS
ARINE ORGANISMS, (ETUDE EXPERIMEN-
ALE DE L'ACCUMULATION DE L'ARGENT
0M CHEZ DIVERS ORGANISMES MARINS),
r primary bibliographic entry see Field 5A.
75-05711

TERMINATION OF POLLUTION PARAME-
RS (CONCEPTO DE POLUCION,
RAMETROS A DETERMINAR),
G. Catalan.
estigacion y Tecnica del Papel, Vol 11, No 40,
55-366, April, 1974.

scriptors: *Water pollution, *Water pollution
ects, *Water quality, Water properties, Biologi-
properties, Chemical properties, Physical pro-
ties, Color, Odor, Taste, Temperature,
spended solids, Radioactivity, Foaming.

eral definitions of pollution are given, and the
ects of pollution on the biological, chemical,
physical properties of water (color, odor,
e, temperature, suspended solids, radioactivi-
and foaming) are discussed. (Sykes-IPC)
5-05725

PORT ON MOOSEHEAD LAKE,
CATAQUIS AND SOMERSET COUNTIES,
INE.
ific Northwest Environmental Research Lab.,
vallis, Oreg.
A National Eutrophication Survey, Working
er No 2, May 1974. 47 p, 1 fig, 5 ref, 3 append.

criptors: *Maine, *Lakes,
atersheds(Basins), Water quality, Nutrients,
solved oxygen, Chlorophyll, Oligotrophy,
sphorus, Nitrogen, Septic tanks, Waste treat-
t, Water pollution control, Trophic level,
utaries, Physicochemical properties, Lake
phometry, Biological communities, Limiting
ors.
tifiers: *Moosehead Lake(Maine), Nutrient
ces, STORET 2309.

n water clarity and dissolved oxygen values
rved in association with low nutrient levels
chlorophyll-a concentrations are indicative of
oligotrophic conditions in Moosehead Lake.
l assay results and nutrient concentration
s indicate Moosehead Lake was phosphorus
ed. However, nutrient spiked subsample
th yields suggest nitrogen limitation would
r with an approximate two fold increase in
phosphorus concentration. Other than septic
seepage, there are no known point source
harges to the drainage basin. A grant has been
rded for construction of a collection system
ertiary treatment plant to serve the villages of Greenville and Greenville Junction. Although plant effluent will be discharged to the lake, the required combination of high treatment and phosphorus removal should not compromise Moosehead Lake water quality. Over 99% of calculated phosphorus and nitrogen loadings can be attributed to non-point sources. The Moose River, draining approximately 63% of the total lake watershed, contributes 40.1% of the total phosphorus and 43.1% of total nitrogen. Notwithstanding the percentage attributable to this and other areal sources, comparison observed phosphorus loading rates with the Vollenweider model indicate no apparent threat to present trophic conditions. (Jones-Wisconsin)
W75-05728

REPORT ON ESTES LAKE, YORK COUNTY, MAINE.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
EPA National Eutrophication Survey, Working Paper No 3, May 1974. 32 p, 1 fig, 5 ref, 3 append.

Descriptors: *Lakes, *Maine, *Trophic level, Eutrophication, Chlorophyll, Nutrients, Nitrogen, Phosphorus, Water quality, Watersheds(Basins), Limiting factors, Water pollution control, Lake morphometry, Tributaries, Physiocochemical properties, Biological communities.
Identifiers: *Estes Lake(Me), York County(Me), Nutrient sources, STORET 2304.

Estes Lake is an impoundment, atypical of the natural lakes and ponds in Maine. Survey data indicate it is eutrophic. Chlorophyll-a values were extremely high, Secchi disc values were low, and nutrient concentrations were rather high. Data obtained in 1954 indicate it was then free of aquatic nuisance conditions, however, more recent studies show it experiencing frequent and heavy blooms of nuisance algae, excessive aquatic weed growth, and depletion of dissolved oxygen in the deeper areas. Algal assays show that is was nitrogen limited at the time the sample was collected, and nitrogen limitation is indicated for the other sampling periods. During the survey year, the Sanford waste treatment facility contributed about 74% of the total phosphorus loading. A substantial reduction of phosphorus from this source should result in improved lake water quality. Nitrogen loading from diffuse sources is calculated to be nearly 75% of the total, while only one-fourth of the total phosphorus is contributed from non-point sources. Because non-point phosphorus loading alone exceeds Vollenweider's predicted 'permissible' level, reduction of areal contributions could also be expected to yield improved water quality. (Jones-Wisconsin)
W75-05729

REPORT ON LONG LAKE, CUMBERLAND COUNTY, MAINE.
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
EPA National Eutrophication Survey, Working Paper No 4, May 1974. 34 p, 1 fig, 7 ref, 3 append.

Descriptors: *Lakes, *Maine, *Water pollution control, Watersheds(Basins), Water quality, Nutrients, Mesotrophy, Phosphorus, Nitrogen, Waste treatment, Trophic level, Tributaries, Physicochemical properties, Lake morphometry, Biological communities, Limiting factors.
Identifiers: *Long Lake(Maine), Cumberland County(Maine), Nutrient sources, STORET 2306.

The first stage of evaluation of Long Lake, its watershed data, and its drainage basin, is reported. It provides state environmental agencies with specific information for basin planning, water quality criteria/standards review, clean lakes, and water quality monitoring activities. Survey data indicate Long Lake is mesotrophic. Algal assay results indicate phosphorus was the limiting nutrient at the time the assay sample was collected. A regional waste collection and treatment system is planned to serve the communities of Bridgeton and Harrison and dwellings along the lake's west side. When this facility becomes operational it is estimated that the phosphorus loading from this source alone will exceed the existing phosphorus loading to Long Lake from all sources. It is concluded that phosphorus removal at the regional treatment facility will be required to protect Long Lake and other lakes in the Presumpscot River chain. Non-point sources phosphorus loading entering through tributaries or direct runoff presently amounts to 77.5% of the total (65.7% for N); however, these figures include substantial contributions from unsewered wastes by west shore communities. Incorporation of these discharges into the proposed regional facility will reduce non-point impact. (Jones-Wisconsin)
W75-05730

REPORT ON BAY OF NAPLES AND SEBAGO LAKE, CUMBERLAND COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
EPA National Eutrophication Survey, Working Paper No 5, May 1974. 49 p, 2 fig, 7 ref, 3 append.

Descriptors: *Lakes, *Maine, *Trophic level, Fish, Recreation, Salmon, Water supply, Oligotrophy, Phosphorus, Water quality, Watersheds(Basins), Nitrogen, Limiting factors, Water pollution control, Lake Morphometry, Tributaries, Physiocochemical properties, Biological communities, Water pollution sources, Treatment facilities, Runoff.
Identifiers: *Bay of Naples(Me), *Sebago Lake(Me), Nutrient sources, STORET 2311.

The Bay of Naples supports numerous kinds of fish, both cold- and warm- water species. Sebago Lake, deepest lake in Maine, is suitable for salmon management. Based on data collected during the survey, the Bay of Naples and Sebago Lake are considered to be oligotrophic. Results of algal assays indicate that phosphorus was limiting in both lakes at the time the assay sample was collected. The only point sources of nutrients that can affect the Bay of Naples and Sebago Lake are those impacting Long Lake just upstream in the Presumpscot River chain. Inclusion of phosphorus removal at the planned regional waste treatment facility at Long Lake would minimize the effect of the phosphorus source on these two lakes. Over 75% of the calculated phosphorus and nitrogen loading to each lake comes from surface runoff. At present, septic tank contributions to both lakes are not believed to be significant. However, comparison of total P loading with the Vollenweider model suggest that slight increases may result in water quality degradation. Thus, as lakeshore and watershed development progresses to meet increasing recreational needs, reevaluation of diffuse phosphorus sources should be made. (Jones-Wisconsin)
W75-05731

REPORT ON RANGELEY LAKE, FRANKLIN COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
EPA National Eutrophication Survey, Working Paper No 6, May 1974. 37 p. 1 fig. 7 ref, 3 append.

Descriptors: *Lakes, *Maine, *Trophic level, Lake fisheries, Cold-water fish, Recreation, Water storage, Septic tanks, Sewage treatment, Storm drains, Oligotrophy, Phosphorus, Watersheds(Basins), Limiting factors, Water pollution control, Lake morphometry, Tributaries, Physiocochemical properties, Treatment facilities, Biological communities.
Identifiers: *Rangeley Lake(Me.), Franklin County(Me.), Nutrient sources, STORET 2310.

Rangeley Lake is famous for its cold-water game fishery. The region is rapidly developing for

recreational purposes, with much of the shoreline containing camps and homes. Most of these are served by septic tanks, although reportedly the soil does not provide adequate absorption of tank effluents. While the lake receives no industrial discharges, it does receive secondary effluent from the Rangeley wastewater treatment plant via Haley Pond, and a nutrient load of unknown magnitude is contributed directly by Rangeley storm sewers. Survey data indicate it is oligotrophic. Algal assay results and lake data show that Rangeley Lake was phosphorus limited when sampled. During the sampling year, about 78% of the total phosphorus load was contributed by nonpoint or areal sources, while the community of Rangeley was contributing about 15%, and camp/home septic tanks were estimated to have contributed about 7%. Construction of 95% phosphorus removal facilities at Rangeley is scheduled in 1974 which should help preserve the lake's present excellent quality. At present, septic tank contributions may not be a problem. However, as lakeshore development progresses, consideration should be given to the control of these nutrient sources. (Jones-Wisconsin)
W75-05732

REPORT ON LONG LAKE, AROOSTOOK COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
EPA National Eutrophication Survey, Working Paper No 7, May 1974. 31 p, 1 fig, 4 ref, 3 append.

Descriptors: *Lakes, *Maine, *Trophic level, Salmon, Trout, Lake Fisheries, Cold-water fish, Recreation, Watersheds(Basins), Irrigation, Nutrients, Chlorophyll, Septic tanks, Phosphorus, Treatment facilities, Mesotrophy, Nitrogen, Limiting factors, Water pollution control, Lake morphometry, Tributaries, Physicochemical properties, Biological communities, Water pollution sources.
Identifiers: *Long Lake(Me), Nutrient sources, STORET 2313.

Long Lake, Aroostook County, is considered on of the best cold-water lakes in northern Maine for fish management, and water quality isi considered to be ideal for landlocked Atlantic salmon and brook trout. In addition to recreation the lake is utilized for irrigation. The low levels of primary nutrients and low yield of the algal assay, as observed, and deep water oxygen depression reported by Maine agencies indicate the lake is mesotrophic. The algal assay indicates that Long Lake was phosphorus limited at the time the sample was collected, field data also indicate phosphorus limitation. Other than septic tanks, the only point source of nutrients to Long Lake is the St. Agatha Sanitary District waste treatment facility. Phosphorus removal at this source is not expected to result in any observable change in trophic condition of Long Lake. Export of nitrients from diffuse sources represent over 85% of calculated total nitrogen and phosphorus loadings. In view of the proximity of present phosphorus loading rates to the predicted 'permissible' limits, continued assessment of cultural practices within the Long Lake watershed should be maintained. (Jones-Wisconsin)
W75-05733

REPORT ON MATTAWAMKEAG LAKE, AROOSTOOK COUNTY, MAINE,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
EPA National Eutrophication Survey, Working Paper No 8, May 1974. 37 p, 1 fig, 5 ref.

Descriptors: *Lakes, Maine, *Trophic level, Waterhseds(Basins), Lake fisheries, Nutrients, Bass, Perches, Pikes, Humic acids, Light penetration, Mesotorphy, Nitrogen, Phosphorus, Sewage effluents, Limiting factors, Water pollution control, Lake Morphometry, Tributaries, Physiocochemical properties, Biological communities, Water pollution sources.
Identifiers: *Mattawamkeag Lake(Me), Nutrient sources, STORET 2308.

Mattawamkeag is a relatively shallow warmwater lake and provides an excellent habitat for smallmouth bass, white perch, and chain pickerel. Except for a few summer cottages, shoreline development is minimal. Reportedly, the lake is consistently strongly humic colored with platinum scale values around 70 ppm. The color limits light penetration to a degree and may account in part for the quite low chlorophyll-a measured during the survey. Low nutrient concentrations and chlorophyll-a in conjunction with summer depression of dissolved oxygen in the hypolimnion signify a mesotrophic condition. The lake data show that the lake was nitrogen limited at the time the assay sample was collected by phosphorus limited the other two sampling times. Provision of secondary wastewater treatment at the communities of Patten and Island Falls would result in sufficient phosphorus reduction to protect Mattawamkeag Lake, as indicated by a comparison of survey data with the Vollenweider model. Areal contribution of primary nutrients is relatively low for phosphorus (42.4% of total P), while rather high for nitrogen (77.3% of total N). (Jones-Wisconsin)
W75-05734

INGESTION AND ASSIMILATION RATES OF CHESAPEAKE BAY ZOOPLANKTON: PRELIMINARY REPORT,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
S. E. Storms, and W. R. Taylor.
In: The Ecology of the Plankton of the Chesapeake Bay Estuary, Progress Report July 1, 1973 - July 31, 1974. 43 p, 12 fig, 6 tab, 12 ref.

Descriptors: *Plankton, *Chesapeake Bay, *Energy transfer, Primary productivity, Secondary productivity, Grazing, Standing crops, Phytoplankton, Zooplankton, Cycling nutrients, Digestion, Copepods, Estuaries.
Identifiers: Acartia tonsa, Acartia clausi.

The impact of copepod grazing, not only on the total phytoplankton standing crop in Chesapeake Bay, but also on the different size classes of phytoplankton within the total standing crop was assessed. The assimilation rates of Acartia tonsa and A. calusi and other major components of the zooplankton were measured while feeding on natural concentrations of N-15 labeled phytoplankton. Values of particulate organic carbon available as phytoplankton ranged from a low of 0.27 mg C/l in August to a high of 2167 mg C/l in April. The mean organic carbon for all stations was also lowest in August (0.85 mg C/l) and highest in April (1.36 mgC/l) while the mean value for particulate organic carbon for all stations was 0.09 C/l. Total ingestion rate for all sizes of phytoplankton cells 2 to 35 micrometer in diameter for Acartia varied from a low of 7.0 mg C/animal/hr in June to a maximum of 288 mg C/animal/hr in October. The mean value for ingestion rates for all stations was 84 mg C/animal/hr, which would indicate that Acartia ingests approximately 100% of its bodily carbon content per day. Based on a mean Acartia concentration at ten animals/liter, 2% of the available carbon is ingested per day. (Auen-Wisconsin)
W75-05735

PHOSPHORUS CYCLING IN THE PLANKTON OF CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. L. Taft, and W. R. Taylor.
In: The Ecology of the Plankton of the Chesapeake Bay Estuary, Progress Report July 1, 1973 - July 31, 1974. 203 p, 37 fig, 18 tab, 109 ref.

Descriptors: *Phosphorus, *Cycling nutrients, *Chesapeake Bay, Estuaries, Phosphorus compounds, Phytoplankton, Zooplankton, Productivity.

Phoshorus distribution in the Chesapeake Bay and the cycling rates of four phosphorus fractions in the euphotic zone are described. Total phosphorus in this zone varied on an annual cycle with the peak values in late summer and early fall. The phosphorus source for the summer increase is the bottom where bacterial activity results in remineralization of inorganic phosphate from organic matter. Phytoplankton are the principal consumers of inorganic phosphate in the open water of the Bay. Bacteria and detritus are insignificant components of the particulate fraction. Low phosphate concentrations and rapid phosphorus cycling in the euphotic zone prevailed from December 1972 through August 1973. The dissolved organic phosphorus pool is composed of a large, stable fraction and a small, kinetically active fraction of phosphorus monoesters. The Bay phytoplankton have the capability to hydrolyze phosphate monoesters and incorporate the liberated inorganic phosphate. The rate of phosphorus cycling between zooplankton and phytoplankton in the euphotic zone is determined by the rate of phosphorus release from the zooplankton. It is postulated that the rate of orthophosphate availability to the B phytoplanktion was equivalent to the rate of orthophosphate release from zooplankton which are smaller than the copepods tested. (Aue Wisconsin)
W75-05736

DIEL PERIODICITY IN UPTAKE OF NITRA AND NITRITE BY RESERVOIR PLANKTON,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
D. W. Toetz.
Available from the National Technical Information Service, Springfield, Va. 22161 as ORO-424. Contribution 503, 1974. 13 p, 4 fig, 8 ref. AT(40-1)-4254.

Descriptors: *Biorthyms, *Diurnal, *Adsorpti *Nitrates, *Nitrites, Reservoirs, Plankton, Irri tion, Primary productivity, Oklahoma, Cycles.
Identifiers: Lake Carl Blackwell(Okla).

Observations on diel uptake of nitrate and nit by reservoir plankton are described and patte of uptake are related to concomitant change temperature, irradiance and nutrient concen tions. Observations were made on uptake in L Carl Blackwell, Oklahoma, at the surface, 0.5 and 2 m on August 3-4, 1971, and at 0.5 m on J 29-30, 1972. Samples were obtained with a toxic water sampler at 4-9 hr intervals and analyzed with a mass spectrometer. Diel perio ty in the uptake of nitrate and nitrite occur reservoir plankton. The time course of change the rate of uptake paralledled changes in ir ance. However, at 0.5 m where nitrate uptake were maximum, uptake of nitrate accelerated ing the course of the day, and then drop abruptly with the onset of darkness. Periodici nitrate uptake needs to be considered in mode primary production where nitrogen is the lim nutrient. Light is clearly involved in nitrate take, but diel changes in the rate of uptake do always exactly parallel diel changes in irradia (Jones-Wisconsin)
W75-05739

EFFECT OF PHOSPHORUS AND POTASS ON PHYTOPLANKTON POPULATIONS FIELD ENCLOSURES,
Agricultural Research Service, For Lauder Fla.
W. H. Ornes, and K. K. Steward.
Available from the National Technical Info tion Service Springfield Va 22161 as PB-231 $3.25 in paper copy, $2.25 in microfiche. Ec

cal Report No DI-SFEP-74-07, May 1973. 14 p. 4 fig, 2 tab, 20 ref.

Descriptors: *Plant populations, *Phosphorus, *Potassium, *Phytoplankton, Waste water treatment, Nutrients, Marshes, Biological communities, Eutrophication, Chara, Dominant organisms, Aquatic plants, Succession.
Identifiers: *Everglades(Fla), Sawgrass, Utricularia.

Some of the parameters involved in the addition of nutrients to a marsh environment are evaluated. The effect of weekly applications of phsophorus and potassium on algal populations in artifically isolated segments of a natural marsh environment was monitored. Applications were made to field enclosures for 22 weeks. The treatment rates were equivalent to the quantities contained in 2.5 cm/ha of sewage effluent with a concentration of 10 mg/liter P and 20 mg/liter K. The rates were arbitrarily chosen and were similar to rates recommended for terrestrial application. Phytoplankton blooms and dynamic shifts in domonant phytoplankton genera resulted. Also, the aquatic macrophytes Chara and Utricularia disappeared after 22 weeks of treatment. Both polluted and clean water phytoplankton genera appeared in the control and treated enclosures. The experiment results indicated a disrupted environment. More study should be conducted before utilizing the sawgrass marshes as living filters for wastewater. (Jones-Wisconsin)
W75-05741

A MATHEMATICAL MODELLING OF LAKE ECOLOGICAL SYSTEMS,
V. V. Menshutkin.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1843-1850, 1973. 4 fig, 1 tab, 7 ref.

Descriptors: *Management, *Mathematical models, *Lakes, Systems analysis, Energy budget, Predation, Spatial distribution, Seasonal, Biomass, Fish, Productivity.
Identifiers: Lake Drivjato(USSR).

A mathematical model of an ecosystem should be based on data of theoretical limnology which describes general regularities in lake processes., and on specific data reflecting the state of a given ecosystem. The development of a control action can be done either in terms of the theory of optimum management, e.g., by dynamic programming, or by game theory methods. Mathematical models which take into account the circulation of matter allow consideration of not only trophic but also spactial structures of ecosystems. A flow chart is shown of the model with allowance for a vertical subdivision of the lake into epi- and hypolimnion. The introduction of the turbulent exchange coefficient varying with time enables simulation of the formation of spring and autumn maxima of phytoplankton biomass. Consideration of the vertical distribution of dissolved oxygen, with allowance for photosynthesis and respiration, makes possible the modeled study of mass death of fishes caused by oxygen deficiency and oxygen hysteresis. The types of mathematical models even can serve as a basis for better understanding and management of natural ecosystems provided that only realistic values and relations are utilized in building such models. (Jones-Wisconsin)
W75-05744

EFFECT OF TEMPERATURE ON THE MINERALIZATION OF ORGANIC PHOSPHORUS COMPOUNDS BY CERTAIN AQUATIC BACTERIA,
W. Reihardt.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1277-1286, 1973. 6 fig, 4 tab, 9 ref.

Descriptors: *Water temperature, *Hydrolysis, *Phosphorus, *Aquatic bacteria, Eutrophication, Growth rates, Myxobacteria.
Identifiers: Germany, Flavobacterium, Sporocytophaga cauliformis.

A mass population of only one bacterial species occurring in a lake at low water temperatures was an ideal object to study the influence of temperature on both growth rates and enzymatic activities of phosphate hydrolysis. Yellow pigmented bacteria chiefly consisting of Flavobacterium species and nonfruiting myxobacteria have been observed as an essential constituent of bacterioplankton in lakes. In eutrophic Mendel Lake (near Constance, Germany) aerobic myxobacteria of allocthonous origin had produced a bacterial waterbloom which persisted longer than two months. Isolated strains did not form fruiting bodies under the employed culture conditions and were in most features identical to Sporocytophaga cauliformis. These bacteria did not only grow at 0C but had a continuous optimum for growth below 20C. Producing an overplus of alkaline phosphatases they had a marked effect on hydrolysis of phosphates. In spite of their psychrophilic habit synthesis of alkane phosphatases did not vary at different growth temperatures, and optimum activities were found near 36C. Pure culture experiments were undertaken to estimate catalytic efficiencies of phosphate mineralization which could be attributed to standing crops of Myxobacteria in lake water. (Jones-Wisconsin)
W75-05745

BENTHOS PRODUCTION OF A HIGH-MOUNTAIN LAKE: NEMATODA,
G. Bretschko.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1421-1428, 1973. 7 fig, 1 tab, 9 ref.

Descriptors: *Benthos, *Productivity, *Nematodes, *Lakes, Elevation, Benthic fauna, Diptera, Crustaceans, Protozoa, Oligochaetes, Distribution patterns, Dominant organisms, Biomass.
Identifiers: Vorderer Finstertalersee(Austria), Montane lakes, Ironus tenuicaudatus, Tobrilus grandipapillatus, Monhystera stagnalis, Ethmolaimus pratensis.

The Nematoda of the Vorderer Finstertalersee (Kuhtai, Austria) are presented. Five profiles were selected with main sampling stations about every five meters of depth. The benthic fauna is separated into three communities: the littoral-slope-zone, where the nematode fauna is dominated by Ironus tenuicaudatus, the current-angle-zone, faunistically similar to the littoral-slope-zone and the flat-depth-zone, the most important zone for nematode fauna. Quantitatively important species are given. Nematodes live in mud zones rich in water, that is in the topmost 4 cm. Only Tobrilus grandipapillatus penetrates deeper, about 20 mm into the mud. Artificial weight classes and their relative frequency were chosen as the basis for determining the population dynamics. Details are given of Tobrilus cf. grandipapillatus, Monhystera ad stagnalis, Ethmolaimus pratensis, Ironus tenuicadatus, and Tripyla glomerans. The defined yield for the entire lake per year is 66 kg or about 4 kg per ha. Eighty percent of this amount is produced in the flat-depth-zone and 90% by T. grandipapillatus. Seventy-seven percent are produced from October to January, and only 8% between June and September. Reasons for the high production under the ice-cover are not entirely understood. (Jones-Wisconsin)
W75-05746

PHYSICO-CHEMICAL REGIME AND BIOPRODUCTIVE PROCESSES IN LAKE SEVAN (ARMENIA) IN TRANSITION FROM OLIGOTROPHY TO EUTROPHY,
N. A. Legovich, A. G. Markosian, T. M. Meshkova, and A. I. Smolei.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1835-1842, 1973. 3 fig, 6 ref.

Descriptors: *Water levels, *Physicochemical properties, *Productivity, *Eutrophication, Lake morphology, Depth, Benthos, Chara, Aquatic plants, Phytoplankton, Anabaena, Diatoms, Chlorophyta, Cyanophyta, Zooplankton, Bethic fauna, Fish populations.
Identifiers: *Lake Sevan(Armenia), Alpine lakes, Hygroamblystegium irriguum, Polyarthra vulgaris, Arctodiaptomus acutilobatus.

The drain of Lake Sevan's (Armenia) waters over 30 years to meet the needs of the republic's economy has led to decrease of the lake level by 17 m and may be qualified as an experiment unprecedented in the history of limnology. Concurrent changes may be regarded as eutrophication caused by changes in its morphometry. During the summer the hypolimnion shows a progressively increasing oxygen deficit. The reduction of water transparency has nearly doubled. Concentration of the basic ions and the total amount of dissolved substances have undergone slight changes. With the decrease of the lake level the stony-pebbled bottom of the littoral zone has been replaced by sandy and sandy-oozy matter subjected to intensive wave action. Changes in the lake physiochemical conditions have been colsely associated with simultaneous biological changes. The development Chara fragilis and Hygroamblystegium irriguum--the basic representatives of macrophyte in the open lake--has become slower. New algal species have appeared among the phytoplankton of the pelagic zone. Polyarthra vulgaris and Arctodiaptomus acutilobatus have multiplied in zooplankton community. Lake Sevan, with its eutrophication closely related to the morphometric changes can be brought back to its previous state of oligotrophy by raising its water level by at least 7 m. (Jones-Wisconsin)
W75-05747

ON THE DISTRIBUTION OF EURYTERMORA AFFINIS (POPPE) (COPEPODA) IN THE WESTERN SCHELDT ESTUARY,
N. de. Pauw.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1462-1472, 1973. 4 fig, 4 tab, 18 ref.

Descriptors: *Distribution, *Copepods, *Estuaries, Salinity, Dominant organisms, Surface waters, Hypolimnion, Tidal effects, Mud flats, Salt marshes, Dispersion.
Identifiers: *Eurytemora affinis, Western Scheldt Estuary(Netherlands).

Copepods were the main component of the zooplankton in the Western Scheldt Estuary, the Netherlands. Within this group, the holoplanktonic calanoid copepod species Eurytemora affinis occurred in the largest numbers and persisted throughout the year. The salinity-space distribution of E. affinis in the estuary was analyzed and the ways in which the Eurytemora populations maintain themselves in certain areas studied. E. affinis appeared placebound, dependent on a direct import from quiet breeding-places in connection with the main stream as in the case of mud-flat--saltmarsh systems and on an indirect import as in the case of harbors and sluice-docks. This import explains the placebound presence in different geographically separated places along the axis of the estuary and its presence at different chlorinities, varying between sea and freshwater. The stream itself did not appear to have its own autochthonous population. The facts tend to prove that besides physical characteristics of the system, such as the estuarine circulation and the salinity distribution, the hydrogeographical detail struc-

ture of an estuary can be of major importance and can contribute to the maintenance and presence of a species. (Jones-Wisconsin)
W75-05748

EUTROPHICATION,
Yale Univ., New Haven, Conn.
G. E. Hutchinson.
American Scientist, Vol 61, No 3, p 269-279, 1973. 4 fig, 1 tab, 50 ref.

Descriptors: *Eutrophication, History, Colorimetry, Phytoplankton, Productivity, Nutrients, Carbon, Trace elements, Diatoms, Oligotrophy, Cyanophyta.

The meaning of the word eutrophication and its history are explained. Advances in methodlogy made possible the study of the nutrition and production of phytoplankton. Materials dissolved in lake water supporting phytoplankton have three ultimate geochemical sources; some come from the atmosphere (carbon dioxide, nitrogen), others from the ocean and carried in the atmosphere (sulfur, halogens), and some from the lithosphere (phosphorus, biological cations and trace metals). Regarding the elements obtained primarily from the lithosphere, phosphorus is most likely to be limiting. It is apparent that the supplies of phosphorus and combined nitrogen, which usually increase during the winter months are depleted in the spring as the phytoplankton increases. Then the population of bloomforming algae begins to develop. Two lesser chemical aspects of the production of undesirable eutrophy are mentioned; one reason blue-green algae are so conspicuous is because they tend to float at the surfaces of lakes and a second biological feature of blue-green algae is their inedibility by aquatic organisms due to their shape, the gelatinous texture, and possibly to some chemical properties. The selective effect of zooplankton is probably of considerable significance. (Jones-Wisconsin)
W75-05749

THE BIOLOGICAL IMPACT OF RESIDENTIAL REAL ESTATE DEVELOPMENTS IN THE SOUTH FLORIDA COASTAL WETLANDS.
Bureau of Sport Fisheries and Wildlife, Atlanta, Ga.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 672, $3.25 in paper copy; $2.25 in microfiche.

Descriptors: *Environmental effects, *Land development, *Urbanization, Coasts, Wetlands, Dredging, Landfills, Canals, Land use, Drainage, Habitats, Water quality, Tidal effects, Legislation, Bulkheads, Riprap.
Identifiers: *Residential real estate, *South Florida.

The harshest human impact upon South Florida's coastal zone--and most particularly upon its marshes, beaches, and submerged bottoms--has been the wholesale conversion of coastal wetlands to residential real estate. The effects of dredging, filling, and canalizing in the coastal shallow waters and wetlands are summarized and analyzed. Continual dredging and filling is enormously destructive of estuarine biological values. Bottom organisms and vegetation in the offshore bottom area are obliterated by dredging. Recolonization of the bottom area by plants is usually prevented by excessive depths that prevent the penetration of sufficient sunlight for photosynthesis. Recent stringent regulation of submerged land dredging and filling has generated an increase in interior, so called upland canal construction. Whether of the bayfill or 'upland' type, canals and associated fills adversely affect fish and wildlife habitats by direct destruction of wetlands, degradation of water quality, and habitat oversimplification. Canal waterfront property construction radically alters or destroys many habitat niches--even before the predictable chain of events occurs that leads directly to water pollution--before the first road is paved or residence erected. Recommendations are made for minimizing future adverse impact on wetlands by residential real estate developments. (Jones-Wisconsin)
W75-05752

PLANKTON DEVELOPMENT DURING THE FIRST YEARS OF INUNDATION OF THE VAN BLOMMESTEIN (BROKOPONDO) RESERVOIR IN SURINAME, S. AMERICA,
J. van der Heide.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1784-1791, 1973.

Descriptors: *Plankton, *Reservoirs, *South America, Tropical regions, Water temperature, Dissolved oxygen, Thermal stratification.
Identifiers: *Van Blommestein Reservoir, *Suriname River(South America).

Inundation of a large area of tropical rain forest and subsequent filling of the first reservoir for hydroelectric purposes in Suriname, South America was studied for 3-1/2 years. Observations on water temperature and dissolved oxygen and on plankton composition are discussed. In the shifting shore zone rapid oxygen consumption and considerable changes in plankton composition followed inundation of the forest floor. The development at a fixed station showed thermal stratification after the first period of disturbance. In the epilimnion, the oxygen content increased gradually. The plankton composition kept changing continuously in space and time. Certain organisms could be ranged in successional series, others showed periodicity phenomena in agreement with seasonal fluctuations of epilimnion temperatures and oxygen content. After stagnation crustaceans, rotifers, some flagellated green algae (Eudorina) and Euglenophyta increased notably in numbers. In the first months of inundation extensive algal mats (Spirogyra, Mougeotia) and fields of duckweed developed. From the beginning, the water hyacinth (Eichhornia crassipes) spread rapidly from a few colonies already present. Desmids dominated the plankton composition towards the end of the observation period. The epilimnion gradually increased in thickness. (Jones-Wisconsin)
W75-05754

VERTICAL PATTERNS OF PRIMARY PRODUCTIVITY IN CASTLE LAKE, CALIFORNIA,
C. R. Goldman, E. A. Stull, and E. de Amezaga.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1760-1767, 1973. 5 fig, 2 tab, 13 ref. NSF GB 6422X.

Descriptors: *Vertical migration, *Primary productivity, *Biorthyms, Lakes, Photosynthesis, California, Phytoplankton, Thermal stratification, Light penetration, Biomass, Water temperature, Light intensity, Biological communities, Depth, Diatoms, Chlorophyta, Cyanophyta, Ice cover.
Identifiers: *Castle Lake(Calif).

Vertical distribution of peaks in phytoplankton productivity were examined in relation to thermal stratification, biomass distribution, and the distribution of species contributing the most to this biomass. For a single day the relative productivity of four species in relation to temperature, light, and the biological parameters of biomass and phytoplankton community productivity were considered. Primary productivity was measured in situ every 5 days at 11 depths with the C-14 method. Examination of the vertical distribution of productivity for the year, indicates that the highest productivity was very near the surface during the period of ice cover; as the ice melted the near surface maximum dropped to an intermediate depth above the thermocline and tended to fluctuate between 1 and 3 m. Diatoms were found throughout the water column with Tabellaria fenestrata in dominance at 7 m, Chlorophycean Oocystis sp dominant at 10 m, and Cyanophycean Microcystis aeruginosa the most abundant species at 15 m. The nutrient response of the phytoplankton population need no longer be interpreted only in terms of change in biomass or community photosynthesis, but can now be traced to the species that do most of the actual work in lakes. (Jones-Wisconsin)
W75-05755

THE AUTECOLOGY OF SAWGRASS (MARISCUS JAMAICENSIS) IN THE FLORIDA EVERGLADES,
Agricultural Research Service, Fort Lauderdale, Fla.
K. K. Steward, and W. H. Ornes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 608, $3.75 in paper copy; $2.25 in microfiche. Ecological Report No DI-SFEP-74-04, May 1973. 10 p, 4 fig, 11 tab, 11 ref.

Descriptors: *Aquatic plants, *Florida, *Nutrient requirements, Standing crops, Density, Nutrients, Nitrogen, Phosphorus, Potassium, Copper, Marshes, Calcium, Iron, Zinc, Plant growth.
Identifiers: *Sawgrass, *Everglades(Fla), Mariscus jamaicensis.

Investigation results are presented of characteristics of typical stands of sawgrass, Mariscus jamaicensis, in the Florida Everglades. Estimates were obtained of standing crop, plant density, stem length, leaf numbers, growth rate and nutrient relationships in tissue, soil and water, together with daily rainfall and water depths. Monthly estimates of these parameters were obtained over 12 to 18 months in mature stands and in stands regrowing after fires. The mature stands exhibited little seasonal variation within the parameters of standing crop, plant density or concentrations of most inorganic nutrients. Nutrient requirements were determined to be low, since tissue levels of nutrients were low particularly Ca and P, as compared to other species of Everglades macrophytes. Concentration of most nutrients in plants regrowing after fires was high during early growth stages, but decreased to levels found in older plants after 3 to 5 months with the exception of Ca, Fe and Zn. After 18 months' growth burned stands of sawgrass had produced only 38% of the standing crop contained in mature stands prior to burning. The apparent low nutrient requirement of sawgrass may partially explain its dominance in the marsh community. (Jones-Wisconsin)
W75-05757

ECOLOGICAL AND PHYSIOLOGICA CHARACTERISTICS OF THE MOST ABUNDANT SPECIES OF ZOOPLANKTON AN ZOOBENTHOS IN TWO NORTHERN LAKES,
M. B. Ivanova, and A. P. Alimov.
Mitteilungen Internationalen Vereiningung Limnologie, Vol 18, Part 3, p 1479-1487, 1973. 2 fig, tab, 5 ref.

Descriptors: *Animal physiology, *Zooplankto *Benthic fauna, Lakes, Artic, Metabolism, Fee ing rates, Growth rates, Energy transfer, Plan ton, Crustaceans, Productivity, Biological co munities, Cold regions, Larvae.
Identifiers: Lake Krivoe(USSR), La Krugloe(USSR).

Investigations were carried out on two northe lakes, Krivoe and Krugloe, at the White Sea co in Chupa Bay, USSR 30 km from the Polar Circ Some ecological and physiological characterist of the most abundant species of zooplankton a zoobenthos that are necessary for calculation production of these lakes are metabolism r food consumption, food assimilation and grow rate. The metabolism rate was calculated from rate of animal respiration, which were maintai in closed bottles. Filtering rate of planktc

crustaceans was determined by C-14 tracing method. Animals were maintained in submerged tanks in the lakes and their growth rate measured daily. Population/benthos in Lake Krivoe and Lake Krugloe is rather low compared with that in more southern lakes due to the lower water temperature in summer. The efficiency of utilization of assimilated food for growth decreases with the further complication of the structure of the organism--population--biocoenosis system. Planktonic crustaceans can be taken as an example. The highest values of coefficients of biocoenosis were established for the individual growth, the lowest values for planktonic biocoenosis. (Jones-Wisconsin)
W75-05759

THE ROLE OF MICROORGANISMS IN ECOTOXICOLOGY,
Institute for Water and Air Pollution Research, Stockholm (Sweden).
A. Jernelov.
August 1974. 9 p, 4 fig.

Descriptors: *Microorganisms, *Toxins, Toxicity, Metabolism, Metals, Bacteria, Fungi, Mercury, Translocation, Synthesis, Cobalt, Arsenic compounds.
Identifiers: Selenium, Tin, Palladium, Thallium, Plutonium, Methyl mercury, Methylation.

The effects of toxic chemical on microorganisms populations and the secondary effects of microbial population changes on other environmental factors that may affect man are discussed. The other type of interaction between microorganisms and toxic compounds is that where microorganisms affect the chemical compounds. Compounds serving as food are omitted. Metal and metalloid metabolism and especially cases where bacteria and fungi instead of degrading are synthesizing organometal compounds are considered. Conversion of divalent mercury to elementary mercury can be performed enzymatically by many microorganisms and is one way in which microbes detoxify mercury. The other detoxification mechanism through which microorganisms handle divalent mercury--biological formation of mono- or dimethyl mercury--has significance as it leads to accumulation of methyl mercury in fish and to a human health hazard when man consumes fish or other aquatic organisms from mercury contaminated areas. The biological methylation of mercury can be predicted from its behavior and transport pattern in the environment. Biological methylation of selenium has been demonstrated. Tin, palladium and thallium can be methylated while lead, zinc, and cadmium cannot. Plutonium will be a greater problem in case breeder reactors come into common use. (Jones-Wisconsin)
W75-05760

NEARSHORE ZOOPLANKTON OF SOUTHEASTERN LAKE MICHIGAN, 1972,
Michigan Univ., Ann Arbor. Great Lakes Research Div.
J. C. Roth, and J. A. Stewart.
In: International Association of Great Lakes Research, Proceedings 16th Conference Great Lakes Research, p 132-142, 1973. 9 fig, 1 tab, 9 ref.

Descriptors: *Zooplankton, *Lake Michigan, *Biological communities, Varieties, Seasonal, Copepods, Crustaceans, Predation, Primary productivity, Shallow water, Deep water, Standing crop.

Results of collections made in the nearshore region of southeastern Lake Michigan, near Bridgman, Michigan are presented. This was part of the preoperational study of a nuclear power plant site. These data are intended to reveal the seasonal succession of species on the eastern side of the lake and to characterize the differences between inshore and offshore zooplankton assemblages. Three stations, ranging from inshore (1.2 km from shore, 14 m deep) to offshore (11.2 km from shore, 40 m deep), were sampled monthly April to November 1972. Total zooplankton populations ranged from less than 5000 individuals/cu m offshore in April to over 280,000 individuals/cu m inshore in August. In spring fauna was dominated by adult Cyclops bicuspidatus thomasi and adults of four Diaptomus species, with D. ashlandi most numerous, in summer by Bosmina longirostris and in fall by immature copepods and a diverse assemblage of Cladocera including Daphnia retrocurva, D. galeata mendotae, Eubosmina coregoni and Holopedium gibberum. A distinct inshore fauna with more Cladocera and fewer copepods than offshore occurred in summer. It may have been maintained by thermal stratification, fish predation or high inshore primary productivity. (Jones-Wisconsin)
W75-05761

DENITRIFICATION IN INDIANA LAKE, RESERVOIR, AND POND SEDIMENTS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5B.
W75-05785

ENVIRONMENTAL FACTORS AFFECTING THE PROPERTIES AND PRECIPITATION OF COLORING COLLOIDS IN AQUATIC HABITATS,
Louisiana State Univ., New Orleans. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W75-05787

THE RELEASE OF PHOSPHORUS FROM POND SEDIMENTS AND ITS AVAILABILITY TO LEMNA MINOR L.,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
A. Fekete.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-240 486, $4.75 in paper copy, $2.25 in microfiche. Master's Thesis, October 2, 1973. 94 p. OWRT A-034-NJ(2). 14-31-001-3830.

Descriptors: Aquatic plants, *Bioassay, *Ponds, *Bottom sediments, Aerobic conditions, *Phosphorus, Water pollution effects, *Eutrophication, Anaerobic conditions, *Pollutant identification, *Analytical techniques.
Identifiers: Duckweed, *Lemna minor L.

Results are reported of a study of the availability of P released from pond sediments under aerobic and anaerobic conditions to Lemna minor L. A bioassay technique using Lemna to measure available P was developed and the results compared to chemical assays. A preliminary study showed that frond numbers, root length, frond diameter, and dry weight consistently reflected P concentrations in solution. Three sediments having low, medium and high NH4F+HCl-extractable P were incubated under aerobic and anaerobic conditions in minus P nutrient solutions. Lemna were then cultured in the decanted solutions. Greater release of available P took place under anaerobic conditions than under aerobic conditions. Extractable P values of the sediments correlated well with bioassay growth responses. Levels of total P in the sediments and the chemically assayed P removed from the incubated solutions showed no relationship to the extractable P of the sediments or the bioassay responses of the Lemna. These findings illustrate the superiority of the bioassay over chemical methods in the estimation of P availability to aquatic plants and the greater release of P from sediments under anaerobic conditions. (Riemer-Rutgers)
W75-05789

THE ECOLOGY OF THE PLANKTON OF THE CHESAPEAKE BAY ESTUARY,
Johns Hopkins Univ., Baltimore, Md.
W. R. Taylor.
Available from the National Technical Information Service, Springfield, Va. 22161 as COO 32796, $9.50 paper copy, $2.25 microfiche. Progress Report September 1972 - June 1973. 54 p, 1 fig, 6 tab, 8 ref. AEC AT(11-1)-3279.

Descriptors: *Chesapeake Bay, *Nutrients, *Estuaries, *Primary productivity, Nitrates, Nitrites, Ammonia, Color, Phosphorus, Carbon, Chlorophyll, Nitrogen, Phosphates, Carbon, Analytical techniques.

The major nutrient constituents in the Chesapeake Bay estuary were studied to establish a bay-wide baseline for chemical oceanography studies and to determine whether the major nutrients were at any time of the year possible limiting factors in primary productivity. Nitrate and nitrite analyses were made with a Technicon Autoanalyzer II system. Ammonium ion concentrations were determined. The final color was measured on the Autoanalyzer using only the sampler pump, colorimeter with 630 nm filter and the recorder. Phosphorus analyses were run on the Autoanalyzer. Total dissolved carbon and inorganic carbon were determined with a Beckman Model 915 Carbon Analyzer. Dissolved organic carbon was taken as the difference between these quantities. Chlorophyll-a, chlorophyll-b, chlorophyll-c and phaeophytin analyses were done by the fluorometric method. In order to obtain both organic and total components, the ultraviolet irradiation method of Armstrong et al., was employed to oxidize aliquots of the samples. Preliminary results of nutrient analyses from Aesop Cruises are tabulated. Recoveries as nitrite plus nitrate of nitrogen after UV irradiation are given. Computation of typical correction factors for northern bay stations on Aesop 9 Cruise is shown. (Jones-Wisconsin)
W75-05792

ON THE SPACE/TIME SCALE QUESTIONS IN LIMNOLOGICAL SYSTEMS ANALYSIS,
Cleveland State Univ., Ohio.
F. M. Galloway.
Water - 1973, American Institute of Chemical Engineers Symposium Series, Vol 70, No 136, p 40-49, 1974. 10 fig, 11 ref.

Descriptors: *Mathematical models, *Lakes, *Dimensions, Temporal Distribution, Spatial distribution, Pollutants, Algae, Great Lakes, Phosphorus, Mixing, Circulation, Eutrophication, Dispersion, Diffusivity, Physicochemical properties.
Identifiers: *Space/time scale.

While the available computer capabilities place practical constraints on the choice of space/time scale, it is the space/time constants of the physical-chemical phenomena involved that impose scale requirements for realistic answers to a given problem. This has seemingly been ignored in many limnological systems modeling efforts to date. Specific examples of space/time constants for physical-chemical phenomena basic to Great Lakes limnological modeling efforts are examined. The first example concerns the uptake of phosphorus by algae, an important reaction in eutrophication models. It is shown that large differences in predicted maximum concentrations of algae can occur depending on whether a two mile or ten mile space scale is used. This implication for eutrophication modeling is that important phenomena can be missed by choosing a space/time scale that is too large. The second set of examples concern lake circulation and mixing. It is implied that in many cases it may be completely satisfactory to use the vertically integrated flow in a two-dimensional model to predict circulation and mixing, rather than using a three-dimensional model. Proper choice of space/time scale is essential for efficient, accurate limnological systems models. (Jones-Wisconsin)
W75-05794

A MATHEMATICAL SIMULATION OF LAKE ECOLOGY AND CONTROL OF ITS BALANCE,
University of Western Ontario, London. Faculty of Engineering Science.
J. T. T. Yang, and A. I. Johnson.
Water - 1973, American Institute of Chemical Engineers Symposium Series, Vol 70, No 136, p 66-82, 1974. 10 fig, 99 ref.

Descriptors: *Mathematical models, *Computer models, *Lakes, *Ecosystems, Biomass, Algal control, Zooplankton, Bacteria, Fish, Biochemical oxygen demand, Nutrients, Oxygen, Temperature, Equations, Herbivores, Energy transfer.
Identifiers: DYSYS computer program.

Up-to-date literature on the system approach to modeling aquatic ecosystems is surveyed and a model is developed for a lake ecosystem using Pontryagin's maximum principle for the control of lake ecosystems. The model includes a moderately large number of variables which are representative of the major biological, chemical, and physical components of the lake. The interaction of various species is simulated using the flexible modular simulation program DYNSYS. A major advantage in using the DYNSYS approach is that it allows independently developed ecosystem modules to be linked together into a larger system. Eventually a global model could be constructed in a systematic manner. A feed-forward scheme is proposed for the control of the aquatic ecosystem from the disturbance caused by a BOD load applied to the lake from an inlet stream. Simulation results of this have been obtained. An optimal control problem for undersirable algae using aquatic herbivores was formulated, and the optimal stocking and fishing rate was synthesized. The model developed is useful in describing some observed ecological phenomena and for estimating ecological changes due to pollution. Above all it is valuable for the development of strategies and means for controlling undesirable ecological changes. (Jones-Wisconsin)
W75-05795

REMOVING IN EXCESS OF 99% PHOSPHORUS AT ELY, MINNESOTA,
Graver Water Conditioning Co., Union, N.J.
R. L. Wilcox.
Water - 1973, American Institute of Chemical Engineers Symposium Series, Vol 70, No 136, p 358-366, 1974. 13 fig, 11 ref.

Descriptors: *Pollution abatement, *Lakes, *Eutrophication, *Nutrient removal, Waste water treatment, Tertiary treatment, Pilot plants, Sewage effluents, Phosphorus, Minnesota.
Identifiers: *Shagawa Lake(Minn), Lake restoration, Demonstration project.

Shagawa Lake at Ely, Minnesota was chosen for a lake restoration demonstration because its location allows nutrient input to be reasonably well controlled, monitored, and results anticipated within a few years. An advanced wastewater treatment plant is now being constructed for addition to the existing conventional trickling filter plant. Primary objective of the plant is to achieve a residual of 0.05 mg/l total phosphorus in all municipal wastewater discharge to Shagawa Lake and it is also designed to meet Minnesota effluent quality standards. This lake was also chosen for the experiment because it has a history of algal blooms, has received municipal wastewater effluent for many years, there is no significant agriculture and no industry except iron mining and logging, hence it was expected that municipal wastewater was the major nutrient source. The eutrophic state of the lake is uncommon in northeastern Minnesota and its water quality is particularly important because its outflow passes through parts of the Superior National Forest, Boundary Waters Canoe Area, and Canada. This project should demonstrate more conclusively than ever before, whether it is possible to reverse the eutrophication process by eliminating to greatest extent possible a major nutrient constituent. (Jones-Wisconsin)
W75-05796

ECOLOGICAL EFFECTS OF HEAT IN THE RIVER,
North Carolina Univ., Asheville.
J. Bernhardt.
Water - 1973, American Institute of Chemical Engineers Symposium Series, Vol 70, No 136, p 415-424, 1974. 7 fig, 7 ref.

Descriptors: *Balance of nature, *Heated water, *Effects, Ecotypes, Oxygen sag, Food chains, Water temperature, Fishkill, Growth rates, Dominant organisms, Fish, Herbivores, Aquiculture, Bass, Chara, Thermal pollution.
Identifiers: Tilapia mossambica, Lake Julian(NC), Synergistic interactions.

An aquatic system may be considered as a steady state system integrating physical, chemical and biological factors at the cell level, the organism, and the population. The major effects of heat are to make oxygen a limiting factor and to alter the steady state. To maintain full oxygenation it is important that nutrients be kept at low levels in heated waters. This should prevent blooms, which consequently should reduce oxygen stress, stabilize community structure, and lessen the dominance of blue-green algae. Biological viability and growth are affected by heat stress. Species diversity generally decreases with thermal stress. Food chains become simpler and populations are subject to more erratic fluctuations. Fish kills are conspicuous but effects of heated effluents are deceptive; they may result from any combination of stresses, i.e., the related problems of temperature and oxygen stress and species-specific pathogens. Synergistic interactions of stresses are important considerations in heated systems. For example, acceptable levels of substances such as copper sulfate become quite lethal as water temperatures rise. Thermal gradients form barriers to fish movement. Thermal beneficiation may be seen in improved growth rate of sport fish and the potential of aquiculture. (Jones-Wisconsin)
W75-05797

PRELIMINARY MODEL OF POTOMAC ESTUARY PHYTOPLANKTON,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
R. V. Thomann, D. Di Toro, and D. J. O'Connor.
Journal of the Environmental Engineering Div., American Society of Civil Engineers, Vol 100, No EE2, p 699-715, 1974. 9 fig, 2 tab, 8 ref.

Descriptors: *Mathematical models, *Phytoplankton, *Potomac River, *Estuaries, Chlorophyll, Water quality, Sewage effluents, Nutrient removal.
Identifiers: Potomac Estuary, Waste load.

A preliminary model of the dynamic phytoplankton behavior in the Upper Potomac Estuary is presented. This research extends previous modeling efforts on the Potomac to incorporate explicitly space-time variability of chlorophyll-a as a water quality parameter, indicative of a eutrophied environment. This model is intended to shed further light on the water quality changes that can be expected when a waste reduction program is completed. A nonlinear dynamic model of phytoplankton chlorophyll verifies the observed 1968 and 1969 phytoplankton and nutrient temporal and spatial trends and approximately verifies the associated concentration levels. The data for 1968 were used to tune the model and the 1969 data were then used for independent verifications using coefficients from 1968 data and changing only flow, temperature, and incoming boundary conditions for the 1969 verification. Late fall phytoplankton blooms were not completely verified and a late winter bloom was not verified. Phytoplankton species discrimination is not incorporated. Models of this type require additional evaluation and testing. Thus, further refinement of the model is necessary before definitive statements can be made of the effects of nutrient reduction on phytoplankton chlorophyll in Upper Potomac Estuary. (Jones-Wisconsin)
W75-05798

EUTROPHICATION IN THE HIGH ARCTIC--MERETTA LAKE, CORNWALLIS ISLAND (75 DEGREE N LAT.),
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler.
Journal Fisheries Research Board of Canada, Vol 31, No 5, p 647-662, 1974. 16 fig, 3 tab, 14 ref.

Descriptors: *Eutrophication, *Arctic, *Canada, Sewage effluents, Cold regions, Ice cover, Phytoplankton, Cycling nutrients, Standing crops, Oxygen sag, Physical properties, Self-purification, Sediments, Biological communities.
Identifiers: *Meretta Lake(Cornwallis Island), Char Lake(Canada).

Meretta Lake on Canada's Cornwallis Island, which has received sewage effluent from a transport base at Resolute Bay for over two decades, offered an ideal situation to evaluate eutrophication in the high arctic. Minimum annual input of phosphorus was 0.24-0.29 g/sq m of lake surface per year in 1971, with 66-80% supplied by sewage. Nitrogen input was 0.55-0.78 g/sq m during the same year, with 41 to 58% from sewage. Several explanations are suggested for the fact that a steady state has not developed. The significance of sediments in the annual chemical regime of Meretta Lake contrasts to nearby oligotrophic Char Lake. The sediments of both lakes have similar mineral composition, but Meretta sediments contribute substantially to the chemical composition of the water of all elements except nitrogen, phosphorus, and sulfur, whereas in Char Lake only silica is supplied by the sediments to any significant degree. The sewage input to Meretta Lake is undoubtedly responsible for the difference. The fact that neither phosphorus nor nitrogen is returned from sediments in spite of high influxes of these elements and low oxygen concentrations, is of particular significance, indicating that the lake would quickly return to natural conditions once the sewage input ceased. (Auen-Wisconsin)
W75-05799

RECOMMENDATIONS OF THE GALVESTON BAY ENFORCEMENT CONFERENCE.
Texas Water Quality Board, Austin; and Environmental Protection Agency, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-230 083, $5.25 paper copy, $2.25 microfiche. Progress Report, October 1972. 93 p, 7 fig, 7 tab.

Descriptors: *Bays, *Texas, *Regulation, *Pollution abatement, Estuaries, Commercial shellfish, Oil pollution, Dredging, Color, Biochemical oxygen demand, Water pollution, Pathogenic bacteria, Municipal wastes, Industrial wastes, Treatment facilities, Water pollution sources, Permits, Disinfiction.
Identifiers: *Galveston Bay(Texas), Houston Ship Channel(Texas), Regional waste treatment plants.

This conference was held to review the existing water quality situation of Galveston Bay and to la a basis for future action. Among the recommenda tions included are that all wastes contributing bac teriological pollution will be disinfected; the Texa Water Quality Board will continue its efforts t consolidate all small waste treatment plants. study is being conducted on all sources of mu nicipal and industrial wastes permitted by th Texas Water Quality Board to discharge effluen to Galveston Bay and its tributaries. These ex aminations shall emphasize determination of com plex organic compounds, heavy metals and othe potentially toxic substances, and oil and greas

from each waste source. Permits will be amended as necessary to insure that the best reasonable available treatment is provided relative to discharges of oil and grease. Greater reductions of waste will be required of waste dischargers. A characterization and evaluation of the water quality sigificance of materials contained in the organic sludge dredged from the Houston Ship Channel shall be conducted. Chemical constituents causing color, such as those from pulp and paper mills, shall be reduced. It is expected that the maximum waste load will be reduced to about 35,000 pounds per day of five-day BOD. (Jones-Wisconsin)
W75-05801

THE FRESHWATER FISHES AND FISHERIES OF SOUTH FLORIDA,
Bureau of Sport Fisheries and Wildlife, Atlanta, Ga.
J. P. Crowder.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 631, $3.75 paper copy, $2.25 microfiche. Ecological Report No DI-SFEP-74-26, February 1974. 29 p, 9 tab, 11 ref.

Descriptors: *Freshwater fish, *Fisheries, *Florida, Canals, Marshes, Sunfishes, Eutrophication, Catfish, Sport fish, Commercial fish, Nutrient removal, Fish harvest, Varieties, Pounds of fish per acre, Water level fluctuations, Fish populations, Fish diets.
Identifiers: *South Florida, Everglades(Fla), Lake Okeechobee(Fla), Big Cypress(Fla).

Native species of fishes of Florida and adjacent waters are listed by family and their common and scientific names. Accumulated data may be incorporated into a systems model for the purpose of better defining the relationships of fishes to each other, to their habitats, and to the other animal life forms, including man, in South Florida. All of the important freshwater sport fishes of South Florida belong to the family Centrarchidae, the sunfishes. The largemouth bass sport fishery of the Everglades is intimately associated with and vitally dependent upon the canals. Lake Okeechobee, a major regional and national sport fishery resource, has recently been evaluated as in an early eutrophic condition. It supports the only important freshwater commercial fishery in the South Florida Ecological Study area. Recommendations are the current legal restrictions on fish harvest from Lake Okeechobee be substantially relaxed, and that a renewed effort be undertaken to re-institute a commercial fishery for panfishes and other fishes, excepting largemouth black bass, having a market potential, as a method of nutrient removal. References of inventories, samples, and measurements of fish populations in south Florida are given. (Jones-Wisconsin)
W75-05802

DIATOMS IN LAKES AND LAKE SEDIMENTS AS AN INDEX TO ENVIRONMENT. PART 1. DIATOM STRATIGRAPHY AND HUMAN SETTLEMENT IN MINNESOTA,
Minnesota Univ., Minneapolis.
E. P. Bradbury.
Available from the National Technical Information Service, Springfield, Va. 22161, as COO 0461, $6.75 paper copy, $2.25 microfiche. Final Report, May 1969-April 1972. 89 p, 17 fig, 2 tab, 52 ref. AEC AT(11-1)-2046.

Descriptors: *Geologic history, *Diatoms, Sediments, *Stratigraphy, Minnesota, South Dakota, Cores, Human population, Eutrophication, Palynology, Paleolimnology.
Identifiers: *Cultural impact, Shagawa Lake(Minn), Elk Lake(Minn), Pickerel Lake(SD), Detroit Lakes Area(Minn), Lake Sallie(Minn), St. Clair Lake(Minn), Lake Minnetonka(Minn), Tanager Lake(Minn).

The principal factors that make diatoms important microfossils for studying the history of aquatic environments are their abundance, ecologic diversity, preservation, identification, and quantification. Fossil diatom assemblages in short cores of lake sediment from nine environments in seven lakes in Minnesota and South Dakota show the reaction of diatoms to limnologic changes associated with lacustrine enrichment following Euro-American settlement. The time of settlement is stratigraphically determined by a rise in the proportion of Ambrosia pollen and by other sediment characteristics. Changes in diatom stratigraphy are interpreted in the context of local settlement history and its probable limnologic effect. The common diatoms occurring in Minnesota lake deposits can be grouped broadly into two major habitat types: planktonic and benthic. As lakes become increasingly enriched with nutrients, the summer diatom plankton is replaced by blue-green algae, which leave no fossil record. The stratigraphic record is dominated instead by late winter and spring diatoms, which prosper in eutrophic water. There are several variations on this theme, Depending on the initial trophic state and other limnologic characteristics, but overall, the diatom stratigraphy of a lake is an effective way to measure the cultural impact on the lake ecosystem. (Jones-Wisconsin)
W75-05805

HOW TO READ A FISH KILL,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 5A.
W75-05812

5D. Waste Treatment Processes

LIVESTOCK MANURE DISPOSAL VIA HYDROGASIFICATION,
Kansas Water Resources Research Inst., Manhattan.
H. F. Rosson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 960, $5.75 in paper copy, $2.25 in microfiche. KWRRI Contribution No. 155, December 1974. 126 p, 24 fig, 36 tab, 33 ref, 4 append. OWRT A-051-KAN(1). 14-31-0001-3516.

Descriptors: *Feed lots, Water pollution, *Farm wastes, *Waste disposal, Gases, Livestock, *Waste water treatment, Energy, Organic compounds.
Identifiers: *Hydrogasification, Hydrogasification yields, Optimum water content, Molten salt, Manure disposal, Supplemental energy, Low sulfur gases, Hydrocarbon gases, Batch reactions.

Manure could be an important source of carbonaceous material and its hydrogasification could help solve the water pollution potential of feedlots as well as provide a supplemental energy resource. Manure can be hydrogasified to produce a mixture of low sulfur gases containing principally water, hydrogen, methane, ethane, and carbon dioxide. The yield of hydrocarbon gases in batch reactions is dependent on the reaction temperature and the hydrogen feed to carbon ratio with higher values producing higher yields. The presence of water is beneficial to yield with an optimum initial water content in the manure of about 50%. When using a molten carbonate salt reaction medium, the optimum initial water content may be slightly smaller. The hydrogasification thermic yield is defined to be the heating value of the dry product gases minus the heating value of the hydrogen feed per unit mass of manure. At a reaction temperature of 1050 degrees F, a maximum thermic yield of 3700 Btu/lb dry manure occurs at a hydrogen feed to carbon ratio of about 0.25 moles/mole. Use of a salt medium increases hydrocarbon yield slightly and increases thermic yield to a maximum of about 5500 Btu/lb dry manure at a hydrogen feed to carbon ratio of .93 moles/mole.
W75-05351

FEASIBILITY STUDIES OF THE PARTITIONING OF COMMERCIAL HIGH-LEVEL WASTES GENERATED IN SPENT NUCLEAR FUEL REPROCESSING: ANNUAL PROGRESS REPORT FOR FY-1974,
Oak Ridge National Lab., Tenn.
W. O. Bond, and R. E. Leuze.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT. No. ORNL-5012, $5.45 in paper copy, $2.25 in microfiche. Report ORNL-5012, January 1975. 108 p, 15 fig, 15 tab,371 ref.

Descriptors: *Feasibility studies, *Radioactive waste, *Research and development, *Waste treatment, *Separation techniques, *Solvent extraction, Ion exchange, Neptunium, Uranium, Plutonium, Americium, Curium, Fuels, Nuclear powerplants.
Identifiers: Fuel reprocessing, *Actinides.

Feasibility studies for removing long-lived actinides from high-level waste have been evaluated on a preliminary basis. Results indicate that it may be possible to remove actinides to a sufficiently low level to decrease the potential hazard of high-level waste at 1000 years to a value comparable to that of naturally occrring uranium minerals. The feasibility study was directed primarily at high-level waste generated by the commercial reprocessing of light-water reactor fuel. A research and development program is required to determine whether these separations processes can be modified successfully and adapted to achieve the necessary separations and, in turn, be integrated into a functional waste processing facility at the expected levels of radioactivity. Data obtained thus far indicate that the most promising concept for achieving the desired removals of actinides will require improved recovery of actinides in conventional reprocessing of fuels as well as secondary processing of the waste. Present laboratory studies are designed to pin-point the advantages of promising potential processes and to resolve some of the difficult chemical problems. (Houser-ORNL)
W75-05368

FEASIBILITY STUDIES FOR DECONTAMINATION AND DENSIFICATION OF CHOP-LEACH CLADDING RESIDUES,
Battelle-Pacific Northwest Labs., Richland, Wash.
B. Griggs.
Available from NTIS, Springfield, Va. as REPT. No. BNWL-1820, $5.45 in paper copy, $2.25 in microfiche. Report BNWL-1820, July 1974. 54 p, 1 fig, 11 tab, 83 ref.

Descriptors: *Radioactive wastes, Liquids, *Nuclear wastes, *Waste treatment, *Waste disposal, Research and development, Streamflow, Gases, Aqueous solutions, Metals, Separation techniques, Density, Uranium, *Feasibility studies.
Identifiers: *Decontamination.

The properties of the chop-leach cladding hull waste stream are reviewed with respect to aqueous, molten salt, and molten metal decontamination. The removal of transuranic contamination and densification of the waste stream by melting appear feasible but technically difficult to produce an acceptable product with only a small increase in the mass of the total waste stream. Research is indicated to develop a process utilizing a gaseous film alteration, aqueous film removal and etching, and flux extraction of the molten metal. (Houser-ORNL)
W75-05371

CHEMICAL ENGINEERING DIVISION, WASTE MANAGEMENT PROGRAMS, QUARTERLY REPORT, APRIL-JUNE 1974,
Argonne National Lab., Ill.
M. J. Steindler, N. M. Levitz, W. J. Seefeldt, and L. E. Trevorrow.
Available from NTIS, Springfield, Va. as REPT. No. ANL-8134, $5.45 in paper copy, $2.25 in microfiche. Report ANL-8134, November 1974. 50 p, 11 fig, 5 tab, 80 ref.

Descriptors: *Radioactive waste disposal, *Soilds, *Underground waste disposal, *Underground storage, *Retention, Safety, Stability, Storage tanks, Specific retention, Evaluation, Research and development, Degradation, Metals.
Identifiers: Decontamination.

Effort on several diverse areas of work related to the study of consolidation techniques for fuel-cladding hulls is reported, along with an outline of the program for FY-1975. The emphasis of work was shifted largely to reviewing information on processes that have applicability to the decontamination of hulls, and finding sources of and negotiating for a supply of irradiated Zircaloy for the upcoming experimental program. A brief review is presented of the program for FY-1974 on the salvage of alpha-contaminated metals. An assessment of pertinent information indicates that a pyrochemical concept appears to be the most suitable approach to solving the problem of decontamination and salvage of alpha-contaminated metals. (Houser-ORNL)
W75-05383

FEASIBILITY AND ALTERNATE PROCEDURES FOR DECONTAMINATION AND POST TREATMENT MANAGEMENT OF PU-CONTAMINATED AREAS IN NEVADA,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 5G.
W75-05384

REVIEW OF THE ENGINEERING ASPECTS OF POWER PLANT DISCHARGES,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5B.
W75-05386

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION: ANNUAL REPORT, JULY, 1972-JUNE, 1973,
Argonne National Lab., Ill.
G. J. Vogel, M. Haas, W. Swift, J. Riha, and C. B. Schoffstoll.
Available from the National Technical Information Service, Springfield, Va., 22161, as Rept. No. ANL/ES-CEN-1006 and EPA-650/2-74-057. $5.45 in paper copy, $2.25 in microfiche. Report ANL/ES-CEN-1006 and EPA-650/2-74-057, June 1973. 131 p, 31 fig, 27 tab, 6 ref.

Descriptors: *Air pollution, *Waste treatment, *Waste disposal, *Gases, *Trace elements, Burning, Chemical reactions, Oxidation, Fuels, Coals, Sulfur compounds, Powerplants.
Identifiers: *Combustion, *Fluidized-bed.

The program for demonstrating the feasibility of fluidized-bed combustion for possible use in power and steam plant applications is divided into three studies: (a) combustion of fossil fuels in a pressurized combustor, (b) regeneration of sulfated additive for reuse in the combustor, and (c) evaluation of the type and level of trace-element pollutants in the flue gas. A fluidized-bed combustion pilot plant and a fluidized-bed regenerator, both capable of operating at 10-atm pressure, have been tested and operated. In combustion of coal at 9-atm pressure and 1550 degrees F (843 degrees C), high (greater than 90%) retention of sulfur in the fluidized bed of dolomite has been obtained with continuous addition of fresh dolomite at a Ca/S ratio of 3. The NO level in the flue gas has been low, less than 150 ppm. Two favored methods for regenerating the sulfated dolomite have been studied: a one-step reductive decomposition of the CaSO4 to CaO at about 1950 degrees F to release SO2, and a two-step process consisting of reducting of CaSO4 to CaS at about 1700 degrees F followed by reaction of CaS with H2O/CO2 to release H2S. Complete release of sulfur from the particles has not been achieved by either regeneration method, and decreption of the particles has been observed. Equipment has been constructed and analytical methods have been selected for determining the quantity and concentration of trace element pollutants in solid or gaseous form in the flue gas. (Houser-ORNL)
W75-05392

QUARTERLY PROGRESS REPORT: RESEARCH AND DEVELOPMENT ACTIVITIES, WASTE FIXATION PROGRAM, APRIL THROUGH JUNE 1974,
Battelle-Pacific Northwest Labs., Richland, Wash. Nuclear Waste Technology Dept.
Available from the National Technical Information Service, Springfield, Va. 22161, as Rept. No BNWL-1841, $5.45 paper copy, $2.25 microfiche. Report BNWL-1841, July 1974. 89 p, 36 fig, 13 tab.

Descriptors: *Management, *Radioactive waste disposal, *Waste water treatment, *Solids, *Liquids, Evaporation, Waste storage, Alternative planning, Safety, Evaluation, Research and development.
Identifiers: *Waste fixation, Product characterization.

Progress is reported for the research and development activities of the waste fixation program. Efforts in commercial waste fixation, product characterization, alternative waste fixation schemes, and safety and systems evaluation are summarized. (Houser-ORNL)
W75-05393

TELEMETRY IN WATER POLLUTION CONTROL,
South Yorkshire Metropolitan Country Council (England).
J. R. Holmes.
Water Pollution Control, Vol 73, No 4, p 433-442, 1974. 11 fig.

Descriptors: *Telemetry, *Water pollution control, Sewage treatment, Computers, Automation, Equipment, Monitoring, *Waste water treatment.

Telemetry and data transmission are applicable to water and sewage treatment. The use of sophisticated computer equipment is described, both analysis and treatment are made by remote control. A total feedback loop is not presently possible, one by which equipment would monitor the incoming effluent, select the appropriate treatment, and direct the sewage treatment machinery with outfall instrumentation. Parts of this system, however, are feasible. Described are multiplexing, transmission media, autodialling monitoring systems, the operational outstation, and the operational master station. (Prague-FIRL)
W75-05397

DESCRIPTION OF A NEW WASTE WATER ANALYZER FOR LABORATORIES (RESPIROMETER) (IN HUNGARIAN),
For primary bibliographic entry see Field 5A.
W75-05398

THE RECLAMATION OF WATER FROM SEWAGE EFFLUENTS BY REVERSE OSMOSIS,
Water Pollution Research Lab., Stevenage (England).
D. A. Bailey, K. Jones, and C. Mitchell.
Water Pollution Control, Vol 73, No 4, p 353-366, 1974. 8 fig, 3 tab, 40 ref.

Descriptors: *Water supply, *Reverse osmosis, Effluents, *Sewage treatment, *Water reuse, Reclamation, Costs, *Waste water treatment, Treatment facilities.
Identifiers: United Kingdom.

A major water supply source in the United Kingdom is river water; the problem of reclamation of this source of water from effluents for direct reuse is discussed. Several techniques have been considered for reclaiming water from secondary sewage effluents. These include treatment with activated carbon, chemical treatment, treatment with ozone, ion exchange, and thermal and membrane processes. The process of reverse osmosis is described in detail. A reverse-osmosis system gives adequate mechanical support to a membrane while providing suitable hydrodynamic conditions for the process water to reach and be removed from the membrane surface. The process removes organic and inorganic substances present in solution. The efficiency of removal of each species depends on ionic charge, molecular weight, and chemical properties. Bacteria and viruses can be removed from solution by this treatment method. In economic terms, the performance and useful life of membranes critically affects the costs of a reverse-osmosis plant. The maximum flux which can now be economically maintained is of the order of 0.5 cu m/d. Further study, however, is being conducted on developing membranes with increased permeability without loss of desalinating properties. (Prague-FIRL)
W75-05399

REMOVAL OF HEAVY METAL CONTAMINANTS FROM FLUID STREAMS,
Atomic Energy Commission, Washington, D.C.
E. L. Albenesius, E. R. Russell, D. W. Tharin, and A. R. McJunkin.
Available from the National Technical Information Service, Springfield, Va. 22161 as PAT APPL 414 029, $4.00 in paper copy, $2.25 in microfiche Patent Application Number 414, 029, November 1973. p 18, 5 fig.

Descriptors: *Heavy metals, *Industrial wastes *Waste water treatment, *Mercury, *Water pollution, Sulfur, Sorption, Rubber, Arsenic compounds, Lead, Copper, Gold.

A fluid containing heavy metal contamination is decontaminated by intimately contacting the fluid with a sulfur bearing shredded rubber material. The method is particularly applicable in removing mercury from aqueous industrial waste solutions. Other contaminating metals that may at least be partially removed from solution include arsenic, lead, copper, silver, gold and platinum. Contact between the solution and rubber can be made in a continuous or a batch type process as well as in a series of batch type stages. Continuous flow through a column containing shredded rubber materials acts to filter out undissolved particles as well as to sorb dissolved metal from the solution. Shredded rubber can also be distributed in seepage or retention ponds to at least partially purify the waste liquid. (Pulliam-Vanderbilt)
W75-05412

DAVIS COUNTY COMPREHENSIVE STUDY CULINARY WATER, PRESSURE IRRIGATION WATER, SANITARY SEWERAGE.
Davis County Planning Commission, Farmington, Utah.
For primary bibliographic entry see Field 3F.
W75-05418

SEWAGE TREATMENT DIVISION REPORT 1970-1971-1972, CITY OF EUGENE (OREGON)
Eugene Dept. of Public Works, Oreg. Sewage Treatment Div.
1973, p 28, 5 fig, 12 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Municipal wastes, *Operation and maintenance, *Treatment facilities, *Trickling filters, Oregon, Sewage, Operating costs, Public utilities, Sewage sludge disposal, Sewage sludge disposal, Sewage systems, Sewerage, Sewers.
Identifiers: *Eugene(Oregon).

Operational data, problems and needs for the Eugene, Oregon Water Pollution Control Plant are summarized. The treatment plant operates as a trickling filter. Incoming raw wastewater is (1) screened or comminuted, (2) passed through a primary clarifier for sedimentation, (3) treated biologically by the trickling filters, (4) passed through a secondary clarifier and (5) discharged into the Willamette River. A portion of the wastewater is recycled through the trickling filters. Operational problems and facility deficiencies are identified and recommendations are given for correction. The 1970 additions more than came up to expectations on improving plant performance. The plant did meet all state requirements during 1972. However, the continually increasing load will soon produce a shortage of plant capacity. Immediate consideration should be made to plan for more capacity since there is a three year lag from start of planning to use of the facilities constructed. The separation of storm from sanitary sewer program, plus the increased treatment capacity resulting from the 1970 primary clarifier addition, has for all practical purposes, eliminated any by-passing of raw sewage during the rainy season. Flows up to 45 MGD receive primary and secondary treatment. (Poertner)
W75-05429

COMPREHENSIVE WATER AND SEWER PLAN, BRADLEY COUNTY, TENNESSEE.
Sanders (B.G.) and Associates, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 6B.
W75-05430

THE ENVIRONMENTAL FLOW OF CADMIUM AND OTHER TRACE METALS: VOLUME I,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5B.
W75-05431

ELECTROCHEMICAL REMOVAL OF HEAVY METALS FROM ACID MINE DRAINAGE,
Ecotrol, Inc., Columbia, Md.
N. B. Franco, and R. A. Balaouskus.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-232 764, $4.75 in paper copy, $2.25 in microfiche. EPA Report No 670/2-74-023, National Environmental Research Center, Cincinnati, Ohio, May, 1974, 95 p, 24 fig, 19 tab, 31 ref.

Descriptors: *Electrochemistry, *Acid mine water, *Heavy metals, *Waste water treatment, Economics, Electrolysis, Waste water, Acid streams, Mine drainage, Hydrogen ion concentration, Electrodes, Economic efficiency, Water pollution, *Costs, Mine drainage.

Laboratory and field studies were conducted to determine the economics of ferrous iron oxidation in a cell containing a bed of conductive particles in the space between the cathode and the anode. The effects of the process on other heavy metals present in acid mine drainage (AMD) and on the character of solids precipitated during treatment of low acidity water were also observed. An 18.9 liter/min (5 gal./min) pilot plant was operated at an actual mine site to evaluate treatment of 40 and 250 ppm ferrous iron AMD at pH levels of 2 and 5. A conventional aeration system was also included to generate comparative data. Approximately 86 percent of the ferrous iron was oxidized during electrolysis of the low pH water. The conversion rate was less in the pH 5 AMD due to coating of electrode sites with ferric hydroxide. A 4 to 10% decrease from 4 ppm occurred in manganese concentration, while alluminum feed values of approximately 1 ppm were reduced by 40 to 60% especially in the pH 2 water. Estimates for a 473 litter/min (125 gal./min) plant based on the pilot data for oxidation only indicate that capital and operating costs for electrochemical treatment would be higher than those for aeration by factors of 5 and 1.7 respectively. (Pulliam-Vanderbilt)
W75-05433

CONTROL OF MERCURY IN EFFLUENTS FROM CHLORINE PLANTS,
Swedish Water and Air Pollution Research Lab., Stockholm.
H. O. Bouveng.
Pure and Applied Chemistry, Vol 29, Nos 1-3, p 75-91, 1972. 5 fig, 3 tab, 11 ref.

Descriptors: *Mercury, *Water pollution control, *Pollution abatement, *Heavy metals, *Industrial wastes, Chlorine, Environmental effects, Water pollution sources, Water pollution, Toxicity, *Waste water treatment, *Separation techniques.

Background information as to the environmental effect of discharges of mercury is provided. The information has justified a programme, outlined in the paper, for reducing mercury in products, waste waters and vented air from chlorine plants using the mercury process. The strict separation of the waste waters and certain technical measures creates possibilities of reducing the discharges effectively. An 80 per cent reduction of the mercury in effluents was achieved, for example, by substituting indirect forced cooling of the hydrogen for the traditional direct cooling and returning the condensate to the head of the amalgam decomposers. The major cause of discharge of mercury with vented air was found to be leaking hot hydrogen in the cell room. Different principles for the polishing of the final effluent and for the removal of mercury from the caustic soda produced are described. (Jernigan-Vanderbilt)
W75-05435

ANIMAL WASTE CONVERSION SYSTEMS BASED ON THERMAL DISCHARGE,
Oregon State Univ., Corvallis. Dept. of Soil Science.
L. Boersma, E. W. R. Barlow, J. R. Miner, and H. K. Phinney.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 113, $4.25 in paper copy, $2.25 in microfiche. Special Report 416, Agricultural Experiment Station, September 1974. 51 p, 12 fig, 11 tab, 96 ref. OWRT B-039-ORE(1). 14-31-0001-4121.

Descriptors: Biodegradation, Anaerobic digestion, *Energy conversion, *Waste treatment, *Recycling, Farm wastes, Production, Microorganisms, Nutrients, Protein, Gases, Methane, Thermal pollution, *Beneficial use, Conservation.
Identifiers: *Waste heat utilization, Thermal discharges.

Society faces many problems related to its growth in numbers and standard of living. Of major concern is environmental degradation resulting from pollution and the consumptive use of non-renewable natural resources. An animal waste management scheme was developed on the premise that one solution to these problems is the development of integrated production systems with recycled sources. The waste product of one industry must become the raw material for another. The feasibility of using waste heat from steam electric plants to sustain a food-producing complex which recycles nutrients is analyzed. Specifically, it is proposed to use microorganisms to convert animal waste into a high protein animal feed and a methane-rich fuel gas. Waste heat from steam electric plants is used as a low cost source of energy for maintaining stable, elevated temperatures in anaerobic digestion and single cell protein production units. Benefits to society include: improved efficiency of energy use and food production, recycling of raw materials, and conservation of non-renewable resources.
W75-05453

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE: EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-05454

COMPARISON OF SEPTIC TANK AND AEROBIC TREATMENT UNITS: THE IMPACT OF WASTEWATER VARIATIONS ON THESE SYSTEMS,
Colorado Univ., Boulder. Dept. of Civil and Environmental Engineering.
E. R. Bennett, K. D. Linstedt, and J. Felton.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 186, $3.75 in paper copy; $2.25 in microfiche. Presented at the Rural Environmental Engineering Conference, Warren, Vermont, September 26, 1973. 27 p, 9 fig, 4 tab, 14 ref. OWRT A-021-COLO(3).

Descriptors: *Waste water treatment, *Septic tanks, *Aerobic treatment, Water utilization, Domestic wastes, Leaching, Evapotranspiration, Economic efficiency.
Identifiers: Household waste water.

Nearly one-third of the homes in the United States are located in unsewered areas and must rely on some form of individual treatment and disposal system for dealing with household wastewater. Water use patterns for individual homes were recorded by function including sinks, shower bath, dishwasher, washing machine, garbage disposal and toilets. Flow characteristics were determined by use of a water use chart recorder. Pollution strength characteristics of each of the wastewater discharges are also presented. These include BOD, COD, SS, MBAS, PO4, and temperature. Individual home wastewater treatment alternatives of septic tank with leaching field, septic tank with evapotranspiration bed and aerobic systems are evaluated on a cost and efficiency standpoint.
W75-05459

ADSORPTION OF PHOSPHORUS BY UNSATURATED SYNTHETIC SOIL,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-05463

AN EVALUATION OF WATER REUSE FOR MUNICIPAL SUPPLY,
Southern Illinois Univ., Carbondale.
IWR Contract Report 74-11, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., December 1974. p 266, 31 fig, 33 tab, 70 ref, 6 append.

Descriptors: *Evaluatin, *Water reuse, *Municipal water, *Water supply, *Economic efficiency, *Simulation analysis, *Alternative planning, *Waste water(Pollution), Water demand, Recycling, Water quality, Decision making, Attitudes, Psychological aspects, Public health, Safe yield, Droughts, Assessment, Streamflow, Mathematical models, Systems analysis, Computer programs, *Colorado.
Identifiers: *Water renovation, Colorado Springs(Col), Consulting engineers, Population projections, Cost minimization.

Reuse can be an alternative source of water for municipal water supply systems. The demand for water continues to increase in the United States,

especially in the burgeoning urban areas; the traditional alternaives for water supply planning, while useful in the past, are either inappropriate today or may no longer be practicable. Recycling renovated waste water has been shown, under specific qualifications, to be a socially acceptable and economically efficient alternative for municipal water supply planning. Two problems may be related to the low community adoption of water reuse: the unavailability of a methodology to access the relative value of reuse and the professional biases of consulting engineers and public health officials. A review is presented of the alternatives for balancing supply of and demand for municipal water. A simulation model for evaluating the economic efficiency of water reuse is formulated and applied to a single community in Colorado, and the nature and role of professional bias in the decision making process in water resue planning are described. The simulation model is designed to investigate the reuse of municipal sewerage as a supplement to present sources of water supply. The model is used to compare alternative plans that include minicipal reuse over fifty year period. The objective is to provide water at minimum cost for the duration of the projection period. Costs considered include capital, operation, and maintenance for both water supply and waste treatment. All costs are incremental, except those associated with present installations. (Bell-Cornell)
W75-05482

EVALUATION OF QUALITY PARAMETERS IN WATER RESOURCE PLANNING (A STATE-OF-THE-ART SURVEY OF THE ECONOMICS OF WATER QUALITY),
For primary bibliographic entry see Field 5G.
W75-05483

MEASURES TAKEN AGAINST WATER POLLUTION IN BASIC NON-FERROUS METAL INDUSTRIES,
Pure and Applied Chemistry, Vol 29, Nos 1-3, p 235-261, 1972, 16 fig, 4 tab, 28 ref.

Descriptors: *Const4aints, *Water pollution, *Heavy metals, *Europe, Air pollution, Technological advancement, Ion exchanger, Recirculation, Water purification, Recycling, Reclamation, Electrolysis, Scrubbers, Leaching, Washing, Cleansing, *Waste water treatment.
Identifiers: Hydrometallurgy.

The unit operations of hydrometallurgy technilogically parallel the methods of effluent treatment in the non-ferrous metal industries. Examples were given which show recent developments and ways of relieving lower degrees of waste water pollution: (1) Increase in the use of salt solutions for producing magnesium: (2) Measures for the prevention of air pollution during aluminum electrolyses cause new effluent problems to arise; (3) Wet or dry gas cleaning in the case of salt cover furnaces at aluminum remelting plants; (4) Change in a process for copper cementation - copper (I) chloride as an intermediate product of metal recovery; (5) Ion exchangers as concentration steps for purifying waste water containing non-ferrous metals; (6) Waste water purification at an ISP plant; (7) Utilization of leaching residues from zinc electrolysis plants; (8) Use of waste lime for hydrometallurgical processes; (9) Recovery of special metals by means of ion exchangers; (10) Recovery of service water as a valuable product in the purification of waste water in basic non-ferrous metal industries. It was noted that some unsolved problems need better technical processes to reduce unfavorable biological effects produced by low concentrations of metal salts, and that future developments in non-ferrous metal works have to examine the water economy conditions closely to meet requirements for a higher metal yield and a better water purification. (Rowe-Vanderbilt)
W75-05484

AEROBIC BIOSTABILIZATION OF SANITARY LANDFILL LEACHATE,
Crawford, Murphy and Tilly, Inc., Springfield, Ill.
E. N. Cook, and E. G. Foree.
J Water Pollut Control Fed. Vol 46, No 2, p 380-392, 1974, Illus.
Identifiers: Aerobic conditions, *Biological treatment, *Landfills, *Leachate, Pollution, Sanitary conditions, Stabilization, *Waste water treatment.

Aerobic biological treatment was effective for stabilizing sanitary landfill leachate in a series of laboratory experiments. The best operational conditions were for a detention time of 10 days, which gave mixed liquor volatile suspended solids concentrations of 4000 mg/l or more in the completely mixed, no-recycle systems. Stabilization of chemical oxygen demand was greater than 97% and biochemical oxygen demand was reduced by more than 99%. Mixed liquor settling properties were good, nutrients were removed, and odor was completely removed. Units with detention times of 2 and 5 days failed. Activated carbon was useful for effluent polishing. Physical-chemical treatment of raw leachate was only partially successful.—Copyright 1974, Biological Abstracts, Inc.
W75-05507

AQUIFER CLOGGING IN COMBINED WASTEWATER RECHARGE,
Massachusetts Univ., Amherst. Dept. of Plant and Soil Sciences.
S. A. Jubboori, G. L. Stewart, and D. D. Adrian.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2732-2744, December 1974. 9 fig, 4 tab, 22 ref. OWRT A-045-MASS (1) and B-011-MASS (14).

Descriptors: *Underground storage, *Aquifers, *Clogging, *Recharge wells, *Model studies, Waste water disposal, Waste water treatment, Water reuse, Permeability, Steady flow, Dupuit-Forchheimer theory, Potentiometric level, Chlorination, Microbial degradation, Simulation analysis.
Identifiers: *Combined wastewater, *Sand models, Chemical treatment, Backwashing.

A laboratory model was constructed to simulate the recharge of combined sewer overflows into a permeable, unconfined formation through a recharge well. The data showed that the relative decrease in permeability during recharge may be calculated by using the least-squares deviations between theoretical and experimental recharge surfaces. Decreases in piezometric surface level, rate of outflow, and permeability are a function of wastewater concentration, duration of recharge, and distance from the well. Chemical treatment is partially successful in redeveloping the formation. Recharge of water with 250 mg/l sodium hypochlorite at the end of a recharge period effectively reduced the clogging that was caused by microbial growth. (Visocky-ISWS)
W75-05520

PROCESS CONTROL OF ACTIVATED SLUDGE TREATMENT, PHASE II,
Kentucky Water Resources Inst., Lexington.
R. I. Kermode, R. W. J. Brett, and J. D. Pault, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 176, $4.75 in paper copy, $2.25 in microfiche. Research Report No. 83, January 1975. 87 p, 29 fig, 14 tab, 14 ref. OWRT A-050-KY(1). 14-31-0001-4017.

Descriptors: *Waste water treatment, Mixing, Model studies, *Activated sludge, Environmental engineering, Mathematical models, Optimization, Quality control, Settling basins, *Sewage treatment, Microorganisms.
Identifiers: *Digital simulation, Process control.

Material balances on substrate and microorganisms were derived in conjunction with various mixing configurations thought to accurately describe the activated sludge process. These models include the completely mixed with bypass, plug flow, and plug flow with bypass. Two sets of kinetic mechanisms for substrate utilization and bacterial growth were employed. A feed forward controller was designed from linear approximations of the material balances derived in the completely mixed with bypass mixing model. Utilizing frequency response methods, the controller was found essentially identical to a completely mixed model controller developed in a prior investigation. Through computer simulation the controller's effectiveness was tested. The controller maintained suitable effluent quality principally through proportional control on the influent flow rate. Additional proportional derivative control on influent substrate concentration produced further reductions in substrate levels; however, when employing realistic forcing functions, these reductions were minor. Comparison of mixing models was dependent upon the degree of substrate loading inflicted on the system. Bypassing had a detrimental effect on effluent quality and process control. (Grieves-Kentucky)
W75-05528

CHARACTERIZATION OF FRUIT AND VEGETABLE PROCESSING WASTEWATERS,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 5B.
W75-05534

BIOLOGICAL FILTERS, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
R. L. Bunch.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1121-1123, June, 1974. 25 ref.

Descriptors: *Trickling filters, *Filters, *Water quality, *Reviews, Industries, Model studies, Water Pollution Control Federation, Nitrogen, Plastics, *Bibliographies, *Filteration.
Identifiers: Rotating biological disk process.

A review of the current literature demonstrates that the emphasis last year was on upgrading trickling filters to meet more stringent effluent requirements and to remove nutrients before discharge. Biological filters were used for nitrification and denitrification. Expressions for the performance of trickling filters were developed. The use of corrugated polyethylene sheets and PVC grids as packing for a biofilter was studied. Industrial applications for trickling filters were found. Mathematical models of the rotating biological disk process were formulated, with equations for both the dynamic and steady-state models. (Orr-FIRL)
W75-05537

EXAMPLES OF WATER AND AIR PURIFICATION BY CATALYTIC REACTIONS (BEISPIELE FUER DIE REINHALTUNG VON WASSER UND LUFT DURCH KATALYTISCHE REAKTIONEN),
G. Vollheim, and J. Troeger.
Dechema-Monographien, Vol 75, No 1452-1485, p 1983-1992, 1974. 3 fig, 5 tab, 7 ref.

Descriptors: *Catalysts, Chemical industry, Environmental control, *Water purification, Chemical reactions, *Waste water treatment, *Industrial wastes, *Chemical.
Identifiers: *Catalytic reactions, *Air purifications.

The use of catalysts in the chemical industry permits factory processes to be carried out without harm to the environment. The reduction of nitroaromatic substances with the aid of iron and hydrochloric acid is contrasted with the reduction by hydrogen on a platinum-active carbon catalyst

which produces no by-products harmful to the environment. A special catalyst for production of halogenated aniline derivatives is described. Finally, the burning of waste gases is considered. (Sandoski-FIRL)
W75-05540

INFILTRATION SMOKED-OUT,
Gardner Water and Sewer Dept., Ill.
For primary bibliographic entry see Field 8G.
W75-05541

WATER OR AIR, WHICH DO YOU PUMP,
FMC Corp., Indianapolis, Ind. Pump Div.
For primary bibliographic entry see Field 8C.
W75-05542

ASBESTOS REMOVAL SYSTEMS PERFECTED,
Water and Waste Treatment, Vol 17, No 6, p 13, June, 1974.

Descriptors: *Asbestos, *Waste water treatment, *Potable water, Coagulation, Filtration, Polyelectrolytes, Filters, Public health, Costs, Water treatment, *Industrial wastes.
Identifiers: Sand filters, Asbestos mining industry, Treatment methods.

Scientists at the Canada Centre for Inland Waters have assembled systems that can remove up to 99.8% of the asbestos fibers from drinking water. The treatment costs an estimated five cents per 1000 gallons. Ordinary sand filtration removes approximately 90% of the asbestos-like fibers in water. However, the remaining 10% consists of very small fibers which may present the greatest health hazard. The most effective system for removal of these fibers is coagulation and filtration used together with a polyelectrolyte. The polyelectrolyte acts to refine the precipitation and coagulation so that even the smallest asbestos particles are removed. This work has important implications for the asbestos mining industry as well as for municipalities on affected waterways. (Orr-FIRL)
W75-05543

TREATED EFFLUENT GOES 'UNDERGROUND',
Water and Sewage Works, Vol 121, No 9, p 60-61, September, 1974. 2 fig.

Descriptors: *Waste disposal wells, *Injection wells, *Effluents, Sewage disposal, Water pollution control, Water management(Applied), Municipal wastes, Aeration, Operating costs, Legislation, Potable water, *Florida.
Identifiers: West Palm Beach(Fla).

A new regional water pollution control facility for the City of West Palm Beach, Florida includes wells to inject treated effluent more than one half mile underground, rather than disposing of wastes through an ocean outfall. The secondary treated effluent will be disposed of by well injection into the boulder zone of the Floridan aquifer. A testing phase is now underway; a 3500 foot deep well will be constructed so that it can be used for test injection purposes and later as a monitoring well for the final disposal system. In addition, a 1200 foot deep well will tap an aquifer of saline water, which will be used as an injection well to dispose of the salt water that will be produced when the deep test hole is being drilled. The wells are part of an overall plan for treatment facilities capable of handling up to 128 million gallons of sewage per day. Separate management of sewage and storm water for the City of West Palm Beach and the Town of Palm Beach is planned. The projects will also test the capabilities of extended aeration on a very large size municipal treatment plant. The extended aeration, with long retention time in the aeration basin, is not subject to shock loading, and requires no highly skilled operations, thus reducing operational costs. The system has been designed to include growth potential and to meet federal effluent requirements for advanced treatment, essentially to the potable water stage by 1983. (Prague-FIRL)
W75-05544

AUTOMATED MONITORING OF RECOVERED WATER QUALITY,
For primary bibliographic entry see Field 5A.
W75-05545

SMOKE TESTS DETECT SOURCES OF ILLEGAL INFLOW,
Cincinnati Dept. of Sewers, Ohio.
For primary bibliographic entry see Field 8G.
W75-05546

METHOD AND APPARATUS FOR PURIFYING FLUIDS,
M. D. Woods.
United States Patent 3,837,800. Issued September 24, 1974. Official Gazette of the United States Patent Office, Vol 926, No 4, p 1347-1348, September 24, 1974. 1 fig.

Descriptors: *Patents, *Water purification, *Waste water treatment, *Ultraviolet radiation, Irradiation, Waste treatment, Sterility.
Identifiers: *Radiation chambers.

A technique for continuously purifying a fluid by the emission of ultraviolet rays is described. The apparatus consists of a body with a series of spaced, parallel, elongated, cylindrical radiation chambers; elongated, interconnected chambers with a height much less than the diameter of the radiation chambers; and elongated, ultraviolet ray emitting lamps mounted in jackets in the radiation chambers, extending from the front to the rear of the radiation chambers. Fluid for purification is received in an elongated chamber and spread into sheet-like flow and passed serially and transversely between the lamp jackets and the radiation chambers' walls. The fluid remains in the sheet-like flow between adjacent radiation chambers by passing through the interconnecting chambers. The purified liquid is discharged from the last radiation chamber. (Leibowitz-FIRL)
W75-05551

LIQUID PURIFICATION APPARATUS AND PROCESS,
Pollution Control Inc., South Barre, Vt. (assignee)
G. F. Humiston, and B. L. Cotton.
United States Patent 3,837,491. Issued September 24, 1974. Official Gazette of the United States Patent Office, Vol 926, No 4, p 1265-1266, September 24, 1974. 1 fig.

Descriptors: *Patents, *Liquid wastes, Water pollution, *Water quality control, *Water purification, Separation techniques, Distillation, Sludge removal, *Waste water treatment.
Identifiers: *Centrifugal separation, *Vacuum distillation, Liquid purification.

A method was developed for the continuous mechanical purification of a liquid containing solid and dissolved pollutants. A liquid chamber is charged with polluted liquid which is subjected to centrifugal separation and vacuum distillation. The centrifugal separation influences the removal of pollutants from the chamber, exposing more surface of relatively pure liquid for the vacuum distillation. A stationary housing comprises the purification apparatus, along with a cylindrical, circumferentially perforated screen member, concentrically arranged within the housing. Vanes inside the screen member are mounted for rapid rotation around the axis, for centrifugation of the liquid. A vapor outlet in the housing applies a vacuum to the liquid within the screen member. A sludge outlet in the housing provides for the removal of sludge from the housing. (Leibowitz-FIRL)
W75-05552

DISCHARGE DEVICE FOR A VACUUM SEWAGE SYSTEM,
Aktiebolaget Cenenta, Malmo (Sweden).
For primary bibliographic entry see Field 8C.
W75-05553

NEW WATER WORKS FOR SUTTON.
For primary bibliographic entry see Field 5F.
W75-05554

REVERSE OSMOSIS AND ULTRAVILTRATION,
Abcor, Inc., Cambridge, Mass.
J. Del Pico, and P. W. White.
Metal Finishing, Vol 72, No 8, p 29-31, August, 1974. 6 fig.

Descriptors: *Reverse osmosis, *Waste water treatment, *Water pollution, *Filtration, Semipermeable membranes, Industrial wastes, Separation techniques, Colloids, Water purification, Distillation.
Identifiers: *Ultrafiltration, Osmotic pressure, Particulate matter, Membrane configuration.

The practical application of reverse osmosis and ultrafiltration now includes the concentration, purification and/or fractionation of a large spectrum of industrial streams. Both processes utilize a semi-permeable membrane as the separating agent, and pressure is used for the driving force to achieve separation. The semi-permeable membrane is considered a 'surface' filter, allowing the passage of water and some of the smaller sized solutes, while being capable of retaining larger solutes, particulates and colloidal matter. A counterpressure is produced, depending on the numerical concentration of molecules retained by the membrane. This osmotic pressure must be overcome before water removal can occur. The nature of the membrane is the primary factor in determining which species are retained, and which permitted passage. Ultrafiltration membranes, on the other hand, are relatively open membranes, retaining only large molecules and colloidal particles, allowing salts passage through the membrane with water. The osmotic counterpressure is low and operating pressures are usually below 100 psi, and throughput per unit area is 1 to 10 times greater than with RO membranes. The size of the molecule to be retained determines the type of membrane utilized. (Leibowitz-FIRL)
W75-05556

PEAT MOSS: AN ALTERNATIVE ADSORPTION MEDIUM.
Water and Pollution Control, Vol 112, No 8, p 18, August 1974. 2 fig.

Descriptors: Water pollution, *Waste water treatment, *Peat, *Adsorption, *Filtration, Industrial wastes, Agricultural wastes, Activated charcoal, Surfactants, Dyes, Oil, Mercury, Proteins, Oil spills, Sewage treatment, Hydrogen sulfide, Iron, Zinc, Nickel, Copper, Ammonia.
Identifiers: *Peat moss, Humic acids, Dimethylamine.

The University of Sherbrooke, Quebec is studying the application of peat moss as effective filtration and adsorption medium, as an alternative to activated charcoal in pollution abatement. The price of peat at 3 to 4 cents per lb is desirable in comparison with that of activated charcoal at 40-60 cents per lb. Peat moss is made up of decomposed tissue of various plants, primarily that of the genus Sphagnum, which can be found over an area of about 37,000 square miles in Canada itself. It is a sponge-like, highly porous structure with an approximate surface area of 200 sq m/g. It is composed of humic acids, and provides cationic exchange properties. On a weight basis, peat moss' adsorptive capacity is significantly inferior to activated charcoal, but it has a positive comparison on an economic basis. This has prompted

investigation into low efficiency application of peat moss in control of agricultural sewage and some industrial odors. Studies are being conducted on the use of peat moss filters in the treatment of industrial waste waters, since peat is known to adsorb oils in amounts 8 to 12 times its own weight. However, where there are surfactants in substantial numbers, the adsorptive capacity of peat moss is greatly diminished. Also under investigation is the application of peat moss in the adsorption of metals in industrial wastes. (Leibowitz-FIRL)
W75-05557

EXTENSIONS TO HANNINGFIELD WORKS OF ESSEX WATER COMPANY.
For primary bibliographic entry see Field 5F.
W75-05558

DESIGN CRITERIA FOR WASTE STABILIZATION PONDS,
Nova Scotia Technical Coll., Halifax.
D. Thirumurthi.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2094-2106, September 1974. 6 fig, 3 tab, 23 ref.

Descriptors: *Design criteria, *Domestic wastes, Biochemical oxygen demand, *Oxidation lagoons, *Waste water treatment.
Identifiers: Environmental conditions, First-order BOD coefficient, Critical solar energy level.

Magnitudes of suggested design parameters for waste stabilization ponds are evaluated. A new system for determining design criteria, which integrates theoretical concepts with experimental data, is presented in practical application. Waste stabilization ponds will be most efficient if designed to suit local conditions, and if the first-order BOD coefficient, which is the key part of this model, is determined individually for each pond. (Nelson-FIRL)
W75-05559

PROTESTING POLLUTION.
Chemical Week, Vol 115, No 7, p 14, August 14, 1974.

Descriptors: *Waste disposal, *Environmental control, Water pollution sources, Mine wastes, Industrial plants, Landfills, *Recycling.
Identifiers: *Land disposal.

An on-land disposal plan as an alternative to discharging wastes into Lake Superior has been rejected by a federal court against the Reserve Mining Company at Silver Bay, Minnesota. The taconite ore processing plant may be shut down if an alternate disposal solution is not agreed to shortly. One alternative is the moving of the processing plant nearer the taconite mine and recycling the wastes to the pits created by mining the ore. (Sandoski-FIRL)
W75-05560

FLOCCULANTS FLOURISHING.
Chemical Week, Vol 115, No 11, p 34, September 11, 1974.

Descriptors: *Flocculation, *Waste water treatment, *Chemical industry, Chemical precipitation, Coagulation, Foreign research, Costs, Demand.
Identifiers: *Flocculants, *Japan, Chemical Economy Research Institute.

The demand for high-polymer flocculants in Japan in 1974 will be 9000 metric tons, an increase of 3600 metric tons over 1973. There is a predicted 30 percent growth in the demand for 1975. Predicted demand is 15,000 m.t. in 1976 and 18,000 m.t. in 1977. The major use of Japanese-produced organic flocculants is for waste water treatment. Eighty percent of the high-polymer flocculants are produced from acrylamide. The oil crisis of 1973 caused the price of flocculants to increase to $3.60-4.00/kilogram in the last months of the year. Labor cost increases have caused further increases in the flocculant price to $4.00-4.60/kilogram. Major producers of chemical flocculants in Japan include Sanyo Chemical Industries, Sumitomo Chemical, and Asahi-Dow. These figures were reported by the Chemical Economy Research Institute, a private chemical research group. (Orr-FIRL)
W75-05561

SEWAGE SLUDGE CENTRIFUGING GETS SCOTTISH OK.
Surveyer, Vol 4285, p 39-40, July 1974. 2 fig.

Descriptors: *Sludge disposal, *Centrifugation, *Polyelectrolytes, *Sewage sludge, Domestic wastes, Water pollution, *Dewatering, Septic tanks, Waste water treatment.
Identifiers: *Sewage sludge centrifuge, Vacuum filter, Capillary suction time.

The Scottish Development Department reports on full-scale trials to investigate the efficiency of centrifuging as a means of dewatering sewage sludges. The Lockerbie Composting Center has composed partially dewatered sludge with organic residue from domestic waste. Sludge enters the center at an average rate of 36.5 cu m per day from many sewage treatment works and a few septic tanks. The original vacuum filter dewatering plant, utilizing wood flour as filter medium, processes sludge at a maximum rate of 5 cu m per hour. An hour is required to prime the filter drum, being effective only 4 1/2 hours. A machine was installed of the solid bowl scroll discharge type, with a rated capacity between 6 and 10 cu m per hour. Polyelectrolyte is added to help flucculation. It is fed into the machine so that mixing and floc formation occur within the feed zone. Experiments with the sewage sludge centrifuge were performed with various pond depths, polyelectrolyte dosing rates and concentrations, centrate quality, and the applicability of the capillary suction time technique in the assessment of appropriate polyelectrolyte dosages. At Lockerbie, sludge cakes are composted with domestic organics in a biostabilizer. There has been no apparent diminution in composting activity, nor has any biological inhibition from the usage of polyelectrolytes been noted. (Leibowitz-FIRL)
W75-05562

CONDENSATE TRAPPING ALLEVIATES POLLUTION,
J. A. Fischer.
Electrical World, Vol 182, No 3, p 44-46, August 1, 1974. 2 fig, 1 tab.

Descriptors: *Water pollution, *Water quality control, *Water reuse, Oil pollution, Sludge disposal, Drainage systems, *Waste water treatment.
Identifiers: *Condensate trapping, Trap-drain condensate-reclamation system, Heating-system trap drains, Cartridge filter, Precoating.

A trap-drain condensate-reclamation system has been perfected by engineers at the Public Service Electric and Gas Company, Burlington, New Jersey. Operating costs have been decreased by $20,000, and the system controls pollution problems originating in plants where heating-system trap drains are dumped into local waterways. A unit was sought that would detect and prevent contaminants from getting into the condensate-storage system during the drain recovery. A cartridge-type replaceable filter was examined for alerting engineers to high levels of contaminants in the condensate. The conclusions reached by experimentation were: about one-million gallons could be filtered between cartridge changes in a unit designed for a maximum flow of 100 gpm, where a particle selection size would be one micron with a cartridge outside diameter of 2.75 in.; the cartridge filter would retain fuel oil entrained in the condensate; and, precoating would be unnecessary filtering, although it could lengthen the required time between cartridge-element changes. In the event of condensate-reclamation system malfunctioning, the filter-differential alarm, conductivity alarm, oil-detector alarm, power-failure alarm and high-and-low-level alarms were installed as part of the continual operating. (Leibowitz-FIRL)
W75-05563

DISINFECTION: THE LAST LINE OF DEFENSE FOR POTABLE WATER,
For primary bibliographic entry see Field 5F.
W75-05564

THE DESIGN AND CONSTRUCTION OF AYCLIFFE SEWAGE WORKS EXTENSIONS,
H. R. Brooksbank, and J. M. Dyson.
Water Pollution Control, Vol 73, No 4, p 367-368, 1974. 1 tab.

Descriptors: *Sewage treatment, *Waste water treatment, Water pollution, *Industrial wastes, Water quality control, Biological treatment, Sludge treatment, Domestic sewage, Effluent control, *Design, *Construction, Treatment facilities, Settling basins.
Identifiers: Biological filters, Humus tanks, Sludge storage tanks, Sludge-drying beds, Heated sludge digestion, Recirculation pumping station, Storm tanks.

In 1941, the Aycliffe sewage works was constructed to serve a Royal Ordinance Factory; after the war it was taken over by the Board of Trade as an industrial estate. From this estate, sewage was discharged to the sewage works. When the land was bought by the Darlington Rural District Council to provide sewage treatment facilities for Newton-Aycliffe in 1950, the works contained 1 screen, 3 rectangular sedimentation tanks, 4 biological filters, 4 humus tanks, 2 pumping stations, 4 sludge storage tanks and sludge-drying beds, with a capacity of 2.275 x 1000 cu m/d DWF. These sewage works were modified in 1964 to service the population of 20,000 in the new town, with an increased water flow from the industrial estate. A separate plant was built to the north to enable a gravity system to be used. This new operation comprised preliminary treatment, storm tanks, 2 circular sedimentation tanks, 4 biological filters, 2 humus tanks, recirculation pumping station, heated sludge digestion and sludge-drying beds. The new capacity was 3.68 x 1000 cu m/d DWF. (Leibowitz-FIRL)
W75-05565

4632 TDS REDUCED TO 322 BY REVERSE OSMOSIS,
P. B. Wold.
Water and Sewage Works, Vol 121, No 7, p 67, July, 1974.

Descriptors: *Reverse osmosis, Water pollution, *Membrane processes, Water quality control, Ion exchange, Bacteria, Electrodialysis, *Dissolved solids, *Waste water treatment, *Water treatment.
Identifiers: Hollow nylon fiber membrane treatment system, Pemeators, *Total dissolved solids(TDS).

Reverse osmosis was used to convert water with 4,000 ppm total dissolved solids to water of the quality described by the Environmental Protection Agency and the North Dakota State Health Department as potable. It was determined that systems based on the hollow nylon fiber devices were feasible because of the fiber membrane's resistance to high and low pH and bacterial degradation. An operating pressure of 400 psig or lower was required. Smaller space is needed for a hollow fiber membrane system. Included in the system was a sand filter for removing suspended solids

from the feed water. Hardness is removed by a weak acid ion exchange installation. The reverse osmosis system can remove 90 to 95 percent of the dissolved solids, based upon the DuPont 'Permasep' permeaters. Rejected water is used for the regeneration of the ion exchange unit and sand filter backwash. Under consideration is the use of the reject water for spraying gravel roads for dust control. This water should contain over 25,000 ppm TDS, many of which are deliquescent in nature. (Leibowitz-FIRL)
W75-05566

CADMIUM ACCURAL IN A COMBINED WASTEWATER TREATMENT-AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W75-05580

FOAM AND BUBBLE FRACTIONATION FOR REMOVAL OF TRACE METAL IONS FROM WATER,
California Univ., Berkeley. Dept. of Chemical Engineering.
E. Valdes-Krieg, C. J. King, and H. H. Sephton.
In: Environmental Protection Agency, Conference on Traces of Metals in Water, Removal and Monitoring, November 16, 1973, Princeton, N.J., 22 p. 9 fig, 13 ref. 14-30-2919.

Descriptors: *Desalination, *Waste water treatment, *Heavy metals, *Foam fractionation, Bubbles, Water pollution, Regression analysis, Ion exchange, Adsorption, Electrochemistry, Isotherms, Distribution, Evaporation, Surfactants, Copper, Volumetric analysis, Laboratory analysis, Gradients.
Identifiers: Regeneration.

The work reported has been concerned with the removal of surfactants and copper from the effluent blowdown brine of evaporation seawater desalination plants. The research has been carried out in connection with the development of a process using surface-active agents to enhance the heat-transfer coefficient and reduce the pressure drop in vertical-tube, upflow evaporation. Foam and bubble fractionation are used to recover and remove the surfactant from the effluent brine. The removal of copper is also of importance since copper enters the water through corrosion and is at a level (about 0.5 ppm) high enough so that it may be deleterious to marine life if the brine is returned directly to the ocean. Foam and bubble fractionation experiments have been carried out in apparatus of various sizes, including (1) a 2 1/2 in. diameter, 6-ft high column, (2) a 1-ft square, 7-ft high column, and (3) a 4-ft square x 9-ft high chamber. Data obtained with the smaller column are reported here. Results for surfactant removal with the 1-ft square column are reported elsewhere. The surfactant employed has been Neodol 25-3A (Shell Chemical Co.), which is the ammonium salt of a sulfated primary alcohol with three ethylene oxide units and a C12 to C15 alkyl group. (Rowe-Vanderbilt)
W75-05590

LABORATORY STUDIES ON FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
T. J. McGhee, L. R. Christenson, and W. R. Bonneau.
Journal of Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE6, p 883-896, December, 1973. Proceedings Paper 10205. 8 fig, 5 tab, 16 ref. OWRR OWRT A-027-NEB(8).

Descriptors: *Feed lots, *Agricultural runoff, *Farm wastes, *Waste treatment, Sedimentation, Retention, Biochemical oxygen demand, Aeration, Activated sludge, Adsorption.
Identifiers: Color removal.

Effective treatment of settled feedlot runoff may be obtained at liquid retention times of 2 days with a positive solids return activated sludge system. The oxygen demand of feedlot runoff is not measured adequately by the 5 day biochemical oxygen demand determination but may be approximated from the chemical oxygen demand determination. The oxygen uptake of feedlot runoff as measured in the Warburg apparatus is a power function of time for at least 90 days. Removal of color is possible by adsorption on both activated carbon and clayey fine sand. Pretreatment is important since the adsorptive capacity of any such medium is limited. (Cartmell-East Central)
W75-05607

AUTOMATIC CONTROL OF LARGE-SCALE COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. W. Labadie, N. S. Grigg, and B. H. Bradford.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 101, No EE1, Proceedings paper No. 11115, p 27-39, February 1975. 7 fig, 23 ref. OWRT C-4172(9028)(5).

Descriptors: *Water pollution control, *Combined sewers, *Overflow, *Automatic control, *Waste water(Pollution), *Management, Optimization, Computers, Drainage, Environmental engineering, Constraints, Hydrology, Reservoir storage, Treatment facilities, Biochemical oxygen demand, Rainfall-runoff relationships, Linear programming, Stochastic processes, Pollutants, Simulation analysis, Hydraulics, Equations, Mathematical models, Systems analysis, California.
Identifiers: *Decomposition techniques, Aggregation approach, *Hierarchical control, San Francisco(Cal), Receiving waters.

The pollution of receiving waters by overflows from combined sewers is a national problem of serious concern. A recent viable solution strategy for the problem involves the development of automatic control systems as an alternative to more expensive sewer separation or large-scale treatment projects. Development of the control logic is difficult, due mainly to the size and complexity of the problem. To deal with this complexity, a hierarchical control strategy is developed and applied to the proposed San Francisco Master Plan for Wastewater Management. The large-scale optimization problem is decomposed into several first-level subbasin problems, with a second level master problem tying them together. An aggregation approach is also presented as an alternative means of developing a hierarchical control structure. The subbasin problems can be solved either on-line or off-line, depending on the complexity of the sewer transport models utilized. The advantages of both the decomposition and the aggregation approaches are: (1) more efficient optimization; (2) considerable lessening in required core computer storage; (3) flexibility in utilizing totally on-line optimal control, or a mixture of off-line and on-line optimization; (4) less complexity in software design through decomposition into several simpler tasks; and (5) compatibility with hierarchical computer control. (Bell-Cornell)
W75-05608

CHANGES IN CONCENTRATION OF CERTAIN CONSTITUENTS OF TREATED WASTE WATER DURING MOVEMENT THROUGH THE MAGOTHY AQUIFER, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 5B.
W75-05625

NITRIFICATION EFFECTS IN WASTE TREATMENT PROCESSES,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering.
T. J. Olenik.

Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 278, $7.25 in paper copy, $2.25 in microfiche. PhD Dissertation, February 1974. 197 p, 51 fig, 10 tab, 77 ref, append. OWRT A-035-NJ(2). 14-31-0001-4030.

Descriptors: *Nitrification, Stochastic processes, Mixing, Water quality control, *Waste water treatment, Nitrates, Nitrites, Time series analysis, Dispersion, Diffusion, Model studies, Ammonia, *Biochemical oxygen demand, *New Jersey, Dissolved oxygen, Statistical models.
Identifiers: *Passaic River(NJ).

Nitrification or second-stage Biochemical Oxygen Demand (BOD) effects were investigated in two wastewater treatment plants along the Passaic River in New Jersey. The two plants, Berkeley Heights and Madison-Chatham, were analyzed by simultaneously performing long-term Dissolved Oxygen (DO) and inorganic nitrogen tests of internal and external flows. The results showed that nitrification does not take place on an overall basis at either plant. The disappearance of ammonia nitrogen noticed in the long-term DO test was considered to be caused mainly by the heterotrophic bacteria, and to a small extent, by the nitrifying autotrophic bacteria. Kinetic rate constants were determined for all effluents at each plant. A tracer study was performed using lithium chloride on the mechanical aeration unit at the Madison-Chatham plant. The purpose of this tracer study was to determine the amount of dead space in the tank that may allow nitrifying organisms sufficient generation time to multiply. A direct result of this testing was a mathematical model of the system based on Wilson's 'black-box' approach. The receiving water (Passaic River) was analyzed for its deterministic and stochastic properties for ammonia-nitrogen values obtained from the Passaic Valley Water Commission. Two years of data at three points along the river were studied by time-series analysis. The results showed that the ammonia-nitrogen values were randomly distributed in time and correlated to some extent in space. (Ahlert-Rutgers)
W75-05661

DESIGN OF AN EXPERIMENTAL SYSTEM FOR STUDYING PHYSICAL-CHEMICAL TREATMENT OF WASTEWATER AT ELEVATED TEMPERATURES,
Arizona Univ., Tucson. Dept. of Nuclear Engineering.
J. W. Carrol.
Master's Thesis, 1974. 59 p, 11 fig, 8 tab, 11 ref, 2 append.

Descriptors: *Waste water treatment, *Sewage treatment, *Reclaimed water, Nuclear power plants, Cooling water, Temperature, *Design, Pilot plants, Coagulation, Activated carbon, Adsorption, Costs, Treatment facilities.
Identifiers: *Heated sewage, *Physical chemical treatment, Clarification.

A design is developed for a 10 gpm experimental system in which heat is used to enhance the physical-chemical treatment of domestic wastewater. The results of experiments conducted in the Civil Engineering Department, University of Arizona, and pilot plant studies, all employing powdered activated carbon and a metal coagulant, are present and served to define the major design and operational criteria. The design incorporated a specially constructed wastewater heating unit and two commercially available treatment units which are utilized as an Adsorption System and a Clarification System. Some features of this design which make it suitable for experimental investigation are: (a) Flow and operational flexibility, ,(b) Automatic operation, (c) Minimum of operator attention, (d)Ease of Maintenance (e)Control equipment affords protection and safety against abnormal operation. A preliminary estimate of the fixed cost is $41,250 with daily operating costs of $66.
W75-05682

ACID MINE DRAINAGE WATER MADE FIT TO DRINK,
Public Works, Vol 105, No 9, p 120, September, 1974. 1 photo.

Descriptors: *Mining, *Mine acids, *Potable water, Drainage, Water quality control, *Ion exchange, Heavy metals, Chemical reactions, Oxidation, Aeration, Neutralization, Water softening, Filtration, Resins, *Acid mine water, *Waste water treatment, Mine drainage.

The use of ion exchange processes for the treatment of water contaminated by acid mine drainage was discussed. Using this process, a plant in central Pennsylvaina converts 800,000 gpd of acid water into potable water and is expected to reach one million gpd within the year. The ion exchange process used in the plant was originally developed to treat brackish water and recently modified to meet the needs of acid mine drainage treatment by using amberlite ion exchange resin beads that exchange carbonates for sulfates in sulfuric acid and metal sulfates. (Jernigan-Vanderbilt)
W75-05688

INDUSTRIAL WATER PRETREATMENT,
Calgon Corp., Pittsburgh, Pa. Water Management Div.
F. H. Seels.
Chemical Engineering, Deskbook Issue, p 27-32, February 26, 1973. 6 fig, 2 tab, 14 ref.

Descriptors: *Industrial water, *Pretreatment(Water), *Water quality, *Economics, Industrial plants, Decision making, Clarification. Lime, Iron, Manganese, Filtration, Adsorption, Ion exchange, Reverse osmosis, Sludge disposal, *Waste water treatment.

Usually, the purpose of water pretreatment is the removal of selected impurities before placing the water into industrial service. Typically, this means the removal of suspended solids or scale-causing minerals, and adjustment of the pH. Pretreatment costs vary with local conditions. While many plants acquire the benefit of at least partial pretreatment through the purchase of municipal water, other industrial installations obtain water from lakes, rivers and wells. These industries must implement pretreatment programs from the beginning. A key factor in industrial water management is determining which water problems should be solved system-wide with pretreatment, and which should be solved more selectively by the addition of chemicals to the water-using processes. Pretreatment operations discussed were: clarification; lime softening; iron and manganese removal; filtration; adsorption; ion exchange; reverse osmosis; and some other less used techniques, such as electrodialysis, ultrafiltration, and electronic devices. Waste products that result from the various pretreatment processes are also discussed. (Pulliam-Vanderbilt)
W75-05695

METHODS FOR THE ANALYSIS AND IDENTIFICATION OF ORGANOLEPTIC SUBSTANCES IN THE TECHNOLOGICAL PROCESS OF WATER TREATMENT (RAZRABOTKA METODOV ANALIZA I IDENTIFIKATSII ORGANOLEPTICHESKIKH VESHCHEST' V TEKHNOLOGICHESKOM PROTSESSE PODGOTOVKIVODY),
For primary bibliographic entry see Field 5A.
W75-05724

THE SECLAR PROCESS AND ITS APPLICATIONS IN PAPERMAKING (LE PROCEDE SECLAR AT SES APPLICATIONS EN PAPETERIE),
P. Lejeune, and J. Serpaud.
ATIP (Association Technique de l'Industrie Papetiere) Revue, Vol 28, No 5, p 237-245, 1974. 2 fig.

Descriptors: *Pulp wastes, *Treatment facilities, Equipment, *Waste treatment, *Water purification, Flocculation, Effluents, Pilot plants, Industrial wastes, Water pollution sources, Pulp wastes, Chemical precipitation, Sedimentation, Sludge, Pulp and paper industry.
Identifiers: Seclar clarifier, *Clarifiers.

After an introduction to the problems involved in paper mill effluent clarification and a review of various types of clarifiers and flocculating agents used in such clarification, the Seclar clarifier is described. This apparatus consists essentially of a flocculation chamber, where the effluent is fed in, a clarification chamber where a filtering fluidized bed of sludge is formed at the bottom and clarified effluent is led off at the top, and a sludge removal chamber. Results obtained with three pilot-plant units in processing paper mill effluents are reviewed. (Speckhard-IPC)
W75-05726

PROBLEM-FREE CLARIFIER SLUDGE TREATMENT (PROBLEMLOSE KLARSCHLAMMBEHANDLUNG),
W. Vogeno.
Allgemeine Papier-Rundschau, No 24/25, p 712, 717, June 20, 1974. 2 fig.

Descriptors: *Sludge treatment, *Sewage sludge, Equipment, *Pulp wastes, Waste water treatment, Water pollution sources, Sludge disposal, Drying, Incineration, Pumping, Dewatering, Wastes, Waste disposal, Solid wastes, Treatment facilities, Mixing.

A new two-stage (drying/combustion) process for processing clarifier sludges of a wide range of compositions and moisture contents is described. In the case of pumpable sludges, the system consists of a sludge heater, a sludge pump, a drum dryer, a multi-tier oven, a fan, and a heat exchanger. Most of the hot gases produced in the oven are used in the drum dryer; the rest go to the heat exchangers. For handling of sludges which are too dry for pumping, the system includes a double-shaft mixer, hammer mill, and separating cyclone in feeding the sludge to the combustion chamber. (Speckhard-IPC)
W75-05727

ASSESSING THE CAPABILITY OF THE EVERGLADES MARSH ENVIRONMENT FOR RENOVATING WASTEWATER,
Agricultural Research Service, Fort Lauderdale, Fla.
K. K. Steward, and W. H. Ornes.
Available from the National Technical Information Service Springfield Va. 22161 as PB-231 652 $3.75 in paper copy, $2.25 in microfiche. Ecological Report No DI-SFEP-74-06, May 1973. 27 p. 7 fig, 8 tab.

Descriptors: *Water reuse, *Marshes, *Waste water treatment, Florida, Plant physiology, Primary productivity, Fertilization, Plant growth, Aquatic plants, Absorption, Eutrophication, Feasibility studies, Vegetation, Nutrient removal, Sediments, Nitrogen, Phosphorus, Potassium.
Identifiers: Everglades(Fla), Sawgrass.

A portion of the Water supply to Everglades National Park has been threatened by construction of an international jetport and with the subsequent industrial and residential development of lands bordering the park. There have been suggestions that the fresh water marshes of the Everglades might be used to renovate waste water from the coastal cities as a means of recycling and conserving fresh water now lost in the ocean. Everglades sawgrass was enriched with simulated effluents in order to determine the feasibility of recycling wastewater through the marshes. Weekly application of nutrients increased assimilation of nutrients by the plants but did not increase growth. Only 12% of the applied nutrients were assimilated into the vegetation. Of the amount remaining, 3% was used to produce algal blooms, 43% settled to the bottom, 55 remained dissolved in the water, and 37% was unaccounted for. The dense algal blooms, which were maintained throughtout the experiment, were believed to have been responsible for the disappearance of several floral components of the ecosystem. It appeared unlikely that the marsh system could be used to renovate wastewater. (Jones-Wisconsin)
W75-05743

INVESTIGATIONS INTO THE MINERAL NUTRITION OF SAWGRASS USING EXPERIMENTAL CULTURAL TECHNIQUES,
Agricultural Research Service, Fort Lauderdale, Fla.
K. K. Steward, and W. H. Ornes.
Available from the National Technical Information Service Springfield Va 22161, as PB-231 609, $3.25 in paper copy, $2.25 in microfiche. National Park Service, Atlanta, Ga., Ecological Report No DI-SFEP-74-05, May 1973. 11 p. 7 fig, 3 tab, 18 ref.

Descriptors: *Aquatic plants, *Nutrient requirements, *Cultures, *Waste water treatment, Phosphorus, Rooted aquatic plants, Reproduction, Marsh plants, Growth rates, Limiting factors, Florida, Waste water disposal, Water reuse.
Identifiers: *Sawgrass, *Everglades (Florida).

The mineral nutrient status of sawgrass plants (Cladium jamaicense (Crantz)) in the field were determined and their response to nutrient enrichment through the use of experimental culture techniques. Nutrient requirements as well as nutrient status of field plants were estimated through the use of tissue analysis procedures for determining critical nutrient concentration of the elements. This technique is based on the assumption that an essential element must be contained in the plant at a concentration sufficient for plant growth. Additions of small quantities of phosphorus produced significant increases in dry weight, shoot length, and vegetative reproduction of new plants. Growth responses of seedlings were highly related to P levels in tissues. Ther appeared to be an optimum P level in tissue, however, and higher levels inhibited dry-matter production, shoot elongation, and new shoot production. This was a significant finding, indicating that serious consequences may result from discharging nutrient-rich waters into the Everglades marshes. Critical P concentration was determined to be higher in seedlings than in sawgrass plants from the field. It was concluded that experimentally determined critical nutrient levels do not adequately diagnose the nutrient status of plants in the field. (Jones-Wisconsin)
W75-05750

SEWAGE TREATMENT PLANT DEPENDABILITY WITH SPECIAL REFERENCE TO THE ACTIVATED SLUDGE PROCESS,
National Field Investigations Center, Cincinnati, Ohio. Sewage Treatment Plant Operation and Design Branch.
A. W. West.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 6[illegible] $3.25 in paper copy; $2.25 in microfiche. March 1971. 12 p.

Descriptors: *Sewage treatment, *Activated sludge, *Design, Treatment facilities, Technology, Control, Systems analysis, Pilot plants, Personnel, Reliability.

A reference for Plant Dependability is based on first-hand operational experiences at dozens of sewage treatment plants, and covers design features and operational procedures that have governed plant performance and final effluent quality. It is an expression of the writer's personal convictions regarding treatment plant design and operation concepts. Designers should select

proper treatment process, provide generous capacity, provide essential flexibility, and make the plant truly controllable. Process features to be evaluated would include the Classic Activated Sludge Process design, the Complete Mix modification, and the Step Aeration modification. Pilot studies may be needed to resolve uncertainties. Design capacity should permit satisfactory plant performance at full load with either one aeration tank or one final clarifier out of service for maintenance. The activated sludge system is a controllable process that must include appropriate meters and accurately controllable gates, valves, pumps, and blowers for optimum performances. Qualified operators are needed to achieve the high quality effluent that can be produced by properly designed waste treatment plants. (Jones-Wisconsin)
W75-05751

LITERATURE SURVEY OF INSTRUMENTAL MEASUREMENTS OF BIOCHEMICAL OXYGEN DEMAND FOR CONTROL APPLICATION 1960-1973,
National Environmental Research Center, Cincinnati, Ohio. Methods Development and Quality Assurance Research Lab.
R. J. O'Herron.
Report EPA-670/4-74-001, February 1974. 31 p, 50 ref. 1 HA 327.

Descriptors: *Instrumentation, *Biochemical oxygen demand, *Waste treatment, Measurement, Reviews.
Identifiers: Process control.

The 'state of the art' of instrumental biochemical oxygen demand methods in the waste treatment field is presented. Urgently needed is an online biochemical oxygen demand instrument suitable to control the treatment process. A new standard, amenable to instrumental measurement, is critically needed to supplant the BOD test for measurement of waste water loading. In addition, the standard should be independent of microbiological activities and their inherent uncertainties, although it must show the results of biological action because, presently, secondary treatment plants are almost exclusively biological. Prospects for process control of waste treatment plants appear favorable if differential measurement capabilities can be further developed. If rapid, reproducible removal of BOD to an acceptable value can be accomplished, differential measurements can give information of the ultimate BOD in less than 1 day. Instrumental TOC, TOD, and COD can already be determined in less than 5 minutes. Detention times for secondary waste treatment would add 6 to 8 hours. The additional processing method and detention time would be the subjects of further research. The method of choice would be biological filtration in which various filtration media, and biological activation techniques would be pursued. (Jones-Wisconsin)
W75-05753

PHYSICAL-CHEMICAL TREATMENT AT ELEVATED TEMPERATURES,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
N. W. Wright.
Available from the National Technical Information Service, Springfield, VA 22161 AS PB-240 300, $4.75 in paper copy; $2.25 in microfiche. Master's Thesis, 1974. 67 p, 18 fig, 2 tab, 39 ref. OWRR A-044-ARIZ(3). 14-31-0001-3803.

Descriptors: *Waste water treatment, *Sewage treatment, *Reclaimed water, Nuclear power plants, Cooling water, Temperature, Sludge, Turbidity, Chemical oxygen demand, Phosphates, Hydrogen ion concentration, Iron, Adsorption.
Identifiers: *Heated sewage, *Physical-chemical treatment, Clarification.

The effect of operating temperature on the physical-chemical treatment of domestic wastewater, using ferric chloride and powdered activated carbon, at temperatures between 24C (75F) and 74C (165F) was explored. A single step operation that combined chemical clarification and adsorption of dissolved organic material was used and the effect of temperature on the following parameters was observed: turbidity, COD (total and soluble), residual phosphate, pH and sludge characteristics. The results showed that optimum operating temperatures do exist for individual parameters observed, and that increased operating temperature was not beneficial to all parameters. Iron concentration was shown to have an important effect on optimum operating temperature.
W75-05763

WATER SUPPLY, TREATMENT, DISTRIBUTION, AND REUSE OPTIMIZATION IN ARID URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-05773

REGIONAL WASTEWATER MANAGEMENT: A WATER QUALITY EVALUATION OF SYSTEM CENTRALIZATION,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
B. J. Adams.
PhD. Dissertation, August 1973. 352 p, 36 fig, 46 tab, 297 ref, 3 append. OWRR A-050-ILL(2). 14-31-0001-3513.

Descriptors: Dissolved oxygen, Costs, *Water quality, Management, *Regional analysis, *Waste water treatment, Economics, Planning, Systems analysis, *Illinois, Stochastic processes, Simulation analysis, *Evaluation, Model studies.
Identifiers: Chicago(Ill).

A water quality evaluation of regional wastewater system centralization was undertaken to test the hypothesis that water quality improvement may result from the spatial and temporal variations of wasteloads attributed to decentralized regional systems. The evaluation employed water quality models developed for both deterministic and stochastic analyses. Each analysis considered a set of experiments which involved a determinination of the water quality resulting from alternative degrees of regional wastewater aggregation. The experiments treated not only the degree of aggregation or equivalently the number of plants in the system but also the stream system length as an indicator of regional morphology and the streamwater/wastewater dilution ratio as an indicator of relative stream size. The water quality assessment was made in terms of the minimum dissolved oxygen level experienced by the system. With a water quality evaluation of regional wastewater system centralization completed, an economic evaluation was undertaken. Cost functions for regional wastewater system components were developed, and costs of the physical systems hypothesized in the water quality analyses were estimated with these cost functions. Finally, a comparison was made between the water quality impact of various regional wastewater systems and the economic impact of these systems. It was concluded that substantial benefits, both economic and water quality, may result from decentralized regional wastewater systems. (Gemmell-Illinois)
W75-05775

COMBINED BUOYANCY AND BOUNDARY EFFECTS ON THE TRAJECTORY OF A TWO-DIMENSIONAL JET,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 5B.
W75-05780

REMOVING IN EXCESS OF 99% PHOSPHORUS AT ELY, MINNESOTA,
Graver Water Conditioning Co., Union, N.J.
For primary bibliographic entry see Field 5C.
W75-05796

AN EXPERIMENT IN THE EUTROPHICATION OF TERRESTRIAL ECOSYSTEMS WITH SEWAGE: EVIDENCE OF NITRIFICATION IN A LATE SUCCESSIONAL FOREST,
Brookhaven National Lab., Upton, N.Y.
G. M. Woodwell, J. Ballard, J. Clinton, M. Small, and E. V. Pecan.
Available from the National Technical Information Service, Springfield, Va. 22161, as BNL-18797, $4.00 paper copy, $2.25 microfiche. Report BNL 18797 (undated). 14 p, 5 fig, 2 tab, 17 ref.

Descriptors: *Soil disposal fields, *Sewage treatment, *Nitrification, Soil filters, Nutrients, New York, Fertilization, Percolation, Groundwater, Irrigation, Vegetation, Waste water disposal.
Identifiers: Long Island(NY.)

An alternative to the present practice in sewage treatment is to use natural or lightly managed terrestrial and aquatic ecosystems singly or in combination as living filters to remove nutrients and release potable water to either ground or surface water channels. The potential for each of the major communities of the terrestrial sere for absorption of the solids and nutrient elements in sewage and for the release of clean water was investigated. Plots included an agricultural field, and three communities that together span the field-to-forest sere of central Long Island, represented by old field, pine forest, and oak-pine forest. The pine forest was a naturally seeded stand of pitch pine about 25 years old. Various types of sewage effluents were applied by spray irrigation equipment. It is concluded that natural and agricultural communities can be used to treat sewage. Examination should be made of how harvest of nutrients is to be accomplished most effectively to avoid the accumulation of salts to the point where losses equal inputs. Any treatment system will require more than one plant community but there is little basis now for speculation as to the combinations that will prove most useful. (Jones-Wisconsin)
W75-05804

SULFIDE CONTROL IN SANITARY SEWERAGE SYSTEMS.
Environmental Protection Agency, Washington, D.C. Technology Transfer Staff.
Process Design Manual, October 1974. 137 p, 38 fig, 10 tab, 71 ref.

Descriptors: *Sulfides, *Sanitary engineering, *Sewerage, Hydrogen sulfide, Physicochemical properties, Odor, Toxicity, Analytical techniques, Oxygen, Industrial wastes, Design criteria, Sewers, Corrosion control.

This manual provides the engineering community and related industry a new source of information to be used in the control of corrosion and noxious conditions resulting from hydrogen sulfide in existing sewerage systems, and in the development of designs for new systems so as to keep them free from these problems. The forms of sulfide in wastewaters, physical-chemical properties of hydrogen sulfide, odor and toxicity of hydrogen sulfide, and the analytical methods are given. Sulfide is sometimes present in wastewaters added to sewers, particularly in certain industrial wastes, and in rare instances groundwaters with high sulfide concentrations have leaked into sewers, but the commonest source of sulfide is biological activity in the sewer. The obnoxious odor of hydrogen sulfide escaping from manholes, pump stations, and wastewater treatment plants is the most potent objectionable characteristic of septic sewage. One effect is the adverse reaction of the activated sludge process. The growth of filamen-

tous organisms, especially Thiothrix, is encouraged by the presence of sulfide. The sulfide concentrations that are found in sewers are closely related to the design of the system. (Jones-Wisconsin)
W75-05808

INVESTIGATIONS ON FILTER HEADLOSS,
Indian Inst. of Tech., Kharagpur. Dept. of Civil Engineering.
P. V. Rao, R. N. Sen, and B. Bhattacharyya.
Journal of the Institution of Engineers (India), Vol 54, No PH2, p 66-70, February 1974. 7 fig, 10 ref.

Descriptors: *Head loss, *Darcy's Law, Filtering systems, Suspended solids, Flow rate, Hydraulics, Sands, Hydraulic gradient, *Filters, Filtration.
Identifiers: *Darcy's permeability coefficient, *Rapid sand filter.

An important parameter of restraint for the working of a rapid sand filter is headloss development, associated with the retention of suspended solids. A correlation has been made of the time rate of change of headloss with sand size and flow rate of a filter. Darcy's permeability coefficient was utilized as a filter performance parameter. The longevity of a filter may be improved if the rate of increase of headloss is reduced during the filter run by proper combination of sand size and rate of flow. (Leibowitz-FIRL)
W75-05809

PLASTIC FILTER TRICKLING BED WASTE WATER TREATMENT (IN JAPANESE),
Y. Otsuka.
Shokuhin Kaihatsu, Vol 9, No 7, p 32-35, July 1974. 2 fig, 4 tab.

Descriptors: *Trickling filters, *Waste water treatment, Plastics, Biochemical oxygen demand, Sludge treatment, Aeration, *Biological treatment, Filters, Filtration.

The trickling filter bed method of waste water treatment utilizes propagation of aerobic bacteria on a filter of large mesh, thus contacting bacteria with organic waste water. The system is similar to other types of biological treatment, but compared with the activated sludge method which results in 0.4-0.6 kg(SD)/kg BOD, the trickling bed method gives 0.3-0.4 kg(SD)/kg BOD. If suspended solids and oil content are large, pretreatment is necessary to reduce oil to about 30 ppm; if an oil film does not form, there is no problem. If nutrients are lacking in the waste water, about 5 portions of nitrogen and one portion of phosphorus should be added to 100 of BOD; however, this should be kept to a minimum to avoid eutrophication. When using a plastic filter packed bed, the waste water is mixed with already treated water and sprayed over the bed. Aerobic bacteria multiply rapidly and eliminate BOD (COD) efficiently. The water is returned to the circulation tank and part of it is discharged. The circulation ratio is determined by waste water concentration, treatment water concentration and the filter bed load. With the plastic bed, M3/M2/day is 30-200. In an open aeration tank, a natural ventilation (for oxygen) always takes place because of the different temperatures of the air and water; but in an enclosed air-tight bed, ventilation should be forced by fans. The number of stages for trickling beds depends on the initial cost, maintenance, and the running cost, but usually two or three stages are used. The amount of sludge is very small and its high self-digestion eliminates the necessity for large quantity sludge treatment. (Seigle-FIRL)
W75-05813

FIRST INSTALLATION IN THE WORLD FOR THE STERILIZATION OF SEWAGE BY GAMMA RAYS (PREMIER INSTALLATION DU MONDE POUR L'HYGIENISATION DES BOUES D'EPURATION AUX RAYONS GAMMA).
Gas-Wasser-Abwasser, Vol 54, No 5, p 170-171, May 1974. 1 fig.

Descriptors: *Waste water treatment, Treatment facilities, *Sewage treatment, *Gamma rays, Radioactive wastes, Dewatering, *Water reuse.
Identifiers: Munich(Germany), Sewage treatment plants, Sterilization.

A new installation for the sterilization of sewage sludge by gamma rays, developed by Sulzer Company, and installed in the Munich area, West Germany, is described. The batch type sterilizer is composed of an underground, concrete irradiation shaft, and uses Co-60, Cesium-137, and other radioactive wastes from nuclear reactors for irradiation of a predetermined duration. The closed circuit design and the automatic control of the charge and discharge processes guarantee maximum radiation protection. The irradiated sewage sludge, which cannot itself become radioactive, is subsequently dewatered and used as manure on farmlands. (Takacs-FIRL)
W75-05814

THE EFFECT OF CHEMICAL WATER TREATMENT TECHNOLOGY ON THE EFFICIENCY OF FILTERS (VLIYANIYE TEKHNOLOGII REAGENTNOY OBRABOTKI VODY NA EFFEKTIVNOST' RABOTY FIL'TROV),
V. F. Nakorchevskaya, and L. A. Kul'skiy.
Vodosnabzheniye i Sanitarnaya Tekhnika, No 5, p 16-18, 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Coagulation, *Flocculation, *Filters, *Pre-treatment, Filtration, *Waste water treatment.
Identifiers: *Chemical treatment, *Aluminum sulfate, *Sand filters, Silicic acid, Filter efficiency.

The effect of aluminum sulfate as a coagulant and activated silicic acid as a flocculant on the efficiency of sand filters was studied. Aluminum sulfate is generally used for pre-treatment of water before filtration. The maximum possible duration of the protective action of the sand filter may exceed the minimum duration by a factor of two to seven. However, the duration of the efficient filter operation decreases with the increase in the contact time between aluminum sulfate and silicic acid. This reaction is due to the increase in the size of the aluminum sulfate floccules with increasing contact time. Therefore, the contact time should not be longer than 10 to 20 seconds. The most durable filtration efficiency is obtained in heterocoagulation or when the flocculant is introduced immediately after the coagulant. (Takacs-FIRL)
W75-05815

METHOD AND APPARATUS FOR TREATMENT OF LIQUID WASTES,
Nittelsu Chemical Engineering Co. Ltd., Chiyoda (Japan). (assignee)
M. Akune, K. Yoshii, and T. Yamauchi.
U.S. Patent No. 3,847,713, 5 p, 2 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 716, November 12, 1974.

Descriptors: *Patents, *Liquid wastes, *Waste water treatment, Organic wastes, Gases, Steam, Incineration.
Identifiers: Ash, Scrubbers, Inorganic wastes, Organometallic compounds, *Combustion.

Liquid waste containing a mixture of organic and inorganic materials or organometallic compounds is, in turn, dehydrated, concentrated, combusted and the ash produced therefrom is recovered in the form of an aqueous solution or a slurry. High temperature combustion exhaust gases are injected into water in a recovery vessel and the ash entrained therewith is recovered as an aqueous solution or a slurry, and the heat contained in the liquid waste as well as the heat evolved from the auxiliary combusting fuel are recovered in the form of steam which contains non-condensable gases that are utilized in the concentration of additional liquid waste under a reduced pressure. (Sinha-OEIS)
W75-05818

SEWAGE OZONIZING UNIT,
Texaco, Inc., New York. (assignee)
B. V. Klock, and R. C. White.
U.S. Patent No. 3,853,760, 3 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 773, December 10, 1974.

Descriptors: *Patents, *Sewage treatment, *Ozone, Pollution abatement, *Waste water treatment, Water pollution control, Sludge.
Identifiers: Coking.

A sewage ozonizing unit for the disposal of waste sewage from a small installation includes a primary settling zone receiving the sewage and separating raw sludge from liquid. A first pump conveys the water to a storage zone and actuates an ozonizer supplying ozone through a gas diffuser to the storage zone. A second pump forces the settled sludge to a coking zone where it is coked in the liquid phase. The coke thus formed then passes to a pressure settling device where it is separated from the aqueous coking effluent which is recycled to the storage zone. (Sinha-OEIS)
W75-05819

REMOVING OIL FROM WASTE WATER WITH SULFUR,
Amoco Production Co., Tulsa, Okla. (assignee)
L. W. Jones.
U.S. Patent No. 3,853,753, 6 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 771, December 10, 1974.

Descriptors: *Patents, *Waste water treatment, *Oil wastes, *Sulfur, Water pollution control, Pollution abatement, Filters, Quality control.

Water containing dispersed oil is caused to flow through a bed of granular sulfur or sulfur coated sand. This presents a surface area of solid phase sulfur to coalesce the dispersed oil. The oil coagulated with sulfur and water is then entered into a cyclone separator where the coagulate is separated from the water. (Sinha-OEIS)
W75-05820

PROCESS AND APPARATUS FOR TREATING WASTES BY A COMBINED ACTIVATED SLUDGE AND BIOLOGICAL FILTER BED,
J. Tymoszczuk.
U.S. Patent No. 3,853,752, 4 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 770, December 10, 1974.

Descriptors: *Patents, *Waste water treatment, *Filtration, *Aeration, *Biological treatment, *Aerobic treatment, Pollution abatement, Water pollution control, Equipment, Activated sludge.

The process comprises maintaining a submerged biological filter bed zone and an activated sludge zone in upstream fluid flow relationship. Sewage is fed to the activated sludge zone. Both zones are aerated. The filter bed zone is backwashed as often as required to maintain the operating effectiveness and an acceptable head at the point of withdrawal of the treated effluent. An upper layer of the filter media is transported to a conduit positioned in the activated sludge zone. (Sinha-OEIS)
W75-05821

LIQUID TREATMENT APPARATUS,
Environmental Technology Corp., Bloomington, Minn. (assignee)
J. E. Bearden.

U.S. Patent No. 3,852,384, 6 p, 8 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 929, No 1, p 328, December 1974.

Descriptors: *Patents, *Aeration, *Waste water treatment, *Pollution abatement, *Water pollution control, Equipment, Chemical oxygen demand, Biochemical oxygen demand, Bubbles, *Oxidation lagoons.
Identifiers: Gas bubble generator, Ponding area.

An apparatus is described for efficiently providing aeration of water in a ponding area such as a sewage ponding tank to maintain the oxygen content of the water at a level sufficient to satisfy the biological and chemical oxygen demand. An open-ended elongated tube is vertically positioned with its lower end above a gas bubble generator so that gas bubbles are entrained in the liquid and carry the liquid and bubbles up through the tube. A plurality of orifices are provided in the tube walls to draw in liquid from the side portions of the tube at a point above the lower end of the tube to increase the efficiency of the aeration. In the preferred form a helical path is provided within the tube to increase further the time of exposure of the gas to the liquid being treated to provide a shearing action to minimize bubble size. Also disclosed is an automatically adjustable length for the tube to compensate for the rise and fall of pond depth. (Sinha-OEIS)
W75-05826

5E. Ultimate Disposal Of Wastes

LIVESTOCK MANURE DISPOSAL VIA HYDROGASIFICATION,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-05351

FEASIBILITY STUDIES FOR DECONTAMINATION AND DENSIFICATION OF CHOP-LEACH CLADDING RESIDUES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-05371

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES, 1973,
Naval Ship Systems Command, Washington, D.C. Nuclear Propulsion Directorate.
For primary bibliographic entry see Field 5B.
W75-05376

CHEMICAL ENGINEERING DIVISION, WASTE MANAGEMENT PROGRAMS, QUARTERLY REPORT, APRIL-JUNE 1974,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-05383

QUARTERLY PROGRESS REPORT: RESEARCH AND DEVELOPMENT ACTIVITIES, WASTE FIXATION PROGRAM, APRIL THROUGH JUNE 1974,
Battelle-Pacific Northwest Labs., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W75-05393

ANIMAL WASTE CONVERSION SYSTEMS BASED ON THERMAL DISCHARGE,
Oregon State Univ., Corvallis. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W75-05453

DISPOSAL OF HAZARDOUS WASTES,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5G.
W75-05504

TRANSPIRATION DRYING OF SANITARY LANDFILLS,
Auburn Univ., Ala. Dept. of Civil Engineering.
F. J. Molz, S. R. Van Fleet, and V. D. Browning.
Ground Water, Vol 12, No 6, p 394-397, November-December 1974. 3 fig, 1 tab, 13 ref. OWRT B-048-ALA (1).

Descriptors: *Landfills, *Waste disposal, *Leachate, *Transpiration, *Moisture uptake, Drying, Solid wastes, Ultimate disposal, Environmental engineering, Model studies, Water loss, Monitoring, Water pollution sources, Garbage dumps, Waste dumps, Waste water(Pollution), Sampling, Lysimeters, Movement, Percolation.
Identifiers: *Sanitary landfills.

Experiments were described which test the feasibility of diminishing the leachate production of sanitary landfills by using the roots of transpiring plants to dry the refuse and surrounding soil. Full-scale models of landfill cores were constructed and filled with typical municipal refuse in the early spring of 1973. Selected plants species such as slash pine, thorny elaeagnus, bristly locust, black locust, and two grasses were used to vegetate two landfill models, while a third was denied vegetation. The various species of selected plants have thrived, even though the lower two-thirds of the landfill models quickly became anaerobic. Roots proliferated rapidly through the top 2.5 ft of cover soil and first refuse layer. Following December 1973, all three lysimeters began producing leachate. However, the volume of leachate produced differed considerably depending on whether the particular lysimeter was vegetated or fallow. To date, the unvegetated control has produced 17.53 inches while the two vegetated models have produced 8.59 inches and 2.49 inches respectively. The unvegetated bin produced the most dilute leachate. If the chemical oxygen demand, the total Kjeldahl nitrogen, and the total solids are used as indices representative of the potency of leachate, then the leachate from the lysimeter containing pine and thorny elaeagnus was 1.97 times more concentrated than that from the fallow lysimeter. (Sanderson-ISWS)
W75-05523

TREATED EFFLUENT GOES 'UNDERGROUND',
For primary bibliographic entry see Field 5D.
W75-05544

PROTESTING POLLUTION.
For primary bibliographic entry see Field 5D.
W75-05560

SEWAGE SLUDGE CENTRIFUGING GETS SCOTTISH OK.
For primary bibliographic entry see Field 5D.
W75-05562

MOBILIZATION OF IRON IN WATER IN THE MAGOTHY AQUIFER DURING LONG-TERM RECHARGE WITH TERTIARY-TREATED SEWAGE, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 5B.
W75-05626

CHEMICAL AND PHYSICAL DATA FOR DISPOSAL WELLS, EASTERN SNAKE RIVER PLAIN, IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 5B.
W75-05632

5F. Water Treatment and Quality Alteration

SOCIO-ECONOMIC IMPACTS OF RURAL WATER SUPPLIES,
University of Southern Mississippi, Hattiesburg. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-05407

DAVIS COUNTY COMPREHENSIVE STUDY: CULINARY WATER, PRESSURE IRRIGATION WATER, SANITARY SEWERAGE.
Davis County Planning Commission, Farmington, Utah.
For primary bibliographic entry see Field 3F.
W75-05418

COMPREHENSIVE WATER AND SEWER PLAN, BRADLEY COUNTY, TENNESSEE.
Sanders (B.G.) and Associates, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 6B.
W75-05430

ASBESTOS REMOVAL SYSTEMS PERFECTED,
For primary bibliographic entry see Field 5D.
W75-05543

NEW WATER WORKS FOR SUTTON.
Water and Waste Treatment, Vol 17, No 8, p 46, August, 1974. 1 tab.

Descriptors: Water pollution, Water quality control, *Bacteria, *Chlorination, Reservoirs, Domestic sewage, Boreholes, *Treatment facilities, *Water treatment, *Waste water treatment.

The construction of a new water works at Grander Green Lane, Cheam, Great Britain, is planned by the Sutton District Water Company to guard against bacterial pollution. The process of super chlorination followed by de-chlorination will sterilize the water. A dose of chlorine applied to the water at a borehole head as soon as it has been abstracted from the borehole should prevent any danger of pollution. As it travels through a contact tank, the chlorine will have one hour to destroy organisms present, an the excess chlorine will be removed by a dose of sulphur dioxide. An addition of ammonia will make the remaining chlorine more persistant in the distribution system and service reservoirs in corrosion prevention of plumbing fittings and odor-taste pollution prevention. Chlorine content will be monitored, displayed and recorded by a chlorine residual recorder, which automatically adjusts the residual chlorine being pumped into supply. The sterilization system will operate under a 'fail-safe' principle, alerting resident staff to quality control malfunctioning. A 24-hour service will be available for consumer problems with domestic plumbing. (Leibowitz-FIRL)
W75-05554

EXTENSIONS TO HANNINGFIELD WORKS OF ESSEX WATER COMPANY.
Water Services, Vol 78, No 940, p 190-196, June 1974. 6 fig.

Descriptors: Water supply, *Reservoirs, *Water supply development, Facilities, Pipelines, Pumps, Filters, Chemicals, Equipment, Costs, Treatment facilities, *Water treatment, Waste water treatment.
Identifiers: Great Britain, Water works.

The extensions to the Hanningfield Reservoir, Essex, Great Britain, were opened on May 10, 1974. The present situation, the new works, and future plans are discussed. A schedule of technical data is included. The new extensions include ef-

fluent pipelines, aqueducts, a pilot plant, vertical flow tanks, accelerators, a chemical house, a chemical plant, electrical and control stations, a carbon dioxide generator, gravity filters, pumping stations, filtered water tanks, wash water tanks, and roads and drains. The new works cost approximately four million pounds. (Orr-FIRL)
W75-05558

DISINFECTION: THE LAST LINE OF DEFENSE FOR POTABLE WATER,
G. C. White.
Water and Sewage Works, Vol 121, No 7, p 66-67, July, 1974.

Descriptors: Water pollution, Water quality, Management, *Disinfection, *Water purification, *Chlorination, Nitrogen compounds, *Waste water treatment, Coliforms, Potable water, *Water treatment.
Identifiers: Free residual process, Ammonia nitrogen, Organic nitrogen, N-chloro compounds.

The Community Water System survey revealed that 77 percent of water treatment plant operators are inadequately trained in elementary water microbiology, with 46 percent deficient in chemistry relating to the operation of the facility. A review of the important aspects of chlorination chemistry was presented. In the free residual process, free chlorine displays the most powerful germicidal ability of all chlorine compounds, with the exception of chlorine dioxide. This process should be operated so that the HOCl content of the final residual is 85 to 90 percent of the total residual. Ammonia nitrogen and organic nitrogen cause the most interference with the process. Ammonia nitrogen may be removed by chlorine easily, requiring approximately 10 parts of chlorine for each part of ammonia. Organic nitrogen compounds can produce a system of unstable residuals, with reactions lasting for days before completion, often resulting in N-chloro compounds with taste and odor problems in the distribution system. The coliform concentration is a salient factor in the evaluation of raw water quality. At Lake Tahoe, California, a plant produces effluent with a coliform concentration less than 2.3/100 ml. This potable standard is achieved with chlorine doses of 2 to 3 mg/liter in the presence of 2 to 15 mg/liter of ammonia nitrogen. (Leibowitz-FIRL)
W75-05564

4632 TDS REDUCED TO 322 BY REVERSE OSMOSIS,
For primary bibliographic entry see Field 5D.
W75-05566

ACID MINE DRAINAGE WATER MADE FIT TO DRINK,
For primary bibliographic entry see Field 5D.
W75-05688

ASSESSING THE CAPABILITY OF THE EVERGLADES MARSH ENVIRONMENT FOR RENOVATING WASTEWATER,
Agricultural Research Service, Fort Lauderdale, Fla.
For primary bibliographic entry see Field 5D.
W75-05743

5G. Water Quality Control

CHLORIDES IN LAKE ERIE BASIN,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-05355

COMPATIBILITY OF HAFNALLOYS 105 AND 150 WITH 238PUO2,
Los Alamos Scientific Lab., N.M.
For primary bibliographic entry see Field 5A.
W75-05363

SHIPPING CONTAINER FOR PLUTONIUM-238 AS FISSILE MATERIAL CLASS 1,
Los Alamos Scientific Lab., N.M.
H. E. Noyes.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT. No. LA-5589-MS, $4.00 in paper copy, $2.25 in microfiche. Report LA-5589-MS, May 1974. 40 p, 2 fig, 1 tab, 4 append.

Descriptors: *Plutonium, *Transportation, *Water pollution sources, *Storage tanks, *Stability, *Porosity, Safety, Design criteria, Leakage, Penetration.

The stainless steel shipping container is a small, right cylindrical assembly approximately 46 cm in diameter and 50 cm high, weighing approximately 91 kg. Access to the inner container is through a series of bolted flanges. The source material within the inner cavity must be doubly encapsulated. The contents must not exceed 720 g plutonium (oxide or metal), or be so reduced in quantity so as to not exceed the legally applicable external radiation limits at contact and at 1 m. The dual container is designed to preclude leakage of any water into the inner container. (Houser-ORNL)
W75-05364

ASSESSING AND CONTROLLING THE HAZARD FROM TRITIATED WATER,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
W. R. Bush.
Available from the National Technical Information Service, Springfield, Va. 22161, as REPT. No. AECL-4150, $5.45 in paper copy, $2.25 in microfiche. Report AECL-4150, April 1970. 98 p, 14 fig, 7 tab, 53 ref.

Descriptors: Assessment, *Assay, *Tritium, *Water vapor, *Nuclear powerplants, *Reactors, *Radioactivity, Nuclear wastes, Hazards, Safety, Evaluation, Absorption, Human population, Public health.
Identifiers: *Tritiated water.

Practical and theoretical information is presented to help radiation surveyors and operators of heavy-water reactors, etc. to understand, assess and control the radiation hazard from tritiated water (HTO or DTO). The intake of HTO through the skin and lungs, its excretion and the associated radiation dose are discussed, and concepts such as critical organ, dose commitment, maximum permissible concentration in air (MPC) a and (MPC) a-hour are explained. Methods of controlling the hazards from tritiated water are discussed: HTO detection in air and urine; ventilation and containment for limiting HTO concentrations in working areas; air-supplied respirators for preventing inhalation of HTO vapor; and protective clothing, barrier creams and washing after exposure to minimize reduction of dose commitment by increasing water intake are explained also. (Houser-ORNL)
W75-05369

USES OF POWER PLANT DISCHARGE WATER IN GREENHOUSE PRODUCTION,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Agricultural Development.
For primary bibliographic entry see Field 3C.
W75-05380

FEASIBILITY AND ALTERNATE PROCEDURES FOR DECONTAMINATION AND POST TREATMENT MANAGEMENT OF PU-CONTAMINATED AREAS IN NEVADA,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
A. Wallace, and E. M. Romney.
Available from NTIS, Springfield Va. as REPT. No. UCLA12-973. $5.45 in papery copy, $2.25 in microfiche. Report UCLA12-973, September 1974. 90 p, 17 fig, 12 tab, 122 ref. AEC AT(04-1) GEN-12.

Descriptors: *Plutonium, *Soil contamination, *Accidents, *Nuclear explosions, Fallout, Air pollution, Water pollution, Deep tillage, Irrigation, Land development, Arid lands, Revegetation, Ecology, Ecosystems, Nevada, Feasibility studies.
Identifiers: Weapons testing, *Decontamination(Soil), *Nevada AEC Test Site.

This report was prepared in response to needs for determining the feasibility and environmental impact of cleaning up Pu-contaminated areas in Nevada. Instead of considering all aspects of radioactive decontamination, it deals primarily with findings from pertinent land area decontamination and post-management experiences which can be applied to solving Pu problems at the Nevada Test Site and the Tonopah Test Range. Previous experiences from accidental and planned releases of Pu in the environment are discussed along with those gained from nuclear fallout decontamination studies. Alternate procedures are discussed which may be useful in Nevada, providing the necessary experimental work is done to test the validity of the assumptions made. Many answers to pertinent questions can be obtained from investigations conducted outside of the Pu area. Recommendations are made for experimental work that should be done to determine the best course of action before cleanup begins. (Houser-ORNL)
W75-05384

NUTIS: NUMERICAL AND TEXTUAL INFORMATION SYSTEM, VERSION 1.0, - A USERS MANUAL,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7C.
W75-05390

MEASURING THE SOCIAL ATTITUDES AND AESTHETIC AND ECONOMIC CONSIDERATIONS WHICH INFLUENCE TRANSMISSION LINE ROUTING,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 6G.
W75-05391

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION: ANNUAL REPORT, JULY 1972-JUNE, 1973,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W75-05392

NUCLEAR POWER FACILITY PERFORMANCE CHARACTERISTICS FOR MAKING ENVIRONMENTAL IMPACT ASSESSMENTS.
Directorate of Regulatory Standards (AEC), Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-05395

TELEMETRY IN WATER POLLUTION CONTROL,
South Yorkshire Metropolitan Country Council (England).
For primary bibliographic entry see Field 5D.
W75-05397

PROTECTION OF THE ENVIRONMENT FROM CONTAMINATION WITH PESTICIDES USED IN COTTON GROWING, (IN RUSSIAN),
V. K. Khasanov.
Gig Sanit. 38(3): 107-108, 1973.
Identifiers: *Cotton, Environmental protection, Fruit, *Pesticide residues, Pollution, Protection, USSR, Water pollution, Irrigation channels.

A study of environmental residues of pesticides used in cotton-growing, including organophosphorus compounds, led to a reduction in the use of aerial application in 1970-1971 (USSR). In the Khorezm region, levels of these pesticides in irrigation channels decreased 44.3% in 1970 and 31.2% in 1971. Residues in fruits also decreased significantly.--Copyright 1974, Biological Abstracts, Inc.
W75-05408

INTERIM WATER QUALITY PLAN FOR THE MINNEHAHA COUNTY STANDARD METROPOLITAN STATISTICAL AREA AND DISTRICT II.
South Eastern Council of Governments, Sioux Falls, S. Dak.
For primary bibliographic entry see Field 6B.
W75-05421

CAREFUL RENEWAL OF A CAMPUS LOCH,
Sheffield Univ. (England).
A. E. Weddle.
Landscape Architecture, Vol 64, No 5, p 406-409, October 1974. 3 fig.

Descriptors: *Limnology, *Lake morphology, *Lake morphometry, *Ecology, *Reclaimed water, Entrophication, Lakes, Silting, Environmental control, Water conservation, Land development, Foreign projects, Dredging.
Identifiers: *Edinburgh(Scotland).

A description is given of the restoration of a Loch (Lake) at Riccarton, an old county estate which is the site of the new Heriot-Watt University, Edinburgh, Scotland. The unversity assigned to the landscape consultants the task of keeping the site, or parts of it at least, as 'natural' or undisturbed as possible. The consultants, realizing a policy of preservation or restriction would not suffice, set out to build a new landscape, focusing on a goal of preservation whereever possible. This report deals with the renewal of the Loch and its associated water courses. Before redevelopment the Loch was shallow and seriosly silted at its near-stagnant western end where mud banks had formed. Being almost entirely overhung by trees and shrubs, marginal vegetation was largely restricted to the inflow stream and neighborhood of the dam. After development, the vegetation of the Loch had clearly undergone wide-spread simplification. The hydrosere along the face of the dam had been reduced from 16 species to a trace of just three, and the water bistort was also gone. Small amounts of ten species of aquatic vegetation had returned. Some planting is recommended to complement the background of native plants. There is evidence that dredging altered the ecosystem of the lake and produced great fluctuations in number and type of species. This is expected to attain an equilibrium soon. (Poertner)
W75-05426

JOINING FORCES TO SAVE DAMAGED LAKES IN SWEDEN AND TUNISIA,
Lund Univ. (Sweden).
S. Bjork.
Landscape Architecture, Vol 64, No 5, p 396-405, October 1974. 11 fig.

Descriptors: *Lake morphometry, *Limnology, *Lake morphology, *Reclaimed water, *Water reuse, Reclaimed water, Water pollution control, Water conservation, Water quality control, Foreign projects, Entrophication, Lakes, Environmental control, Ecology, Hypolimnion.
Identifiers: *Lake restoration, Sweden, Tunisia.

Descriptions are given of four lake restoration projects, three in Sweden and one in Tunisia, that prove the need for cooperative efforts between public administrators, politicians and technicians. The four projects were undertaken by a team of limnologists at the University of Lund in Sweden as part of a lake restoration program that has been going on for several years. The lakes investigated in this program represent a wide variety of conditions. Thus, three different sets of methods had to be worked out to correct the balance of the three different lake ecosystems. This meant that, among other things, the equilibrium between production and mineralization had to be restored. The aims of the University's lake restoration program are to: develop methods of solving man-made environmental problems, restore lakes judged to be of high environmental value, train limnologists, and contribute additional knowledge to theroretical ecology. About twenty university researchers have been active in this project. (Poertner)
W75-05428

CONNECTICUT WATER LAW: SUMMARY AND INDEX OF STATUTES,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 6E.
W75-05437

ALTERNATIVE METHODS OF EVALUATING THE ECONOMIC AND SOCIAL ASPECTS OF WATER QUALITY,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Economics.
V. D. Polhemus.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 026, $7.50 in paper copy, $2.25 in microfiche. M.A. Thesis, January, 1974, 231 p. OWRT A-014-NJ(5).

Descriptors: *Environmental effects, *Evaluation, Benefits, Environment, Measurement, Analytical techniques, Fishing, Recreation, *Water quality, *Market value, Econometrics, *Intangible benefits, *Alternative costs.
Identifiers: Subjective techniques.

Within the decision making process which justifies or rejects programs to restore environmental quality, there is implicit a system of measurement. Described are the problem of deteriorating water quality and the need for a reliable, uniform evaluation system within the existing framework of a free market where personar freedoms are continually being eroded by increasing overnment activity. Presented are techniques of dollar value, index and group measurement which have bee accepted in the past or are currently proposed in the literature. Of all the possible evaluation techniques reviewed, not one was free of criticism; however, monetary techniques reflecting market values were least objectionable.
W75-05445

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE: EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
F. H. Pearson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 111, $8.50 in paper copy; $2.25 in microfiche. Ph.D. Thesis, 247 p, June 1974. 72 fig, 55 tab, 60 ref, 16 append. OWRT A-030-PA(3). 14-31-0001-3838.

Descriptors: *Limestone, *Neutralization, *Acidic wastes, Kinetics, Chemical reactions, Thermodynamics, Hydraulics, *Mathematical models, Waste water treatment.
Identifiers: *Reagents, Physical boundary.

Crushed limestone is usually the cheapest reagent for the neutralization of acidic wastes. For the rational design of limestone neutralization processes, an evaluation is needed of the kinetics of the chemical reactions involved, coupled with an analysis of chemical and physical boundary conditions that control the extent to which the reactions are completed. Chemical kinetics are evaluated by observation of a chemical system in which the reactions of concern occur. Chemical boundaries are established by the thermodynamics of the reactions. Physical boundaries, such as the time and surface area of contact between the reactants, are evaluated by application of the laws of hydraulics to the geometry and hydraulics of the system. The kinetics of the rate-limiting chemical reactions that occur when limestone is exposed to acidic water were evaluated by experiment over a rather wide range of conditions. Equations governing the system were assembled into a mathematical model, which describes the progress of the neutralization process under specified conditions. The model was applied to predict the performance of a number of barriers of crushed limestone, that had been constructed in acidic streams to alleviate acid-pollution. Field measurements were taken and samples of water from the barriers were analyzed to determine barrier performance. Based on the comparison between predicted and observed performance of the prototypes, a simple procedure was derived for the design of limestone barriers.
W75-05454

SELECTIVE WITHDRAWAL AT AN INTERMEDIATE DEPTH FROM A DENSITY STRATIFIED IMPOUNDMENT,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
G. R. Clark.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 016, $5.75 in paper copy, $2.25 in microfiche. M.S. Independent Study Report, June 1974. 118 p, 16 fig, 3 tab, 16 ref, 3 append. OWRT B-080-WIS(4). 14-31-0001-3948.

Descriptors: Hydraulics, *Impoundments, Flow, *Destratification, *Thermal stratification, *Water quality control, Model studies, *Withdrawal, Reservoirs, Hypolimnion.
Identifiers: *Selective withdrawal.

A variety of methods have been proposed to improve the water quality of lakes and reservoirs. The overall improvement of water quality in a reservoir through the removal of the poor quality, hypolimnetic water is described. In particular, theoretical and experimental investigations on selective withdrawal of a viscous, non-diffusive, linearly-stratified fluid from the bottom of a reservoir have been carried out. The governing differential equations which describe planar and axisymmetric withdrawal are derived. In each case, an assumed horizontal velocity profile is substituted into the integral form of the momentum equation; the resulting ordinary differential equation is solved numerically to give the variation with distance from the outlet of the thickness of the layer of hypolimnetic water withdrawn. Using the assumed velocity profile and the principle of mass conservation, expressions are derived in each case to predict the quality of the water withdrawn. Laboratory experiments are conducted; the results obtained verify the theoretical predictions. Procedures for predicting the withdrawal layer thickness and discharged water quality in an actual reservoir are discussed. (Ho-Wisconsin)
W75-05456

SOME POLLUTION-RELATED ATTITUDES OF HIGH SCHOOL YOUTH IN THE UNITED STATES AND BRAZIL,
Illinois Univ., Urbana, Dept. of Sociology.
L. H. Bluhm.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 156, $7.50 in paper copy; $2.25 in microfiche. PhD Thesis, 1973. 218 p, 30 tab, 8 fig, 7 append, 29 ref. OWRT B-052-ILL(2). 14-31-0001-3275.

Descriptors: *Attitudes, *Social values, United States, *Social change, *Illinois, Surveys, Water pollution, Social aspects, Measurement.
Identifiers: Youth, Pollution issues, Federal intervention, *Brazil.

Attitudes toward pollution issues, and the potential for change in such attitudes were investigated. Data were obtained from high school seniors in a small Illinois town which was attempting to solve a severe water pollution problem. Students' pollution attitudes were measured in a bench-mark survey. They were exposed to a speech against Federal intervention in local pollution issues and resurveyed. As expected, attitudes shifted toward opposition to Federal intervention. However, analysis of variance indicated that students who ranked themselves as independent and able to predict events in their lives (who were least alienated) were least influenced by the speech. It was concluded that there seem to be levels of attitudes, from basic world views to issue-specific attitudes, such as those on pollution. Changes in issue-specific attitudes seem to be related to an infrastructure of more general, diffuse attitudes. Though the entire study was not replicated in Brazil, the results generally support the conclusions based on U. S. data.
W75-05461

TOWARD A TECHNIQUE FOR QUANTIFYING AESTHETIC QUALITY OF WATER RESOURCES,
Utah State Univ., Logan.
For primary bibliographic entry see Field 6A.
W75-05473

QUANTIFYING AESTHETIC OPPORTUNITY,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 6A.
W75-05476

EVALUATION OF QUALITY PARAMETERS IN WATER RESOURCE PLANNING (A STATE-OF-THE-ART SURVEY OF THE ECONOMICS OF WATER QUALITY),
IWR Contract Report 74-13, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Virginia, December 1974. 250 p, 1 fig, 56 tab, 199 ref.

Descriptors: *Water quality, *Surveys, *Evaluation, *Water resources, *Water purification, *Benefits, *Costs, Technology, Planning, Water supply, Optimization, Surface waters, Groundwater, Water treatment, Wastes, Recycling, Water allocation(Policy), Methodology, Models, Studies, Equations, Reservoirs, Hydrology, Standards, Systems analysis.
Identifiers: *Economic analysis, Instream treatment, Instream use.

Presented is a report intended to provide the Corps of Engineers and other planners with a summary and critique of the literature considering the economics of water quality and a synopsis of relevant methodology which relates water quantity to water quality. Economic cost and benefit calculations are stressed along with optimizing procedures. Water quality is reviewed from the standpoint of: determining the influence of water contaminants on various uses of water; water quality indices and standards; water quality models; technology and cost of water supply purification and of waste and receiving-water purification; benefits derived from enhanced water quality; economic techniques for optimal water supply purification and allocation; and economic techniques for optimal waste and recycling water purification. (Bell-Cornell)
W75-05483

LIME RETENTION IN ANTHRACITE COAL-BREAKER REFUSE,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05496

DISPOSAL OF HAZARDOUS WASTES,
Geological Survey, Denver, Colo.
R. Pearl.
Water Well Journal, Vol 28, No 10, p 43-45, October, 1974.

Descriptors: *Waste disposal, *Legal aspects, Management, Radioactive wastes, Industrial wastes, Radioactive waste disposal, Landfill, Waste disposal wells, Waste disposal.

The United States Environmental Protection Agency comprehensive report to Congress in 1973 on storage and disposal of hazardous wastes is reviewed. This report points out that: (1) the magnitude of the hazardous waste problem was greater than originally anticipated, (2) current management practices for treating, storing or disposing of hazardous wastes do not provide the necessary reassurances that man or the environment are being adequately protected. The Environmental Protection Agency presented eleven key findings and one recommendation to Congress. The Environmental Protection Agency also proposed a Hazardous Waste Management Act, which later was introduced to Congress as Senate Bill S1086 and House Bill HR4873 by Senator Baker and Representatives Staggers and Devine. Some of the provisions of this act are listed. (Bradbeer-NWWA)
W75-05504

AQUIFER CLOGGING IN COMBINED WASTE-WATER RECHARGE,
Massachusetts Univ., Amherst. Dept. of Plant and Soil Sciences.
For primary bibliographic entry see Field 5D.
W75-05520

METER FOR SEWER FLOW MEASUREMENT,
Illinois Univ., Urbana. Dept. of Civil Engineering.
H. G. Wenzel, Jr.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings Paper 11070, p 115-133, January 1975. 11 fig, 3 tab, 17 ref, 2 append. OWRT B-063-ILL (3).

Descriptors: *Discharge measurement, *Flow measurement, *Water measurement, *Flowmeters, Venturi meters, Pipe flow, Sewers, Drainage, Hydraulics, Urbanization.

An experimental and analytical study was performed to develop the geometry for a Venturi type flow meter for use in sewer flow measurement. The meter consists of a constriction in the pipe which produces critical flow under open channel flow conditions and acts as a conventional Venturi meter under full flow conditions. The constriction is constructed by using cylindrical segments the diameter of which are larger than that of the pipe, leaving the invert and crown clear. Head loss characteristics and experimental rating curves for both open channel and full flow conditions were described. Information was also presented to permit the selection of geometrical parameters for optimum performance for a specific installation. (Jess-ISWS)
W75-05522

THE RELATIONSHIP OF ELECTRIC POWER STATION THERMAL CIRCULATION TO BIOLOGICAL PRODUCTIVITY: PHASE II - CONTROL OF THERMAL POLLUTION BY BIOLOGICAL SYSTEMS,
Baylor Univ., Waco, Tex. Inst. of Environmental Studies.
For primary bibliographic entry see Field 5C.
W75-05533

A GENERIC METHODOLOGY TO FORECAST BENEFITS FROM URBAN WATER RESOURCE IMPROVEMENT PROJECTS,
Dornbusch (David M.) and Co., Inc., San Francisco, Calif.
For primary bibliographic entry see Field 6B.
W75-05536

MULTIPLICATION OF ALGAE IN SEWAGE WATER,
Tamil Nadu Agricultural Univ., Coimbatore, (India).
P. Vidhyasekaran, M. Deiveekasundaram, K. Balaraman, and G. Rangaswami.
Indian Journal of Agricultural Science, Vol 43, No 5, p 504-506, May, 1973. 2 tab, 7 ref.

Descriptors: *Algae, *Sewage, Water reuse, *Waste water(Pollution), *Proteins, *Nitrogen.
Identifiers: Nitrogen sources, *Poultry feed.

Algae which might be used for poultry feed were found to grow well in sewage water with an added nitrogen source. Various nitrogen sources widely altered the protein content of the algae, and groundnut-cake was found to markedly increase the protein content of the algae, and to provide maximum yield of algal dry matter and higher algal nitrogen. (Sandoski-FIRL)
W75-05539

WATER QUALITY ANALYSIS SYSTEM WITH MULTICIRCUIT SINGLE SHELL HEAT EXCHANGER,
Beckman Instruments, Inc., Fullerton, Calif.
For primary bibliographic entry see Field 5A.
W75-05549

A CLOSE LOOK AT LONDON'S WATERS,
Surveyor, Vol 143, No 4278, p 39, June 7, 1974.

Descriptors: *Water pollution, *Water quality control, *Filtration techniques, *Effluents, *Industrial wastes, Phosphates, Bacteriology, Reservoirs, Chlorophyll, Phenols, Biodegradation.
Identifiers: *Slow sand filtration, Meta Cresol, Particulate carbons, Ammoniacal nitrogen.

The Metropolitan Water Board was established as one of the first public bodies of its type in Great Britain to appraise water quality matters there. The MWB established a Water Examination Department in 1905 which for years has produced a reused water supply from water containing increased proportions of purified sewage and trade effluent, of a safe quality and sufficient supply. The supply has been derived from the Thame and Lee Valleys, comprising such industrial areas as Luton, Oxford, Swindon and Stevenage. MWB originated many studies and new techniques based on an interest in water bacteriology. Slow sand filtration experiments showed how filters might be run at up to 12 m/day without effluent quality deterioration; this doubled the rate of previous practice. An assessment of the amount of removal of phenols by slow sand filters was made, resulting in the conclusion that to remove doses of one mg/liter, a five day acclimatization is necessary. Phenol at 0.5 mg/liter was removed on the first day, and 0.2 mg/liter with Meta Cresol. In a five day acclimatization about 7.5 mg/liter of the five phenols tested was removed. Experimentation was initiated in the treatment of water with ozone or chlorine before filtration; this treatment increased degradability of organic chemical bacteria. (Leibowitz-FIRL)
W75-05550

DEVELOPING WATER SAMPLING STANDARDS.
For primary bibliographic entry see Field 5A.

W75-05555

REMOVAL OF CATIONS FROM LEACHATE BY INTERACTION WITH SUBSURFACE SOILS,
Environmental Protection Agency, Boston, Mass. Solid Waste Management Branch.
. W. Leighton, and F. C. Blanc.
Journal of the Boston Society of Civil Engineers, Vol 60, No 4, p 145-162, October, 1973. 6 tab, 9 fig.

Descriptors: *Cations, *Leachate, *Infiltration, Landfills, Sodium, Potassium, Calcium, Iron, Magnesium, Laboratory tests, On-site data collections, Adsorption, Ion exchange, Analytical techniques, Spectroscopy, Soils, Metals, Water pollution control.

This investigation was conducted in order to determine the magnitude of cation removal from leachate provided by soils under a landfill. The interaction of sodium, potassium, calcium, iron and magnesium cations in leachate with a soil was examined for eight Massachusetts soils in laboratory soil column experiments. Removal capacities for the various soil types were developed based on the soil column experiments. The removal values ranged from 3.8 milliequivalents to 31.1 milliequivalents per 100 grams of dry soil. Shaker tests were used to verify the soil column experiments. (Jernigan-Vanderbilt)
W75-05589

PERFORMANCE OF RED PINE AND JAPANESE LARCH PLANTED ON ANTHRACITE COAL-BREAKER REFUSE,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05597

PUBLIC PERCEPTIONS OF WATER QUALITY IN A METROPOLITAN AREA,
Georgia Inst. of Tech., Atlanta. School of Industrial and Systems Engineering.
. W. Hines, and G. E. Willeke.
Water Resources Bulletin, Vol 10, No 4, p 745-755, August, 1974. 14 tab, 3 ref. OWRT-A-023-GA(3).

Descriptors: *Water quality, *Psychological aspects, Water law, *Water pollution, Water resources, Water utilization, *Attitudes, Management, Public health, *Georgia, Water treatment, Water conservation, Water policy, Water management, Water costs, Social aspects, Water requirements, Industries, Industrial water, Municipal water, Industrial wastes, Municipal wastes.
Identifiers: *Public perception, *Atlanta(Ga), Dekalb Co(Ga), Fulton Co(Ga), Mass media, Public education, Metropolitan wastes.

A study of public perception of water quality problems in metropolitan Atlanta, Georgia, showed that 2/3 of the population considers these problems serious or critical, and 56% thought they were worsening. Present law was considered too weak by 58%, and a stronger enforcement role was favored for the state by 3/4 of the sample. Three-fourths of the population also favored increased expenditures for improved treatment facilities, and both industries and municipalities were considered to be major contributors to water pollution. Findings clearly show the importance of timely dissemination of accurate information about water quality to the public. Television and newspapers appear to be the most important media, with supplementary field trips and familiarization tours. Study population consisted of 1600 households in Fulton and DeKalb Counties, Georgia. A cluster sampling design with two stages of stratification, county and census tract, was employed. Perceptual differences between the counties were not large, nor for income, race, and sex comparisons. The varying experiences of respondents, however, had a large effect on their appraisal of the water quality situation. (Grden-North Carolina)
W75-05605

AUTOMATIC CONTROL OF LARGE-SCALE COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05608

COMBINING ESTIMATES OF LOW-FLOW CHARACTERISTICS OF STREAMS IN MASSACHUSETTS AND RHODE ISLAND,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 2E.
W75-05629

THE DETECTION AND STUDY OF NITRIFICATION IN STREAMS AND ESTUARIES,
Rutgers-the State Univ., New Brunswick, N.J. Dept. of Environmental Services.
For primary bibliographic entry see Field 5A.
W75-05659

PHOTOSYNTHETIC REAERATION IN THE UPPER PASSAIC RIVER,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W75-05662

WATER QUALITY IN THE GREAT LAKES: A NEW TIMETABLE,
P. S. Ward.
Journal, Water Pollution Control Federation, Vol 46, No 8, p 1842-1845, August, 1974. 1 fig.

Descriptors: *Great Lakes, *Water quality control, *Federal government, Legal aspects, Iron, Phosphorus, Mercury, Heavy metals, Toxicity, Contaminants, Organic matter, Coliforms.

The problems encountered by the International Joint Commission (IJC) in its efforts to attain its water quality improvement goals were discussed. The Great Lakes Water Quality Agreement was signed in 1972 as a result of IJC recommendations. The agreement outlined both general and specific water quality objectives to be obtained or in progress by 1975. Recommended concentration levels were established for coliforms, dissolved oxygen, total dissolved solids, taste and color, pH, iron, phosphorus, and radioactivity. Interim objectives were designated for temperature, mercury and other toxic metals, and persistent organic contaminants. A recent report indicated that the IJC will not meet its objectives in the anticipated time frame, mainly because of U.S. bureaucratic complexity and presidential impoundment of water pollution funds. Meanwhile some progress has been made in improving the Great Lakes. Phosphorus loading to all the Great Lakes except Erie have been lowered by the reduction of phosphorus in detergents. Selected water works along the Ohio shore of Lake Erie reported reductions in phytoplankton and total coliform bacteria, and DDT levels in Lake Michigan continued to decline. (Jernigan-Vanderbilt)
W75-05694

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. R. Walker, G. V. Skogerboe, and T. L. Huntzinger.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 299, $3.75 in paper copy, $2.25 in microfiche. Paper presented at the Ninth American Water Resources Conference, Olympic Hotel, Seattle, Washington. October 21-26, 1973. 25 p, 10 fig, 7 tab, 13 ref. OWRT B-083-COLO(7).

Descriptors: Irrigation water, Municipal water, *Optimization, Salinity, *Water quality control, Waste water treatment, Water quality standards, River basins, *Urbanization, *Utah, Model studies, *Optimum development plans, *Water utilization, Cities.
Identifiers: *Utah Lake area(Utah).

Urbanizing river basins in the west are encountering serious water quality degradation resulting from the expanded water utilization. In order to avoid aggravating such conditions, water quality controls need to be implemented. The important questions are, therefore, where and how to impose such constraints on the urban and agricultural sectors to achieve the desired level of pollution control. An application of the model developed to address such questions is made in the Utah Lake drainage area of Central Utah as a test of the model's utility. The region is subdivided into five major sub-basins containing both municipal and agricultural water demands. A submodel of each subbasin is developed which optimizes the water quality control strategies by linking the urban to the agricultural uses and then evaluating the levels of control for each sector. From these results, a cost-effectiveness function for each sub-basin is generated. By jointly considering the cost-effectiveness relationship for each sub-basin, an optimum policy for the entire basin is determined.
W75-05774

REGIONAL WASTEWATER MANAGEMENT: A WATER QUALITY EVALUATION OF SYSTEM CENTRALIZATION,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05775

ESTUARIAL AND COASTAL POLLUTION,
For primary bibliographic entry see Field 5B.
W75-05811

BOAT FOR COLLECTING OIL SLICKS AND OTHER CONTAMINANTS FROM THE SURFACE OF WATER,
D. J. Weatherford.
U.S. Patent No. 3,862,904, 7 p, 7 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 930, No 4, p 1875, January 28, 1975.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Boats, Flotsam, Skimming, Barges, Equipment.
Identifiers: Debris.

A new oil collection craft is a maneuverable, self-propelled barge equipped with a front-end surface skimmer to which surface films of oil and or other contaminants are drawn by means of a floating boom. The floating boom in the form of a large loop or noose, as it is drawn inward, confines the circumscribed film to an even smaller area of increasingly heavy film until it is swept into the vessel at the skimmer aperture. A heavy wire mesh basket shields the skimmer aperture, collects floating debris, brush and other solid waste materials, and is lifted upward and emptied into a grinder and compressor apparatus which transforms such debris into compacted bales for subsequent disposal. The collected oil and other liquid contaminants are pumped into a floating storage bag which is towed behind the barge. Pumping equipment utilized for the pumping of oil to the storage bag also may be employed to pump water and other fire-fighting chemicals to water cannons and spraying ports for use in fighting fires. (Sinha-OEIS)
W75-05816

FLEXIBLE OIL BOOM,
R. A. Fossberg.
U.S. Patent No. 3,852,978, 4 p, 7 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 534, December 10, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Barriers, Waves(Water), Equipment, Separation techniques, Floats.
Identifiers: Wave action, *Booms.

A flexible oil boom is produced comprising a barrier wall of flexible sheet material having an upper portion and a lower portion. These are joined together by an overlapping connection at a location below the water line. At spaced locations along the length of the barrier wall are a series of vertical pockets, each containing a stiffening rod for holding the boom in a vertically upright position. Flexible straps are mounted in the overlapping connection such that each strap surrounds the lower edge of the upper portion and is sewn into the overlapping connection. Free ends of the strap extend outward from each side of the barrier wall for connecting floats. Each strap is sewn into the overlapping connection as close as is possible to each stiffening rod pocket. Individual weights are attached to the barrier wall at the lower end of each stiffener rod pocket. When the boom is deployed in a body of water, an individual float is attached to each strap end so that a pair of opposed floats are associated with each stiffening rod. This pair of opposed floats at the water line and the weights at the lower end tend to maintain each stiffening rod in a substantially vertical position. The barrier wall between the stiffening rods is quite flexible and can flex both horizontally and vertically. In choppy wave action the boom is able to ride the waves because the portion of the barrier wall in the region of each stiffening rod is able to rise and fall with choppy waves without affecting more remote portions of the boom. (Sinha-OEIS)
W75-05824

FLOATING ANTI-POLLUTION DEVICE,
Kleber-Colombessa, Paris (France). (assignee)
L. Ballu.
U.S. Patent No. 3,852,964, 4 p, 8 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 929, No 2, p 530, December 10, 1974.

Descriptors: *Patents, *Flotsam, *Barriers, Water pollution control, Water quality control, *Pollution abatement, *Floats.

The barrage or barrier consists of a skirt provided with ballast and supported by floats. In order to adapt each portion of the barrage to the conditions into which it is placed, the corresponding skirt may be raised so as to modify its height. Straps connect the bottom of the skirt with the upper portion of the float. The two ends of the straps are tied together by loops placed along one of the end portions of the strap so that the strap is rendered endless, each strap passing underneath the ballast of the skirt. When lengthening or shortening the strap with the aid of adjacent loops, the ballast is lifted or lowered corresponding to a decrease or increase of the height of the skirt. (Sinha-OEIS)
W75-05825

NEW PRIORITIES FOR GROUND-WATER QUALITY PROTECTION,
Geraghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 5B.
W75-05827

SOIL AND GROUND-WATER SALINIZATION BENEATH DIVERSIFIED IRRIGATED AGRICULTURE,
Agricultural Research Service, Fresno, Calif. Ground Water Recharge Field Station.
For primary bibliographic entry see Field 3C.
W75-05842

OXYGEN UTILIZATION, DARK ASSIMILATION OF CARBON DIOXIDE AND THE RATE OF PHOTOSYNTHESIS IN NAUTRAL AND FILTERED WATER SAMPLES. (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. I. Romanenko, and E. G. Dobrynin.
Mikrobiologiya. Vol 42, No 4, p 573-575. 1973. English summary.

Descriptors: *Reservoirs, *Water quality, Algae, Filters, Membranes, *Bacteria, *Sampling, *Water analysis.
Identifiers: Assimilation, Biocenoses, Membrane, Nautral, Oxide, Oxygen, Photosynthesis, Rate, Reservoirs, Samples, Water.

The number of bacteria, the utilization of oxygen and dark assimilation of CO2 remained almost the same in water samples filtered through a membrane filter with the diameter of pores of 3-6 micro; the number of algae decreased almost 8 times. Therefore both the utilization of oxygen and the assimilation of CO2 in the dark in natural biocenoses of reservoirs are mainly due to the activity of bacteria. Copyright 1974, Biological Abstracts, Inc.
W75-05846

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

A COMPUTERIZED MODEL FOR DETERMINING THE OPTIMAL WATER UTILIZATION FOR AGRICULTURE,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
J. M. Van Deman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 965, $4.75 in paper copy, $2.25 in microfiche. MS Thesis, 1973. 89 p, 6 tab, 19 ref, 6 append. OWRT B-068-NC(1). 14-31-0001-4114.

Descriptors: *Mathematical models, *Linear programming, Optimization, Agriculture, Water demand, Irrigation, Income, *Water utilization, Computer models, Computer programs, Model studies, *Optimal development plans, Water policy.

A mathematical model was derived to determine which crops to grow on what soils under which irrigation policies in order to maximize a net return. The income for growing minus the cost for irrigating a crop determined the per acre return for each crop-soil-irrigation policy combination. Restrictions on crop allotments, soil acreages, and water availability were imposed. Because the restrictions and return were linear, the derived model was a linear programming problem. A user-oriented computer system was developed to solve the model. The system utilized MPS/360 to obtain the optimal solution and to perform post-optimal analyses on the objective function and right hand sides. Also, computer programs were written to determine coefficients, develop the input matrix, and print user-oriented reports from the solution and post-optimal analysis. (McJunkin-North Carolina State)
W75-05356

TOWARD A TECHNIQUE FOR QUANTIFYING AESTHETIC QUALITY OF WATER RESOURCES,
Utah State Univ., Logan.
IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., October 1974. 91 p, 5 fig, 8 tab, 56 ref. P. J. Brown, Editor.

Descriptors: *Water resources development, *Aesthetics, *Evaluaton, *Measurement, *Environment, *Scenery, Methodology, Analytical techniques, Planning, Effects, Research, Value, Constraints, Psychological aspects, *Water quality, Management, Wildlife habitats, Surveys, Model studies, Systems analysis.
Identifiers: *Aesthetic opportunity, Quantification, *Subjective analysis, *Landscape aesthetics, *Straw man model, National goals, Aesthetic changes, Perceptions, Water aesthetics, Environmental quality, Impact, Public involvement, Social welfare, Weighting system, Disaggregation, Preferences, Multiple-objective, Regional goals, Natural environment, Quantitative techniques, Computer analysis.

Presented are the proceedings of a colloquim held in Park City, Utah in October of 1972 to explore various means of incorporating aesthetic considerations into the water resources planning process. The conference brought together a multidisciplinary group of experts in the field of natural aesthetics in order to design a strategy to examine and develop the aesthetic opportunity sector of the straw man model. The straw man is heavily oriented toward computerized analysis, hence quantifying the aesthetic effects of water resource development alternatives was a primary topic of discussion during the conference. Aesthetic opportunity is one of nine national goals specified by the Office of Water Resources Research in respect to its sponsorship of the development of a new water resources planning system. The function of this report is not to debate the rationality of the aesthetic opportunity goal model, but rather to focus on how one might deal with the quantification of aesthetic quality changes. Organizationally the report narrows from a general discussion of criteria for evaluation aesthetic quality quantification schemes to specific concern with quantifying landscape aesthetics, and then broadens again to sum up the general topic. One means of measurement is the examination of surveys taken to determine people's preferences for particular elements in the natural environment. Analyzed are those elements constituting the aesthetic nature of experience. Also, aesthetic opportunity is related to the individual's state of physiological and psychological security. (See W75-05474 thru W75-05479) (Bell-Cornell)
W75-05473

ON THE CRITERIA FOR AND THE POSSIBILITY OF QUANTIFYING THE AESTHETIC ASPECTS OF WATER RESOURCE PROJECTS
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
R. S. Boster.
In: Toward a Technique for Quantifying Aesthetic Quality of Water Resources. IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., p 6-21, October 1974. 1 fig, 13 ref.

Descriptors: *Water resources development, *Aesthetics, *Evaluation, Projects, Comprehensive planning, Economic efficiency, Standards, Measurement, Computer models, Systems analysis, Watersheds(Basins), Model studies.
Identifiers: *Environmental quality, *Aesthetic opportunity, *Criteria, *Aesthetic quantification, Multiple objectives, Straw man model, Judgment, Public involvement, Wildland areas.

Increased interest in methods of evaluating water resource projects has led to a significant and continuing re-evaluation. Project feasibility is now being determined by concerns other than just traditional economic efficiency. A highly important task today is to evaluate feedback, focusing on the objective of environmental quality. The criteria which must be met by any system designed to quantify aesthetic quality are discussed. Included is a description of studies dealing with the aesthetic appraisal of forest stands. Presented is a list of twelve criteria being used to evaluate

judge a new technique for quantifying the public's perceptions of windland areas managed in different ways. Considered are six differentially-managed pine watersheds. The approach is based on extensions of psychology's Theory of Signal Detection and on a systematic conceptual model. Discussed are some ideas regarding the straw man' planning scheme as a possible solution framework for quantifying aesthetics related to water resources development. The 'straw man' allows for comprehensive planning and critical feedback. Desirable traits of methods designed to quantify aspects of environmental perception include conduciveness to public involvement and theoretical soundness. (See also W75-05473) (Bell-Cornell)
W75-05474

AN OVERVIEW: THE DEVELOPMENT OF AESTHETIC OPPORTUNITY CRITERIA AS IT RELATES TO THE PLANNING PROCESS,
Utah State Univ., Logan.
J. W. Fuhriman.
In: Toward a Technique for Quantifying Aesthetic Quality of Water Resources. IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., p 22-31, October 1974. 2 tab, 5 ref.

Descriptors: *Water resources development, *Aesthetics, *Evaluation, *Planning, *Methodology, Environmental engineering, Multiple purpose, Value, Regions, Sites, Land use, Attitudes, Recreation.
Identifiers: Quantification, *Aesthetic opportunity, *Environmental quality, Impact, *Attractiveness, Criteria.

Considered is the quantification of aesthetic opportunities as they relate to water resources. The interface between aesthetic opportunity and other relevant planning and design concerns is clarified. Any aesthetic opportunity quantification system should provide a means for evaluating the relationship between aesthetic opportunity and the inherent quality. Such a system should be developed to yield insight into aesthetic opportunity as it relates to a given broad-scale region and into the aesthetic opportunities that exist in relation to a given function and a specific landscape/waterscape. Moreover, the system should be readily adaptable to any planning methodology. A cursory review is given of some current environmental planning methods and related attitudes/values. Many approaches use a systematic study of natural and cultural resources to determine the inherent qualities of a particular region or site for land use purposes. These resource qualities are interpreted in terms of their capacity to withstand impact and/or their ability to be attractive to a given activity or range of activities. Described is a study for determining the attractiveness of a particular site for a given function of activity. All potential activities were divided into three areas--recreational, residential, and transportational--and were grouped according to severity of impact on major site resources. The determination of activities through impact-attractiveness studies provides opportunity for an increased focus regarding observer-use response to the environment. (See also W75-05473) (Bell-Cornell)
W75-05475

QUANTIFYING AESTHETIC OPPORTUNITY,
Arizona Univ., Tucson.
R. Gum, R. Judge, D. Kimball, and W. Wilson.
In: Toward a Technique for Quantifying Aesthetic Quality of Water Resources. IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., p 32-51, October 1974. 2 fig, 4 tab, 12 ref.

Descriptors: *Water resources development, Water quality, *Planning, *Measurement, Aesthetics, *Evaluation, *Methodology, Psychological aspects.
Identifiers: Quantification, *Aesthetic opportunity, *Disaggregation, Perceptions, Preferences, Societal goals, Mental indicators, Water aesthetics, Ratio scale, Straw man scheme, Comparative judgement, Weighting system, Ranking, Rating.

Developed are measures of aesthetic parameters designed for inclusion in the planning process. In dealing with weighting schemes to link elements within and between 'straw man' sectors, herein the aesthetic opportunity sector is disaggregated and the techniques for making preference evaluations at different points in the framework are outlined. Additionally, the paper describes how to mathematically link one level of the goal hierarachy with another level. A modification of the 'straw man,' the operational planning paradigm forming the basis of this research, is described. Four basic assumptions are followed: (1) societal goals can exist in a branching, tree-like structure; (2) people react to physical, economic, and social facts through their perceptions of these facts; (3) perceptions or mental indicators (i.e., water odor) are the upper structure of the straw man, and the physical indicators (i. e., BOD) are below; and (4) one can acquire directly from people their preferences and tradeoff between various components of the straw man. The research procedure to redefine the straw man was based on a lexicographic analysis of people's perceptions of the components of aesthetic opportunity in combination with a modified Delphi process. Developed were ratio scales of people's preference for changes in the components of the aesthetic opportunity straw man. Results of experimental runs are described in a comparison of normalized group weights as generated by each technique for the components of water aesthetics: odor, floaters, and clarity. (See also W75-05473) (Bell-Cornell)
W75-05476

LOOKING THROUGH THE EYES OF THE PUBLIC OR PUBLIC IMAGES AS SOCIAL INDICATORS OF AESTHETIC OPPORTUNITY,
Idaho Univ., Moscow.
G. J. Cherem.
In: Toward a Technique for Quantifying Aesthetic Quality of Water Resources. IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., p 52-64, October 1974. 2 fig, 2 tab, 2 ref.

Descriptors: *Environment, *Wildlife habitats, *Aesthetics, *Evaluation, Surveys, Photography, Data collections, Measurement, Water resources, Scenery.
Identifiers: *Aesthetic opportunity, Quantification, *Landscape aesthetics, *Public images, Change, Trails, Aggregation.

The newly conceived method of user-employed photography has been utilized to measure visitor response to the natural environment. The study area is the 700-acre wildlife sanctuary of Kensington Metropolitan Park, forty miles northwest of Detroit. Through aggregation of many scenes photographed by users of a nature trail, particular scenes, 'termed public images,' which people tend to photograph over again are identified. A public image photograph is seen as a response to a critical mass of senso-environmental changes occurring within an immediate trail vicinity. For example, coming upon water after hiking on dry land is a change, or contrasting condition, motivation the picture-taking. The twelve dimensions of senso-environmental change are listed. The dimensions of change, which are basically bi-polar in nature, are discussed in relation to the strength of public image. The novel technique of user-employed photography is presented as a data collection tool--through the eye of the subject. The perspective of public image as 'public aesthetic preference' is shown to provide a useful theoretical and impirical tool for the quantification of aesthetic opportunity; it has direct application to water-based aesthetics. (See also W75-05473) (Bell-Cornell)
W75-05477

UNDERSTANDING SCENES: AN EVALUATION TECHNIQUE,
Utah State Univ., Logan.
P. J. Brown.
In: Toward a Technique for Quantifying Aesthetic Quality of Water Resources. IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., p 65-75, October 1974. 16 ref.

Descriptors: *Aesthetics, *Evaluation, *Methodology, *Measurement, *Scenery, Water resources, Planning, Photography, Regional analysis, Surveys, Model studies, Psychological aspects, Feasibility.
Identifiers: *Environmental quality, *Landscape aesthetics, *User preferences, Quantification, Gestalt psychology, Rating, Indexing, Visual aestheticism.

The analysis of landscapes, and innate pattern recognition and cultural enhancement of aesthetic quality are discussed. What is aesthetic is what is easy to see and what is good in our experience. Considered are Gestalt Psychology's observations of what constitutes visual aestheticism. Orderliness of the arrangements of elements in a scene is a factor. For a scene to be aesthetic, the right amount of information provided. A general outline of a method for quantifying aesthetic quality is given. A two-stage evaluation of scenes is proposed in which the researcher (or planner) determines how scenes are put together and then evaluates them with respect to cultural norms. Using photos of the scenes, the elements of the scenes can be examined in relation to user preferences for the scenes, thus identifying which particular scenic elements are significant for measuring aesthetic quality. Described is a model explaining 66% of the variation in landscape aesthetic preference scores. Such scores become the tools for describing aesthetic quality. Considered is the usefulness of such evaluation for water resources planning. Next, a more explicit statement of the method and a technique for studying the method to determine its feasibility are given. Use of the method for scene analysis is discussed in which the scene elements to be examined are presented followed by how they might be studied and quantified. The applicability of this method to regional analysis of visual aesthetic quality is given. (See also W75-05473) (Bell-Cornell)
W75-05478

INDICATORS FOR AESTHETIC OPPORTUNITY,
Bureau of Land Management, Washington, D.C.
F. L. Newby.
In: Toward A Technique for Quantifying Aesthetic Quality of Water Resources. IWR Contract Report 74-8, U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va., p 76-87, October 1974. 8 ref.

Descriptors: *Evaluation, *Scenery, *Psychological aspects, *Aesthetics, *Environment, Planning, Decision making, Management, Resources development.
Identifiers: *Aesthetic opportunity, Pattern recognition, Human development, Social welfare , Human behavior, Quantification, Predictive model.

How one might evaluate the basic components of scenes which are related to innate and learned pattern recognition is discussed. Several techniques for evaluation are proposed. Aesthetic opportunity is related to the relative state of physiological and psychological security enjoyed by an individual. Considered are human development and growth in terms of needs and goals. Whether or not man is consciously concerned about the aesthetics of his environment, he is searching for meaning, cohe-

sion, and order in his surroundings. Predictability and relative complexity are environmental qualities which influence whether or not a person has an opportunity for an aesthetic experience. With order and complexity being essential environmental elements, it is assumed that quantification of these elements could lead to the development of an analytical predictive model for resource decision-making. It is recommended that the social and behavioral scences become an integral part of resource or environmental management, since social welfare can be achieved only when man begins to plan, develop, and manage with the environment and himself as a collective entity. (See also W75-05473) (Bell-Cornell)
W75-05479

ANALYSIS OF THEORIES AND METHODS FOR ESTIMATING, BENEFITS OF PROTECTING URBAN FLOODPLAINS,
Washington Univ., St. Louis, Mo. Inst. for Urban and Regional Studies.
For primary bibliographic entry see Field 4A.
W75-05481

AN EVALUATION OF WATER REUSE FOR MUNICIPAL SUPPLY,
Southern Illinois Univ., Carbondale.
For primary bibliographic entry see Field 5D.
W75-05482

AUTOMATIC CONTROL OF LARGE-SCALE COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05608

PROBABILISTIC MODEL OF RARE HYDROLOGIC EVENTS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2A.
W75-05766

A DECISION-AIDING MODEL FOR PLANNING OPTIMAL RESOURCE ALLOCATION OF WATER BASINS,
Arizona Univ., Tucson. Dept. of Watershed Management.
E. T. Bartlett.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 286, $5.75 in paper copy; $2.25 in microfiche. Ph D Dissertation, 1974. 132 p, 14 fig, 19 tab, 69 ref, 2 append. OWRT B-032-ARIZ(6). 14-31-0001-3858.

Descriptors: *Optimum development plans, *Arizona, Basins, *Watershed management, Decision making, Optimization, Mathematical models, Stochastic processes, Simulation analysis, Systems analysis, *Model studies, Planning, *Resource allocation, *Dynamic programming, *Linear programming, *Water distribution(Applied).

The water basin model employs two methods of system analysis for developing optimal management plans. These two methods, linear programming and dynamic programming, are used in a hierarchial combination for comparing alternatives on water basins. The model links both on- and off-site uses of basins in a rational combination of levels. The multilevel model considers the initial condition and potential of vegetation, climate, and soils at the lowest level and proceeds through a hierarchial scheme to arrive at allocation of budgetary resources among response units and subwatersheds. For an array of basin investment levels, the guide indicates how the water should be allocated among on- and off-site uses using a dynamic program, how the investment should be allocated among sub-watersheds using a dynamic program, and how the investment should be allocated among development alternatives on each subwatershed using a linear program. A test run of the model was made on an existing basin in northern Arix. using forage grazing as the on-site use and water for irrigation as the off-site use. Basic inventory data obtained from the Bureau of Land Management provided input for determining ecologic and hydrologic response to on-site management. The sensitivity of plans to on-site benefits from forage harvest was examined and showed that direct benefits to the federal government do not justify development expense. However, on-site development was indicated when benefits were based on the corresponsing value that private firms given for grazing forage. The model serves three useful functions: (1) provides preliminary guides for managers, (2) brings to light future research needs, and (3) provides impetus for developing better models.
W75-05770

INVENTORY THEORY APPLICATION TO THE OPTIMUM CONTROL OF IRRIGATION WATER,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
Marcia A. Gonzalez de de la Fuente.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-240 288. $4.25 in paper copy, $2.25 in microfiche. M. S. Thesis, 1974. 53 p, 10 fig, 21 ref. OWRT B-032-ARIZ(7). 14-31-0001-3858.

Descriptors: Watershed management, Decision making, *Optimization, *Mathematical models, Stochastic processes, *Simulation analysis, Systems analysis, Model studies, *Irrigation water, *Soil water, Water levels, Demand.
Identifiers: *Inventory models, *Evaporative demand.

This study was centered mainly in the use of inventory models to find an optimal solution to the problem of what soil water level to maintain in order to obtain the maximum profit from an irrigated crop. To set up the mathematical models some simplifying assumptions were made. It was assumed that the rate of evapotranspiration is uniform, although it is known that this rate decreases as the available water content approaches zero. This assumption is not a need since inventory theory can handle a curvilinear relationship. All models presuppose that there is no restriction in the availability of water; the operation os systems for delivering irrigation water to the farmer is another problem that could be easily handled by inventory models. The models developed here take account of the stochastic nature of the evaporative demand and its dependence on rainfall during the growing period, and the more realistic situation in which the lag time in delivering water to the soil is positive can be included. Moreover, multi-product inventory models can be used to simulate the storage of water, fertilizer, and salts simultaneously. The requirements for the use of these models for the management of irrigation systems are the availability of data on the evaporative demand of a crop, short-term forecasts on rainfall probabilities, and that the farmer keeps track of the water level in the soil reservoir. The limitations for the development or adaptation of other inventory models as suggested above are very few.
W75-05771

WATER SUPPLY, TREATMENT, DISTRIBUTION, AND REUSE OPTIMIZATION IN ARID URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. R. Walker, G. V. Skogerboe, and R. C. Ward.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 289, $3.25 in paper copy, $2.25 in microfiche. Paper presented at the Ninth American Water Resources Conference, Olympic Hotel, Seattle, Washington, October 21 - 26, 1973. 22 p, 7 fig, 18 ref. OWRT B-083-COLO(6).

Descriptors: Agricultural transfer, *Institutional constraints, Interbasic transfer, Optimization, Recycling, *Water distribution(Applied), Water quality, Water resources, Water treatment, Cities, *Water supply, *Water reuse, Model studies, *Colorado, Costs.
Identifiers: Arid-urban areas, Denver(Colo).

A management level model has been formulated in which a systematic analysis format is employed to answer some of the basic questions regarding urban water management strategies. The model incorporates a multilevel optimization scheme to coordinate urban water supply, distribution, and wastewater management. A test of the model's utility is made in an application to the water management problems of the Denver, Colorado metropolitan area. Denver has utilized both agricultural transfers and transmountain diversions to supplement the natural stream resources of the South Platte River. Although plans are being made to increase the capacity of these sources, increasingly stringent standards on the area's effluents are enhancing the feasibility of reclaiming and recycling a portion of the wastewater. The urban model used in this study indicates the decision points at which respective strategies are introduced. However, by formulating the model from a planner's viewpoint, the most important results gained from the analysis are the costs of various institutional constraints which may restrict the decision maker's ability to implement optimal policies.
W75-05773

OPTIMAL ALLOCATION OF WATER QUALITY CONTROLS IN URBANIZING RIVER BASINS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-05774

A SYSTEMS APPROACH TO THE OPERATION OF FLOOD CONTROL RESERVOIRS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05784

THE PHOSPHORUS-CHLOROPHYLL RELATIONSHIP IN LAKES,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 2H.
W75-05837

6B. Evaluation Process

COMMERCIAL NAVIGATION ON THE UPPER MISSISSIPPI RIVER: AN ECONOMIC REVIEW OF ITS DEVELOPMENT AND PUBLIC POLICY ISSUES AFFECTING MINNESOTA,
Minnesota Univ., Minneapolis. Dept. of Agriculture and Applied Economics.
For primary bibliographic entry see Field 4A.
W75-05353

A STUDY OF AESTHETIC PREFERENCES,
Wyoming Univ., Laramie. Dept. of Sociology.
J. P. Mitchell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 9[illegible] $5.25 in paper copy, $2.25 in microfiche. MA Thesis, December 1974. 126 p, 41 tab, 28 ref, 4 appen. OWRT A-018-WYO(2).

Descriptors: *Wyoming, *Aesthetics, *Attitud[illegible] *Social values, *Scenery, Psychological aspe[illegible] Surveys, Evaluation, Economic impact, W[illegible] rivers.

lentifiers: Socioeconomic variables, Social references.

ffects of specific socio-economic variables upon ie preferences of Wyoming citizens towards outoor water-related scenery, were investigated. A ample composed of 237 respondents from various eas of Wyoming were interviewed. Preferences ere measured by the ranking of color photoraphs, representing outdoor water-related scenes ommon to the state of Wyoming, from best-liked least-liked. It was discovered that socioconomic variables have a minimal relationship ith aesthetic preferences. Further research conntrating upon individual factors was recomended.
75-05359

EASURING THE SOCIAL ATTITUDES AND ESTHETIC AND ECONOMIC CONSIDERAIONS WHICH INFLUENCE TRANSMISSION INE ROUTING,
attelle-Pacific Northwest Labs., Richland, ash.
or primary bibliographic entry see Field 6G.
75-05391

OCIO-ECONOMIC IMPACTS OF RURAL ATER SUPPLIES,
niversity of Southern Mississippi, Hattiesburg. ept. of Economics.
. C. Williams, Jr., and C. P. Cartee.
ater Resources Bulletin, Vol 10, No 1, p 144-2, 1974. 5 ref. OWRR A-060-MISS (2).

escriptors: *Rural areas, *Domestic water, ater management(Applied), Administration, ocal government, Water supply, Economic imct, Government support, Planning, Social pects.
entifiers: *Farmers Home Administration.

the end of fiscal year 1973, the Farmers Home dministration had financed over 7,561 water and wer systems at a cost in excess of $2 billion. oupled with the growing number of water stems, however, has been increased questioning the systems' efficiency and adequacy of operaons. To illustrate the problem a survey was conicted of the managerial practices of 534 rural ater systems in Mississippi. Results based upon a % response, indicated that 87% of the operators ere part-time. Only 20% of the systems has an inuse program for testing some aspects of water ality, while over 53% reported no form of water eatment. Under new directives, however, all will required to have a minimum of chlorination. e survey indicated no significant economies of ale associated with the operation of larger stems. Several operational alternatives and commendations were discussed: (1) integration system operations by contracted services; (2) mbination of individual systems for operation d maintenance; and (3) greater county-wide stem planning, development, and operation. veral direct and indirect impacts--residential d commercial development and greater social enities associated with the system's develop-nt--are also noted. (Schroeder-Wisconsin)
75-05407

NTERIM WATER QUALITY PLAN FOR THE INNEHAHA COUNTY STANDARD ETROPOLITAN STATISTICAL AREA AND STRICT II.
uth Eastern Council of Governments, Sioux lls, S. Dak.
cember 1973. p 156, 3 fig, 3 tab, 5 append, 17 . AUD grant.

scriptors: *Planning, *Water resources velopment, *Wastewater disposal, *Cities, outh Dakota, *Municipal water, Water supply velopment, Urbanization, Governments, tropolitan studies, Baseline studies, Sewerage, Sewage treatment, Environmental control, On-site data collections.
Identifiers: *Sioux Falls(South Dakota).

A summary is presented of problems and needs in public water supply and wastewater facilities in Minnehaha County Standard Metropolitan Statistical Area (SMSA), South Dakota. The planning area lies almost entirely within the Big Sioux River Basin which drains from northeastern South Dakota into the Missouri River, just North of Sioux City, Iowa. Skunk Creek, which drains about 5000 square miles, is the main tributary. Sioux Falls is the largest contained city, with a 1970 population of 72,488. All the satellite communities surrounding Sioux Falls are expected to show continued population growth. This increase will require improved and expanded water and sewage facilities, creating even heavier demands on community budgets already strained. Capital improvements programming will become an absolute necessity. Manufacturing is the single most important element in the region's economy, providing 20% of the total employment in the planning area. The quality of the ground and surface waters in the dual areas which appear to be experiencing more than normal degradation. Summaries are given of the conditions of water and wastewater facilities in each of the communities within the SMSA and the needs and proposed improvements in each community. Available financing options are reviewed. (Poertner)
W75-05421

COMPREHENSIVE WATER AND SEWER PLAN, BRADLEY COUNTY, TENNESSEE.
Sanders (B.G.) and Associates, Inc., Atlanta, Ga.
Southeast Tennessee Development District, Atlanta, Georgia, June 1972. p 112, 8 fig, 14 tab. No. HA Grant.

Descriptors: *Sewerage, *Water supply, *Planning, *Tennessee, *Public utilities, Governments, Long-term planning, Regional analysis, Water supply development, Cities, Urbanization, Water resources development, Comprehensive planning, Regional development.
Identifiers: *Bradley County(Tennessee).

The purpose of the study was to investigate the present and future demands for water supply and sewerage services and to develop a coordinated and comprehensive plan to furnish Bradley County, Tennessee with such services. The study is primarily concerned with the needs of the rural, unincorporated portions of the County, but clearly recognizes the tremendous influence and potential of the County's growth center--Cleveland. Part I of the report contains the basic background studies upon which the plan is based. These include a thorough analysis of past and projected population and economic trends, existing and forecasted land use patterns, and pertinent physical conditions such as topography, soils, utilities and transportation networks. Part II provides an evaluation of existing water and sewerage systems with respect to their adequacy to meet present and future demands. Goals and objectives are formulated, and an area-wide, integrated plan for water and sewerage systems improvement presented. Action recommendations are oriented toward assuring the implementation of the proposals. The proposals envision the development of integrated water and sewer systems sufficient to serve the entire population and industrial needs of Bradley County through 1990. Recommendations for the County-wide water system include the ultimate creation of a vast base circle loop, utilizing the expanded Cleveland system as the initial framework. The ultimate sewer plan proposals are based upon the construction of new treatment facilities and large gravity trunk lines. (Poertner)
W75-05430

ALTERNATIVE METHODS OF EVALUATING THE ECONOMIC AND SOCIAL ASPECTS OF WATER QUALITY,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W75-05445

LAND-USE CHANGES AND THE ECONOMIC EVALUATION OF NATURAL VIRGINIA PINE STANDS ON THE DIAL CREEK WATERSHED, DURHAM COUNTY, NORTH CAROLINA,
North Carolina State Univ., Raleigh. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-05446

AN EVALUATION OF THE RESEARCH PROGRAM FOR THE STATE OF WASHINGTON WATER RESEARCH CENTER.
Washington State Water Research Center, Pullman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 007, $3.75 in paper copy; $2.25 in microfiche. Report No. 18, July 1974, 42 p. (Prepared by Joint Scientific Committee and Water Research Center Staff.) OWRT A-999-WASH(6).

Descriptors: *Washington, *Water resources Institute, Planning, Research priorities, Water policy, *Future planning(Projected), Projects, Evaluation.
Identifiers: *Research needs.

The State of Washington Water Research Center, formed on November 11, 1964, immediately set itself to assessing the state's water research needs. The resulting document formed the basis for establishing need for research projects of the Center in ensuing years. Since that time, several changes have taken place in the field of water policy which required a re-examination of research needs in the state of Washington. Accordingly, in late 1971 the Center's Joint Scientific Committee undertook to reassess the water research needs for the state of Washington. This document should be considered as a background paper for future programs of the Center.
W75-05455

SOME POLLUTION-RELATED ATTITUDES OF HIGH SCHOOL YOUTH IN THE UNITED STATES AND BRAZIL,
Illinois Univ., Urbana, Dept. of Sociology.
For primary bibliographic entry see Field 5G.
W75-05461

MUNICIPAL AND INDUSTRIAL REIMBURSEMENT FOR A WATER RESOURCE PROJECT IN WYOMING'S PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W75-05472

TOWARD A TECHNIQUE FOR QUANTIFYING AESTHETIC QUALITY OF WATER RESOURCES,
Utah State Univ., Logan.
For primary bibliographic entry see Field 6A.
W75-05473

AN OVERVIEW: THE DEVELOPMENT OF AESTHETIC OPPORTUNITY CRITERIA AS IT RELATES TO THE PLANNING PROCESS,
Utah State Univ., Logan.
For primary bibliographic entry see Field 6A.
W75-05475

QUANTIFYING AESTHETIC OPPORTUNITY,
Arizona Univ., Tucson.

For primary bibliographic entry see Field 6A.
W75-05476

LOOKING THROUGH THE EYES OF THE PUBLIC OR PUBLIC IMAGES AS SOCIAL INDICATORS OF AESTHETIC OPPORTUNITY,
Idaho Univ., Moscow.
For primary bibliographic entry see Field 6A.
W75-05477

UNDERSTANDING SCENES: AN EVALUATION TECHNIQUE,
Utah State Univ., Logan.
For primary bibliographic entry see Field 6A.
W75-05478

EVALUATION OF QUALITY PARAMETERS IN WATER RESOURCE PLANNING (A STATE-OF-THE-ART SURVEY OF THE ECONOMICS OF WATER QUALITY),
For primary bibliographic entry see Field 5G.
W75-05483

A GENERIC METHODOLOGY TO FORECAST BENEFITS FROM URBAN WATER RESOURCE IMPROVEMENT PROJECTS,
Dornbusch (David M.) and Co., Inc., San Francisco, Calif.
D. M. Dornbusch, and C. O. Falcke.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 209, $7.00 in paper copy, $2.25 in microfiche. Completion Report, November 1, 1974. 173 p, 25 fig, 20 tab, 39 ref, 4 append. OWRT C-5065(No 4201)(1).

Descriptors: *Pollution abatement, *Property values, *Direct benefits, Wildlife, Recreation, Aesthetics, Algae, *Planning, Regression analysis, *Forecasting, Methodology, *Econometrics, Water quality, Evaluation, Cities.
Identifiers: Perception survey instruments, *Urban water resources, Case site descriptors, Debris, Clarity, Seattle(Wash), Mystic River(Conn), Marion Millpond(Wisc), Willamette River(Ore), Kanawha River(West Virginia), Rockaway River(New Jersey).

Environmental amenities with locational relations to residential property are reflected in the market price for that property. A model expressing the relationship between benefits, measured by changes in real property values, and water quality improvement, was estimated using econometric techniques and opinion surveys. Results showed that lay people relate water quality in terms of the following categories listed in order of perceived importance: (1) wildlife support capacity, (2) recreation opportunity, and (3) aesthetic comprising industrial wastes, clearness, odor, debris and algae. An index measuring residents' perception of water quality changes was constructed to reflect the relative valuation of each category and the sensitivity of benefit gains to threshold and leveling-off effects. Residents' opinions about water quality changes at a given water body differ sharply and non-systematically from those of water quality experts. The amount of benefits in terms of increased property values derivable from water pollution abatement varies with perceived water quality change, type and size of water body, and, most significantly, extent and character of non-waterfront residents' visual and physical access to the water body. A generic method to assess property value changes in terms of these variables is presented in tabular form. No regional variation in the attainable benefits was detected.
W75-05536

PUBLIC PERCEPTIONS OF WATER QUALITY IN A METROPOLITAN AREA,
Georgia Inst. of Tech., Atlanta. School of Industrial and Systems Engineering.
For primary bibliographic entry see Field 5G.
W75-05605

VALUATION OF A GROUND-WATER SUPPLY FOR MANAGEMENT AND DEVELOPMENT,
Nevada Univ., Reno.
For primary bibliographic entry see Field 4B.
W75-05613

A TAX SYSTEM FOR GROUNDWATER MANAGEMENT,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 6C.
W75-05654

A TIME-SPACE TECHNIQUE TO ANALYZE SNOWPACKS IN AND ADJACENT TO OPENINGS IN THE FOREST,
Arizona Univ., Tucson, Dept. of Watershed Management.
For primary bibliographic entry see Field 4A.
W75-05764

MANAGEMENT OF SUBSIDING LANDS: AN ECONOMIC EVALUATION,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4B.
W75-05765

PROCEDURES FOR DEVELOPING A MODEL FOR PLANNING WATERBASED LINEAR PARKS ALONG STREAM CHANNELS IN SEMIARID URBAN REGIONS,
Arizona Univ., Tucson. Dept. of Watershed Management.
R. C. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 326, $5.25 in paper copy, $2.25 in microfiche. Master of Science Thesis, 1973. 100 p, 15 ref, 3 tab, 53 ref. OWRT B-023-ARIZ(5). 14-31-0001-3556.

Descriptors: Watershed management, Optimum developments plans, *Urbanization, Water management(Applied), Water reuse, Parks, *Recreation, Model studies, Streams, Channels, Flood control, *Small watersheds, *Arizona, Watersheds(Basins), Natural resources, Land use, Constraints, Environmental effects.
Identifiers: Semi-arid urban regions, Linear park systems, Anklam watershed(Ariz).

Development of procedures for a water-based linear park planning model has been undertaken to encourage recreation planners to use stream channels and flood plains within small watersheds in semiarid urban regions for recreation and flood control purposes. Dry stream channels should be utilized as the core of the linear park system which would include horse, bicycle, and hiking trails, picnic and play areas; natural vistas and desert buffer strips; lakes; and also be part of a larger continuous metropolitan recreation system. Localized flood damage may also be reduced within small watersheds by diverting portions of storm runoff from main washes into off-channel basins. Water impounded in these basins may be retained for recreational purposes or released after peak flow into the main channel. Planning procedures outlined include: a statement of goals and objectives, an inventory of natural resources, an analysis of urban land use patterns, consideration of legal and administrative constraints, economic feasibility, examination of criteria for site selection and design, environmental impact analysis, and review of procedures for plan implementation. Aklam Watershed, located on the eastern slope of the Tucson Mountains, Arizona, has been utilized as the model area for the conceptual development of a linear park system.
W75-05769

PROCEDURE FOR ESTIMATING TOTAL FLOOD DAMAGE IN URBAN AREAS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05776

CRITERIA FOR EVALUATION OF URBAN DRAINAGE AND FLOOD CONTROL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05778

A SOCIO-ECONOMIC EVALUATION OF ALTERNATIVE WATER MANAGEMENT POLICIES ON THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept of Agricultural Economics.
R. R. Lansford, and T. G. Gebhard, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 468 $3.75 in paper copy, $2.25 in microfiche. Presented at American Society of Civil Engineers Conference, September 27, 1974, Amarillo, Texas. 3 p, 7 fig, 9 tab. OWRT A-045-NMEX(7).

Descriptors: *New Mexico, Water resources, *Water demand, Economics, *Water resource development, Management, *Economic prediction, *Surface-groundwater relationships, Natural resources, Water requirements, Resource allocation, River Basin Groundwater management, Water quality, Water utilization, Human population, Employment, Industrial water recreation, *Water management(Applied), Linear programming.
Identifiers: *Rio Grande Basin(N Mex), *Socio-economic models, Groundwater appropriation, Input-output coefficients, Surface-groundwater conjunctive use model, Economic land classification, Mathematical groundwater model.

An interdisciplinary approach to the solution of the water resource problems of the Rio Grande region in New Mexico was made possible by the integration of hydrology, geology, and engineering with economics. Research procedures developed to carry out this study were closely coordinated by the investigators to achieve the primary objective of evaluation of the social and economic impacts of alternative water-use policies. A socio-economic model was developed to represent the New Mexico economy, with special emphasis placed upon the Rio Grande region. Inputs into the socio-economic model were obtained from separate studies covering the hydrologic, agricultural, municipal and industrial areas. Three sets of alternatives were considered: (1) growth without a water constraint; (2) growth, holding surface water constraint; (3) growth, holding both surface and ground water constraint. Without water constraint, both production and depletions are expected to exhibit the largest increase (5 percent and 49.6 percent, respectively). When surface water constraint is imposed, the value of production is reduced by only $5.6 million in the year 2000, and by $14.2 million in 2020; water depletions are expected to decrease about 27 percent by 2020. When a total water constraint is imposed, the value of production is decreased $1 million below that expected when using only a surface water constraint, and water depletions are reduced only slightly. (Hain-New Mexico State
W75-05790

EVALUATION OF POPULATION GROWTH AND PER CAPITA CONSUMPTION OF WATER ON THE REGIONAL ECONOMIC GROWTH OF THE RIO GRANDE REGION IN NEW MEXICO,
New Mexico State Univ., University Park. Dept of Agricultural Economics.
R. R. Lansford, S. Ben-David, T. G. Gebhard, W. Brutsaert, and B. J. Creel.

Available from the National Technical Information Service, Springfield, Va. 22161 as PB-240 485, $3.25 paper copy, $2.25 microfiche. Presented at Natural Resource and Environmental Economics, American Agricultural Economics Association Summer Meeting, August 18-21, 1974, College Station, Texas, Texas A and M University, 13 p, 1 fig, 1 tab, 5 ref. OWRT A-045-NMEX (6).

Descriptors: *New Mexico, Water resources, Water demand, Economics, *Water resources development, Management, *Economic prediction, *Surface-groundwater relationships, Natural resources, Water requirements, Resource allocation, River basins, Groundwater management, Water quality, Water utilization, Human population, Employment, Industrial water, Recreation, Water management(Applied), Linear programming.
Identifiers: *Rio Grande Basin(NMex), Socioeconomic model, Groundwater appropriation, Input-output coefficients, Surface-groundwater Conjunctive use model, Economic land classification, Mathematical groundwater model.

A socio-economic model was used to estimate the effects of alternative population projections and domestic per capita consumption estimates on distribution of production and water requirements between 1970 - 2020. The results indicate that there are sufficient water resources in the Rio Grande region to carry on a viable regional economy under all four alternatives: (1) Low Population (BEA) - 1970 Per Capita Water Consumption Schedule (2) Low Population (BEA) - State Water Plan Per Capita Consumption Schedule (3) High Population (OBERS) - 1970 Per Capita Water Consumption Schedule (4) High Population (OBERS) - State Water Plan Per Capita Consumption Schedule (Hain-New Mexico State)
W75-05791

PLANNING THE DEVELOPMENT OF WATER RESOURCES,
Queensland Irrigation and Water Supply Commission, Brisbane (Australia). Systems Branch.
J. C. Boughton.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 1-13, 1974. 4 fig, 2 tab.

Descriptors: *Water resources development, Project planning, *Cost-benefit analysis, Feasibility studies, *Environmental effects, Computers, Simulation analysis, Assessments, Input-output analysis, Evaluation, Economics, Engineering, Planning, Water allocation, Australia.
Identifiers: *Leopold matrix, Environmental impact studies.

Until 1950, the dominant concern in planning the development of water resources in Australia was engineering feasibility. About 1950, interest in the economic analysis of water resources development increased substantially. At present, the three major components of planning the development and allocation of water resources are engineering investigations, economic evaluations, and environmental impact studies. The engineering investigations are much better developed than the corresponding economic and environmental studies. Computers have greatly aided in these investigations. Economic evaluations of a water resources development project are benefit-cost evaluations that consider both tangible and intangible factors. Economic evaluations now extend from comparisons of direct project benefits and costs to regional analysis with input-output transaction matrices. There is a profusion of actions and effects involoved in environmental evaluation of water development works. Environmental evaluation techniques were illustrated by the Leopold matrix and the Batelle system. Development planning techniques are themselves developing in response to demands for more detailed and diverse assessments. (Singh-ISWS)
W75-05832

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ALTERNATIVE METHODS OF EVALUATING THE ECONOMIC AND SOCIAL ASPECTS OF WATER QUALITY,
Rutgers - the State Univ., New Brunswick, N.J. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W75-05445

MUNICIPAL AND INDUSTRIAL REIMBURSEMENT FOR A WATER RESOURCE PROJECT IN WYOMING'S PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
C. E. Huff.
Available from the National Technical Information Service as PB-239 998, $5.75 in paper copy, $2.25 in microfiche. M.S. Thesis, March 1974. 135 p, 5 fig, 14 tab, 41 ref, 4 append. OWRT C-4351 (9063)(3).

Descriptors: *Wyoming, Projects, *Cost repayment, *Income, *Economic impact, Equity, *Economic efficiency, Administration, Industries, Cities.
Identifiers: *Platte River Basin (Wyo), *Coal industry.

The study consisted of an analysis of current and proposed reimbursement mechanisms pertaining to municipal and coal industry growth resulting from an interbasin water diversion to Wyoming's Platte River Basin. Criteria used in the analysis were: (1) efficiency, (2) equity, (3) revenue rasing ability, and (4) administrative feasibility. The impacts and reimbursement flows affecting the business sector, government sector, and household sector were depicted in impact and reimbursement matrixes for Converse County, Wyoming. The conclusions pointed out the need for several changes in, or additions to, the present system of reimbursement mechanisms.
W75-05472

VALUATION OF A GROUND-WATER SUPPLY FOR MANAGEMENT AND DEVELOPMENT,
Nevada Univ., Reno.
For primary bibliographic entry see Field 4B.
W75-05613

A TAX SYSTEM FOR GROUNDWATER MANAGEMENT,
Geological Survey, Reston, Va.
T. Maddock, III, and Y. Y. Haimes.
Water Resources Research, Vol 11, No 1, p 7-14, February 1975. 4 tab, 14 ref.

Descriptors: *Water management(Applied), *Taxes, *Groundwater resources, Water allocation(Policy), Administration, Water distribution(Applied), Water rights, Water conservation, Irrigation water.
Identifiers: *Groundwater management.

A tax scheme was developed to create an incentive among users to conserve groundwater and reduce the external diseconomies that pumping produces. Quotas are established for wells by using an agricultural management model. If a user pumps more than the quota established for his well, he may be assessed a tax; if a user pumps less than his quota, he may be entitled to a rebate. However, taxes are collected and redistributed in such a way that zero taxes are accumulated from year to year. (Knapp-USGS)
W75-05654

MANAGEMENT OF SUBSIDING LANDS: AN ECONOMIC EVALUATION,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 4B.
W75-05765

IMPLEMENTATION OF THE FEDERAL WATER PROJECT RECREATION ACT IN COLORADO,
Colorado State Univ., Fort Collins. Dept. of Political Science.
For primary bibliographic entry see Field 6E.
W75-05772

6D. Water Demand

COMMERCIAL NAVIGATION ON THE UPPER MISSISSIPPI RIVER: AN ECONOMIC REVIEW OF ITS DEVELOPMENT AND PUBLIC POLICY ISSUES AFFECTING MINNESOTA,
Minnesota Univ., Minneapolis. Dept. of Agriculture and Applied Economics.
For primary bibliographic entry see Field 4A.
W75-05353

A COMPUTERIZED MODEL FOR DETERMINING THE OPTIMAL WATER UTILIZATION FOR AGRICULTURE,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-05356

THE IMPACT OF ENERGY DEVELOPMENT ON WATER RESOURCES IN ARID LANDS, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 3E.
W75-05471

AN EVALUATION OF WATER REUSE FOR MUNICIPAL SUPPLY,
Southern Illinois Univ., Carbondale.
For primary bibliographic entry see Field 5D.
W75-05482

ESTIMATION OF COMMERCIAL, INDUSTRIAL AND GOVERNMENTAL WATER USE FOR LOCAL AREAS,
California Univ., Santa Barbara.
L. J. Mercer, and W. D. Morgan.
Water Resources Bulletin, Vol 10, No 4, p 794-801, August, 1974. 3 tab, 10 ref.

Descriptors: *Water utilization, *Water users, *Water demand, *Water use, Consumptive use, Water policy, Water management, Water resources, Water supply, *California, Water, Water allocation, Water delivery, Projections, Planning, Estimating, Water resources development, Estimating equations, Regional analysis, Analysis, Management.
Identifiers: SIC Code, *Non-residential water use, CIG use(Commercial-industrial-governmental), *Santa Barbara County(Cal), Water use.

A method to estimate non-residential (commercial, industrial, and government) water use for a regional water service area in Santa Barbara County, California, is discussed. While the geographic and economic area studied is relatively large and includes several water districts, costs were relatively small and techniques easily used. Estimated water use per employee by two-digit SIC (Standard Industrial Classification) and by broad categories is presented. For the area involved, the highest water use per employee occurs in the arboreta and botanical-zoological gardens (SIC 84). With small employment, however, this has a minimal impact on total water use. The second highest water user is the food preparation and processing industry. The amount of water used by

government and service industries accounts for a higher proportion of non-residential water use than is commonly thought. This is especially important to urban areas which do not have heavy water use by manufacturing. A useful extension of this framework is to develop a continuing series of water use by SIC. Results can then be applied to a variety of planning problems for both local and regional water agencies, including improved projections for water use. (Grden-North Carolina)
W75-05604

APPLICATION OF THE ALEKSANDRA MINERAL WATER FROM WYSOWA AND ITS SALT TABLETS IN THE TREATMENT OF DUODENAL ULCERS, (IN POLISH),
Military Hospital, Poznan (Poland).
J. Durkalec.
Balneol Pol Vol 17, No 4, p 421-425, 1972.

Descriptors: *Mineral water, Water types, *Treatment, *Public health, Human diseases, Salt water.
Identifiers: Aleksandra, Duodenal ulcers, Poland, Treatment, *Ulcers, Spas, Salt tablets.

Comparative clinical examinations indicated the positive influence of 'Aleksandra' from Wysowa mineral water, or water from its tablets, in treating duodenal ulcers. Patients receiving the mineral water in addition to basic treatment showed recession of radiological symptoms to a greater extent than patients treated by pharmacological and dietary means only. Apart from single cases of transitory diarrhea, no other side effects were noted. Similar results were achieved with the use of salt tablets. It is recommended that these be used during post-spa treatment at home for reasons of convenience.--Copyright 1974, Biological Abstracts, Inc.
W75-05712

A SOCIO-ECONOMIC EVALUATION OF ALTERNATIVE WATER MANAGEMENT POLICIES ON THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W75-05790

EVALUATION OF POPULATION GROWTH AND PER CAPITA CONSUMPTION OF WATER ON THE REGIONAL ECONOMIC GROWTH IN THE RIO GRANDE REGION IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W75-05791

6E. Water Law and Institutions

DIGEST OF ENERGY FACTS FOR WATER RESOURCES STUDIES IN MINNESOTA,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 3E.
W75-05352

CONNECTICUT WATER LAW: SUMMARY AND INDEX OF STATUTES,
Connecticut Univ., Storrs. Inst. of Water Resources.
R. W. Deitchman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 992, $4.75 in paper copy, $2.25 in microfiche. Report No 22, October 1974. 83 p. OWRR A-999-CONN(15)

Descriptors: *Water law, *Legislation, *Connecticut, *Water rights, Water resources, Water pollution control, Water quality control, Regulation.
Identifiers: *Public regulation, Connecticut General Statutes.

A list of laws relevant to water resources has been compiled from the Connecticut General Statutes, a series of documents containing the legislative mandates and policies of the state of Connecticut. As the Statutes are not readily available nor indexed for easy retrieval, concise abstracts of each of the water-related statutes, coded with the chapter and section number from the General Statutes, have been included. To provide easy access in a preliminary search for specific laws, a subject index, with key words from the statutes, has been devised. Although intended only as a summary of the Connecticut water law statutes, a basic understanding of the water-related policies of the state of Connecticut is provided. (de Lara-Connecticut)
W75-05437

UNDERSTANDING THE WATER RESOURCES RESEARCH CENTER, GRADUATE SCHOOL, UNIVERSITY OF MINNESOTA,
Minnesota Univ., Minneapolis. Water Resources Research Center.
W. C. Walton.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 180, $4.25 in paper copy, $2.25 in microfiche. Bulletin 73, September 1974, 52 p. OWRR A-999-MIN(32).

Descriptors: *Institutions, *Minnesota, *Water Resources Institute, *Universities, Training, *Education, *Research and development, Organizations, Water Resources Research Act.

Information is presented on the origin and history of the Water Resources Research Center of the University of Minnesota. Organizational structure, functions, characteristics, goals, and programs of the Center during the past 10 years are described, and background information is presented concerning water resources programs in Minnesota.
W75-05443

TECHNOLOGICAL LIMITATIONS TO GROUND-WATER MANAGEMENT,
Guyton (William F.) and Associates, Houston, Tex.
W. F. Guyton.
Presented at Water for Texas Conference, Texas A and M University, College Station, September 19, 1974. 15 p.

Descriptors: Regulation, *Legal aspects, *Management, *Water rights, Regulated flow, Legislation, Planning, Recharge, Well permits, State jurisdiction, *Texas, *Water law.
Identifiers: Correlative rights, Absolute ownership.

Texas has realized the common stake in good management of ground-water resources and has acquired a reasonably good working knowledge of the various aquifers and their development. In 1904 Texas Supreme Court held that the owner of the land was the absolute owner of the percolating water and could withdraw for use all the percolating water he wanted without regard to the effect on his neighbors, a decision known as the doctrine of absolute ownership. In 1949, Texas passed a local optional groundwater control law under which local underground-water districts can be formed to manage ground-water resources. Three active districts exist now, all on the Texas High Plains and the water is chiefly used for irrigation. Even here, however, there has been no effort to regulate the production of the wells directly. This appears to be a shift from the doctrine of absolute ownership to a doctrine of correlative rights, which may be determined by the percentage of land owned over the aquifer. Where the area of land is proportional to water needs as in the case of rural areas where irrigation is the major use o ground-water, the correlative rights approach wi work. Where cities use water in amounts basicall independent of land area, the correlative right system would be inappropriate. (Bradbee NWWA)
W75-05510

WATER QUALITY IN THE GREAT LAKES: NEW TIMETABLE,
For primary bibliographic entry see Field 5G.
W75-05694

IMPLEMENTATION OF THE FEDERA WATER PROJECT RECREATION ACT COLORADO,
Colorado State Univ., Fort Collins. Dept. of Poli cal Science.
J. A. Spence.
Available from the National Technical Inform tion Service, Springfield, Va 22161 as PB-240 2 $7.00 in paper copy, $2.25 in microfiche. M. Thesis, June 1974. 183 p, 1 fig, 13 tab, 11 ref, pend. OWRT A-015-COLO(1).

Descriptors: *Recreation, *Colorado, Le aspects, Legislation, Cost sharing, Projects.
Identifiers: *Federal Water Project Recreat Act.

The implementation of the Federal Water Proj Recreation Act in Colorado appears to be fulfill its congressional mandate. Colorado's experie with the application of P.L. 89-72 is limited, h ever, because of the time period required planning, authorizing, and funding water proje and by a general adverse public response to construction of reservoirs. Only a small numbe Federal water projects in Colorado have b authorized and none of these projects h reached the stage where the non-Federal fu need to be appropriated. It does appear, howe that the Act will continue to fulfill the expectat of its policymakers in Colorado, despite s problems which could impede its application.
W75-05772

WATER SUPPLY, TREATMENT, DISTRI TION, AND REUSE OPTIMIZATION IN A URBAN AREAS,
Colorado State Univ., Fort Collins. Dept Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-05773

COMMERCIAL NAVIGATION ON THE UP MISSISSIPPI: ECONOMIC AND ENVI MENTAL CHOICES,
Minnesota Univ., St. Paul. Dept. of Agricu and Applied Economics.
R. Christianson.
Available from the National Technical Info tion Service, Springfield, Va 22161 as PB-24 $3.25 in paper copy, $2.25 in microfiche. nesota Agricultural Economist, Agricultura tension Service, University of Minnesota 564, February 1975. 6 p, 1 fig. OWRT MINN(7).

Descriptors: *Navigation, Water p *Minnesota, *Mississippi River, Economics vironment, Legal aspects, Jurisdiction, waterways.
Identifiers: *Public policy.

Policy choices facing Minnesota and the Midwest regarding low cost water transpo and environmental values are reviewed. De ment of the Upper Mississippi River for co cial navigation is briefly reviewed from an cal viewpoint. The economic role of the wa is examined. The two court battles over ope maintenance, and replacement of nav development are placed in the context of

choices facing Minnesota and the Upper Midwest. (Waelti-Minnesota)
W75-05788

6G. Ecologic Impact Of Water Development

DIGEST OF ENERGY FACTS FOR WATER RESOURCES STUDIES IN MINNESOTA,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 3E.
W75-05352

NUTIS: NUMERICAL AND TEXTUAL INFORMATION SYSTEM, VERSION 1.0, - A USERS MANUAL,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7C.
W75-05390

MEASURING THE SOCIAL ATTITUDES AND AESTHETIC AND ECONOMIC CONSIDERATIONS WHICH INFLUENCE TRANSMISSION LINE ROUTING,
Battelle-Pacific Northwest Labs., Richland, Wash.
P. L. Hendrickson, R. W. Bahl, B. A. Gray, and W. S. Maynard.
Available from the National Technical Information Service, Springfield, Va., 22161, as Rept. No. BNWL-1837. Report BNWL-1837, July 1974. 121 p, 5 fig, 8 tab, 32 ref.

Descriptors: *Attitudes, Social aspects, *Aesthetics, *Nuclear powerplants, *Sites, *Methodology, Technology, *Assessment, Evaluation, Benefits, Economics, Water quality, Public health, Safety, Cultural control, Recreation.
Identifiers: *Transmission line routing.

The summary report represents an interdisciplinary effort to extend a methodology for siting nuclear power plants to the problem of routing electric power transmission lines. The methodology incorporates both public values and technical assessments. The criteria used in the siting study analysis included economic, water quality, air quality, animal/plant, cultural/recreational, health and safety, and aesthetics. (Houser-ORNL)
W75-05391

NUCLEAR POWER FACILITY PERFORMANCE CHARACTERISTICS FOR MAKING ENVIRONMENTAL IMPACT ASSESSMENTS.
Directorate of Regulatory Standards (AEC), Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161, as Rept No WASH-1355, $7.60 paper copy, $2.25 microfiche. Report WASH-1355, December, 1974. 230 p, 4 fig, 9 tab, 26 ref, 3 append.

Descriptors: *Nuclear Powerplants, *Environmental effects, *Assessment, *Evaluation, *Sites, Accidents, Legislation, Legal aspects, Effluents, Radiation, Radioactive waste disposal, Air pollution, Water pollution, Water quality, Damages, Aquatic populations, Ecology, Ecosystems, Land management, Water utilization, Design criteria.

In the past, licenses to operate nuclear power plants have been granted for specific plants located on specific sites. The licensing process has involved the concurrent review of all safety and environmental issues associated with plant siting, design, construction, and operation. For purposes of environmental impact assessment, the required information concerning the facility would include only those characteristics that can affect the site and its environs. The performance characteristics of nuclear power stations which significantly affect the environment are identified in this report. Models used to assess environmental impacts are not specified; however several models are presented or referenced for illustrative purposes. None of these should necessarily be regarded as the recommended approach for simulating a given impact. A set of performance characteristics for a hypothetical nuclear power facility is derived from a composite of design data and expressed numerically as envelopes whose bounds describe existing technology for light-water-cooled nuclear power stations. (Houser-ORNL)
W75-05395

A PRELIMINARY INVESTIGATION OF THE EFFECTS OF WATER LEVELS ON VEGETATIVE COMMUNITIES OF LOXAHATCHEE NATIONAL WILDLIFE REFUGE, FLORIDA,
Buearu of Sport Fisheries and Wildlife, Atlanta, Ga.
W. W. Hagenbuel, R. Thompson, and D. P. Rodgers.
Available from the National Technical Information Serivce as PB-231 611, $3.25 in paper copy, $2.25 in microfiche. Ecological Report No DI-SFEP-74-20, February 1974. 29 p. 17 fig, 5 tab, 17 ref.

Descriptors: *Water level fluctuations, *Vegetation, *Flooding, *Wildlife conservation, Florida, Water management(Applied), Fish, Distribution, Aquatic plants, Wetlands, Marshes, Water storage.
Identifiers: *Loxahatchee Natl. Wildlife Refuge(Fla), Everglades(Fla).

Vegetative changes occurring on Loxahatchee National Wildlife Refuge located in the Everglades, in relation to water level fluctuations are shown and the impact of alternate water regimes projected. Results will be used to encourage implementation of a water management program. Goals for this 145,635-acre refuge include providing for maximum populations of wading birds and waterfowl, representative numbers of native wildlife, and increased numbers of endangered and rare species. The basic ground sampling techniques was a five-point sampler to record vegetation across contours of known elevations. The data were related to recorded water conditions at those elevations over time. Vegetative changes were also determined by aerial photographs. Inundation curves for 15 plant species were prepared from data at 2,715 stations. The species were grouped into four distinct communities based on similarities in inundation curves. Sampling data were extrapolated to estimate proportions of the study area occupied by each community and to predict changes that would accompany proposed adjustments in the water regulation schedule. Based on the demonstrated relationships between seasonal water level fluctuation and plant community distribution, a 14-to-17 foot (mean sea level) water regulation schedule was superior to the proposed 17-to-15 foot. (Jones-Wisconsin)
W75-05737

THE EFFECTS OF PRESCRIBED BURNING ON SAWGRASS, CLADIUM JAMAICENSE CRANTZ, IN SOUTH FLORIDA,
Miami Univ., Coral Gables, Fla.
C. A. Forthman.
Available from the National Technical Information Service Srpingfield Va, 22161, as PB-231 603, $4.75 in paper copy, $2.25 in microfiche. Ecological Report No DI-SFEP-74-10, June 1973. 93 p, 18 fig, 6 tab, 1 append. 14-10-9-900-355.

Descriptors: *Grasses, *Burning, *Florida, Plant growth, Vegetation regrowth, Plant populations, Nutrients, Phosphates, Grasslands, Potassium, Nitrates.
Identifiers: *Sawgrass, Everglades(Fla), Cladium jamaicense.

Understanding the effects of fire on the sawgrass community is essential to sound management practices for the area. Response of sawgrass to burning under prescribed conditions was studied. Specific attention was given to the rate and character of sawgrass regeneration, changes in species composition in the burned area and nutrient release in the ash of sawgrass fires. The prescribed burn sites, all of which are in the Shark River Slough in the Everglades National Park, an unburned area, also in the park, and a wildfire site, north of the park adjacent to a water impoundment area were surveyed. Sawgrass has several morphological characteristics making it well adapted to withstand fire. The first portions of leaves produced after a fire lack the rigidity of unburned sawgrass. Sawgrass did not reach its pre-burn height in the first year after burning in sites burned in the fall, but did not reach the pre-burn height in the spring burn. The sites burned in the spring had greater over-all growth rates than either of the sites burned in the fall. Potassium and large amounts of phosphate-phosphorus were released into the water by burning sawgrass. Nitrate-nitrogen also showed a slight increase. (Jones-Wisconsin)
W75-05740

WATER MANAGEMENT: THE KEY TO FISH AND WILDLIFE VALUES IN SOUTH FLORIDA,
Bureau of Sport Fisheries and Wildlife, Atlanta, Ga.
J. P. Crowder.
Available from the National Technical Information Service Springfield Va 22161, as PB-231 653, $ 3.25 in paper copy, $2.25 in microfiche. Ecological Report No DI-SFEP-74-18, February 1974. 8 p.

Descriptors: *Water management(Applied), *Fish, *Wildlife conservation, *Florida, Environmental effects, Urbanization, Water resources development, Water, Utilization, Water quality, Eutrophication, Water level fluctuations, Estuaries, Water supply, Water storage, Water demand, Runoff, Flooding.
Identifiers: *South Florida, Hydroperiod alteration, Everglades(Fla).

Some probable effects of continued population growth and development in South Florida upon water quality, quantity, and distribution are described. Backpumping, or any other scheme to stack more stored water on the Everglades marshes and to consisitently flood those marshes for abnormally prolonged periods is an undesirable approach to the augmentation of a fresh water supply. Without rigid and enforceable constraints on human population growth, each technological solution to the problem of water supply will stimulate growth that, in turn, will generate the additional demand for more water and more civil works to provide it. Each sucessive episode in this self-nourishing supply-demand cycle will close more water-management options and will destroy more fish and wildlife benefits by superimposing technological over natural systems. Reduction of downstream flow from the major lower east coast canals may adversely influence estuarine salinity regimes downstream from the affected canals. Certain effects of seasonal drying and flooding on Everglades vegetation were explored and defined in order to develop the capacity to predict the changes in vegetation that will probably occur with the new schedule for Conservation Area 1 (Loxahatchee National Wildlife Refuge). (Jones-Wisconsin.
W75-05742

STATUS OF COLONIES OF LAND WADING BIRDS IN SOUTH FLORIDA,
National Audubon Society, New York.
For primary bibliographic entry see Field 4C.
W75-05803

THE EFFECTS OF DRAINAGE AND ASSOCIATED DEVELOPMENT IN THE BIG CYPRESS SWAMP,
Bureau of Sport Fisheries and Wildlife, Atlanta, Ga.
J. P. Crowder.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231-612, $3.25 paper copy, $2.25 microfiche. Ecological Report No. DI-SFEP-74-21, February 1974. 9 p.

Descriptors: *Drainage effects, *Land development, *Swamps, *Environmental effects, Florida, Water quality, Wildlife, Fish, Estuaries, Water distribution(Applied), Water supply, Salinity, Estuaries.
Identifiers: *Big Cypress Swamp(Fla), Southwest Florida, Everglades(Fla).

If the Big Cypress Swamp and the northwestern portion of the Everglades National Park are to be protected from damage or destruction, they must be assured of high quality water, adequate in quantity, and properly timed. Any proposals for draining or altering land within the Big Cypress, particularly within the central subarea C, should be scrutinized to anticipate and avert environmental damage. Nutrient overenrichment of waters from agricultural and urban areas is expected to reduce species diversity and ecosystem stability. Increases in water-borne pesticides are also expected to accompany development and could elevate levels above the present relatively low concentrations in water, soils, and animal tissues in the Big Cypress. Major alterations to surface water flows will disturb the critical periodicity of water delivery to estuarine zones, produce surface water depth fluctuations out of phase with the seasonally heavy feeding requirements of aquatic wading birds, and precipitate massive redistributions of dominant vegatative communities in favor of the less aquatic types. Drainage that causes a pulsing of freshwater flows to sea will intermittently reduce salinity to abnormally low levels in the estuarine zone and will increase the transport of silt and chemical pollutants. (Jones-Wisconsin)
W75-05807

7. RESOURCES DATA

7A. Network Design

OPTIMUM DESIGN OF MOUNTAINOUS RAINGAGE NETWORKS USING BAYESIAN DECISION THEORY,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2B.
W75-05524

RANDOM AND SYSTEMATIC ERRORS IN PRECIPITATION AT AN EXPOSED SITE,
Waikato Valley Authority, Hamilton (New Zealand).
For primary bibliographic entry see Field 2B.
W75-05845

7B. Data Acquisition

SHIPPING CONTAINER FOR PLUTONIUM-238 AS FISSILE MATERIAL CLASS 1,
Los Alamos Scientific Lab., N.M.
For primary bibliographic entry see Field 5G.
W75-05364

DEVELOPMENT OF AIR-SAMPLING TECHNIQUES, PROGRESS REPORT, OCTOBER 1, 1973, THROUGH MARCH 31, 1974,
Los Alamos Scientific Lab., N.M.
For primary bibliographic entry see Field 5A.
W75-05365

ELECTRONIC IDENTIFICATION AND TEMPERATURE MONITORING,
Los Alamos Scientific Lab., N. Mex.
A. Koelle, R. Freyman, S. Depp, and D. Holm.
Available from NTIS Springfield Va. as REPT No. LA-5790-PR, $4.00 in paper copy, $2.25 in microfiche. Report LA-5790-PR, December 1974. 5 p, 3 ref.

Descriptors: *Monitoring, *Temperature, *Research and development, *Cattle, *Animal diseases, *Animal pathology, Environmental effects, Biology, Environmental sanitation, Epidemiology, Public health, Economics, Computer programs.
Identifiers: Identification.

During fiscal year 1975 the proof of principle of electronic identification and temperature monitoring of animals has been established. A preprototype system including two transponders and battery powered readout has been constructed and demonstrated to be capable of transmitting three decimal digits of identification and temperature to 1/10 degree Celsium (C) accuracy to a range of about 7 m (20 ft). Plans are being made to improve the circuitry and to design a national electronic identification and temperature monitoring system with the United States Department of Agriculture (USDA). The system appears to have other applications for identifying and monitoring highly valued items. (Houser-ORNL)
W75-05381

TELEMETRY IN WATER POLLUTION CONTROL,
South Yorkshire Metropolitan Country Council (England).
For primary bibliographic entry see Field 5D.
W75-05397

A PROCEDURE FOR PLACING LARGE UNDISTRUBED MONOLITHS IN LYSIMETERS,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 2G.
W75-05517

ANALYSIS OF GROUND-WATER REGIMES BY USE OF NATURAL URANIUM ISOTOPE VARIATIONS,
Florida State Univ., Tallahassee. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05535

PROBLEMS WITH THE USE OF CASCADE IMPACTORS,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-05574

INDUSTRIAL SOURCE SAMPLING FOR TRACE METALS,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5A.
W75-05575

MICRO-TOPOGRAPHIC PROFILE GAGE,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis, and W. D. Cole.
Agricultural Engineering, Vol 53, No 1, p 17, January 1972.

Descriptors: *Strip mines, *Bank erosion, *Soil profiles, *Topography, *Gages, Data collection, Films, Analytical techniques, Appalachian Mountain region.

Knowledge of erosion and subsequent siltation is basic to the development of adequate control practices. A profile gage was developed that allows rapid determinations of changes along a four-foot profile. Data are recorded on film for later tabulation and compilation. (Forest Service)
W75-05599

A THEORETICAL STUDY ON THE INTERPRETATION OF RESISTIVITY SOUNDING DATA MEASURED BY THE WENNER ELECTRODE SYSTEM,
Missouri Univ., Rolla. Dept. of Geophysical Engineering.
For primary bibliographic entry see Field 8G.
W75-05618

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tuscon. Graduate Committe on Hydrology.
For primary bibliographic entry see Field 2E.
W75-05619

THE MEASUREMENT OF VERTICAL STRAIN IN GLACIER BORE HOLES,
Alaska Univ., College. Geophysical Inst.
J. C. Rogers, and E. R. LaChapelle.
Journal of Glaciology, Vol 13, No 68, p 315-319, 1974. 4 fig. NSF GA 28544.

Descriptors: *Strain measurement, *Ice, *Boreholes, *Instrumentation, Glaciers, Glaciology, Drill holes, Exploration, Measurement, Data collections, Snow cover.

A method to measure the vertical strain in glacier bore holes was described that entailed placement of passive markers at varying depths. The position of these markers with respect to a surface reference was measured by an electronic sensor lowered into the hole. These measurements can be combined with inclinometer measurements to yield the total velocity vector in the ice surrounding the hole. Although the method was designed for use in a 0.05 m diameter hole, it can easily be applied to holes of different diameters and to winter snow covers as well as glacier ice. (Humphreys-ISWS)
W75-05674

AN APPLICATION OF INFRARED REMOT SENSING TECHNIQUES TO ECOLOGICA PROBLEMS,
Air Force Avionics Lab., Wright-Patterson (AFB), Ohio.
L. W. Crouch, and R. D. Mower.
Available from the National Technical Inform tion Service , Springfield, Va. 22161, as AD78 028, $3.75 in paper copy, $2.25 in microfich Technical Report 74-98, July 1974. 40 p, 24 fig.

Descriptors: *Remote sensing, *Infrared radi tion, *Thermal pollution, Water temperatur *Ecology, Discharge(Water), Effluents, A mosphere, Attenuation, Meteorology, Solar radi tion, Laboratory tests, Photography, Temperatu gradients.
Identifiers: *Infrared imagery.

A compendium of aerial infrared imagery was c tracted from a research and development labora ry test of an Air Force infrared scanner. The p pose of the test was to demonstrate the ability one Air Force scanner to display thermal d ferentials found in a ground scene. The flight t area included a series of waterways and co tiguous shorelines that illustrate ecology them phenomena. Specific examples of imagery w extracted from the test program data. A summ of pertinent infrared technology was presen which relates sensor performance to atmosphe conditions, target and background characterist as well as image information content. In additi brief photographic interpretation comments w included for each infrared image. (Sims-ISWS)
W75-05679

USE OF REMOTE SENSING FOR VEGETATION INVENTORIES IN A DESERT SHRUB COMMUNITY,
Arizona Univ., Tucson. Dept. of Watershed Management.
E. B. Fish, and E. L. Smith.
Progressive Agriculture in Arizona, Vol 25, No 3, p 3-5, May-June, 1973. 4 fig, 4 tab, 2 ref.

Descriptors: *Aerial photography, *Desert plants, *On-site data collections, *Remote sensing, *Surveys, *Arizona, Data collections, Regional analysis, Sampling, Vegetation, Cacti, Costs, Equipment, Films, Instrumentation, Land use, Long-term planning, Satellites(Artificial), Shrubs.
Identifiers: *ERTS, Imagery, Pima County(Ariz), Santa Rita Experimental Range.

The feasibility of using remote sensing techniques to sample desert vegetation as an aid to land-use planners to rapidly, accurately, and economically inventory extensive areas of natural ecosystems is examined. The test site, a mesquite-paloverde community located on the Santa Rita Experimental Range in Pima County, Arizona, at an elevation of about 3200 ft, was delineated using complete stereo coverage at a scale of 1:6000 (approximately 10 in per mi) with black and white panchromatic and with Ektachrome color infrared film. Sampling of two subcommunities, using a scale of 1:6000 (approximately 1 in per 50 ft) with multiseasonal, color infrared photographes, permitted identification of the major shrubs and cacti. Individual plants of many species could be seen in this scale though not accurately identified because of size. Ground truth samples were also made, and a comparison of the two techniques indicated that significant cover differences for staghorn cholla and hackberry remained undetected by imagery sampling. In general, however, the imagery techniques, using approximately one-third as many samples, detected crown cover differences nearly as well as more intensive ground sampling. Remote sensing imagery was thus concluded to be advantageous for vegetation inventories because it affords increased access to sampling area, a reduction of labor and costs (10 man days, 5 round trips for ground sampling in contrast to 3 mean days, 2 hrs flying time, and 100 ft of film for imagery sampling), and yields a permanent visual record for conditions at a specific time. (Gloyd-Arizona)
W75-05721

REMOTE SENSING AS A VEGETATION MAPPING TOOL IN THE PROPOSED CHARLESTON DAM SITE AREA,
Arizona Univ., Tucson. Office of Arid Lands Studies.
L. E. Foster, B. Musick, and P. R. Ogden.
Progressive Agriculture in Arizona, Vol 25, No 3, p 6-9, May-June, 1973. 8 fig, 1 tab, 1 ref.

Descriptors: *Aerial photography, *Arizona, Deserts, *Mapping, *Regional analysis, *Remote sensing, Sierozems, Topography, Vegetation, Correlation analysis, Data collections, Desert plants, Instrumentation, Satellites(Artificial), Surveys.
Identifiers: *Charleston Dam Site(Ariz), Chihuahuan Desert, Cochise County, San Pedro Valley, ERTS.

ERTS (Earth Resources Technology Satellite) multi-spectral imagery was used with high-altitude color or infrared color photography to make a multilevel vegetational survey of the proposed Charleston Dam Site area in the San Pedro Valley, Cochise County, Arizona. The area, covering approximately 120,000 acres located within the Chihuahuan Desert, is a predominantly desert scrub community. Vegetation boundaries were delineated by high-altitude color infrared photography, an initial vegetation map developed in the laboratory, and 11 vegetation classifications were derived therefrom. Using color variations of soil surface, vegetation and topography, whitethorn acacia (Acacia vernicosa), tarbush (Flourensia cenua), and creosotebush (Larrea tridentata) were noted as the dominant species. From an altitude of 570 mi the study area was imaged through multiband ERTS imagery, and a technique using the same surface color variations of the soil, topography, and vegetation permitted the derivation of broad vegetation boundaries. ERTS may serve an important role as a regional information source since the large area encompassed by one ERTS photograph makes it an excellent data-collection instrument. Aircraft and satellite photography permit detailed mapping of vast areas quickly, though in a desert region great reliance on soil, topography and vegetation correlations is necessary. When high-altitude photography is used, detailed mapping of small objects (3 m in diameter) may be achieved by the excellent resolution. ERTS on the other hand, with a resolution element of approximately 100 m, results in a loss of some information. (Gloyd-Arizona)
W75-05722

SIMULTANEOUS AND AUTOMATED DETERMINATION OF TOTAL PHOSPHORUS AND TOTAL KJELDAHL NITROGEN,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-05756

TECHNIQUES FOR DETERMINING AMOUNTS AND DISTRIBUTION OF PRECIPITATION IN MOUNTAIN VALLEYS OF IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 2B.
W75-05783

AUTOMATIC WATER SAMPLER,
For primary bibliographic entry see Field 5A.
W75-05822

METHOD AND APPARATUS FOR MONITORING POLLUTION OF NATURAL WATERS,
Environmental Research Inst. of Michigan, Ann Arbor. (assignee)
For primary bibliographic entry see Field 5A.
W75-05823

THE ESTIMATION OF SOIL MOISTURE DEFICITS BY PENMAN'S AND THORNTHWAITE'S METHOD IN MID CANTERBURY,
Department of Agriculture, Ashburton (New Zealand). Winchmore Irrigation Research Station.
For primary bibliographic entry see Field 2D.
W75-05831

USE OF TIME-LAPSE PHOTOGRAPHY TO ASSESS POTENTIAL INTERCEPTION IN ARIZONA PONDEROSA PINE,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2C.
W75-05834

A SAMPLER FOR TAKING SOIL SAMPLES FROM SPECIFIC SOIL ZONES,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
D. L. Terry, C. B. McCants, and F. G. Averette.
Soil Science, Vol 118, No 6, p 402-404, December 1974. 1 fig, 1 tab.

Descriptors: *Sampling, *Agronomy, Soil analysis, *Fertility, *Equipment, Fertilization, Soil investigations, Soil surveys, Fertilizers, Research equipment, Soil contamination, Soils.
Identifiers: *Samplers.

A soil sampler was developed which can be used to take a sample from a specific depth zone without contamination occurring from adjacent zones. A sampling experiment compared the sampling characteristics of conventional tube and auger samplers with the new sampler. Samples were taken from a zone less than 1 inch below a fertilized zone without appreciable contamination from the fertilized zone. The superiority of the new sampler was evident. The sampler was recommended for use in field studies where the exact location of fertilizer elements in the soil profile is desired. (Sanderson-ISWS)
W75-05839

COMBINED USE OF SATELLITE, RADAR, AND AEROSYNOPTIC INFORMATION FOR FORECASTING HEAVY PRECIPITATION, TAKING THE SNOWFALL OF OCTOBER 14-16, 1971, IN THE CENTRAL REGION OF THE EUROPEAN USSR AS AN EXAMPLE,
For primary bibliographic entry see Field 2B.
W75-05841

LIMITATIONS OF THE INSTANTANEOUS PROFILE METHOD FOR FIELD MEASUREMENT OF UNSATURATED HYDRAULIC CONDUCTIVITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W75-05843

RADIOMETRIC MEASUREMENTS OF STRATOSPHERIC WATER VAPOR IN THE SOUTHERN HEMISPHERE,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2B.
W75-05844

7C. Evaluation, Processing and Publication

A COMPUTERIZED MODEL FOR DETERMINING THE OPTIMAL WATER UTILIZATION FOR AGRICULTURE,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W75-05356

ELECTRONIC IDENTIFICATION AND TEMPERATURE MONITORING,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 7B.
W75-05381

ANNUAL REPORT ON PROJECT ANO115A, FISCAL YEAR 1974,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W75-05382

NUTIS: NUMERICAL AND TEXTUAL INFORMATION SYSTEM, VERSION 1.0, - A USERS MANUAL,
Oak Ridge National Lab., Tenn.
R. H. Strand, and D. G. Taylor.
Available from NTIS, Springfield Va. as REPT. No. EDFB-IBP 74-10, $4.00 in paper copy, $2.25 in microfiche. Report EDFB-IBP 74-10, October 1974. 27 p.

Descriptors: *System analysis, *Ecosystems, *Data collections, *Information exchange, *Information retrieval, Documentation, Publications, Computer program, Data processing, Data storage and retrieval, Programming languages.

Numerical and Textual Information System (NUTIS) is a data-management tool for handling of information. One objective in the International Biological Program was the development of integrated and automated information handling procedures for numeric data from comprehensive total ecosystem analyses. The design of the Numerical and Textual Information System (NUTIS) was centered on this objective. NUTIS was developed upon the following criteria: (1) to design a system for storing, cataloging and retrieving numerical data sets; (2) to provide a versatile system which would be easy to learn to use; (3) to make a compromise between efficiency and portability to other installations; (4) to allow efficient updating and improvement by implementation in a modular form; (5) to protect against adulteration of the data by controlling user access; and (6) to satisfy the basic requirements with a minimum of time and money. (Houser-ORNL)
W75-05390

THE ENVIRONMENTAL FLOW OF CADMIUM AND OTHER TRACE METALS: VOLUME II,
Purdue Univ., Lafayette, Ind.
K. J. Yost, V. L. Anderson, J. E. Christian, W. J. Davis, and W. V. Kessler.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-229 479, $7.00 in paper copy, $2.25 in microfiche. Progress Report, July 1, 1972 to June 30, 1973. 189 p, 66 fig, 20 tab.

Descriptors: *Path of pollutants, *Cadmium, *Trace elements, *Heavy metals, *Industrial wastes, Zinc, Lead, Water pollution, Industrial plants, Model studies, Analytical techniques, Rural areas, Graphical analysis, Instrumentation, Laboratory equipment, Statistical methods.

The project was composed of two basic components; (a) collaborative research with industrial and waste processing facilities whose process streams contain significant amounts of cadmium, zinc, lead and other heavy metals, and (b) environmental studies to identify translocation mechanisms, distribution and fate of cadmium, lead and zinc in the urbanized, heavily industrialized Chicago-East, Chicago-Gary area bordering the southern rim of Lake Michigan. The objectives for the first year of the present study with respect to (a) were to identify, enlist the cooperation of, and initiate sampling programs in pertinent industrial and waste processing facilities. Objectives for component (b) were to scope metal contamination in the Chicago-East Chicago-Gary study area and to choose specific ecosystems and metal transport mechanisms for subsequent, more intensive study. Volume II included reports on (1) modeling and logistics (modeling cadmium discharge from an electroplating line, an air transport model, analysis of cadmium paths in zinc smelter operations, and a preliminary version of a rural ecosystem model); (2) statistical aspects of the experimental design and data analysis; (3) a description of the analytical laboratory; (4) a graphical technique for identifying stable cadmium compounds; and (5) a brief description and list of speakers and attendees at the Purdue - ILZRO cadmium conference. (See also W75-05431) (Pulliam-Vanderbilt)
W75-05432

GROUND WATER ACTIVITIES IN THE USGS,
Geological Survey, Washington, D.C. Ground Water Branch.
For primary bibliographic entry see Field 4B.
W75-05503

GROUNDWATER MODELS FOR TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 2F.
W75-05508

A NUMERICAL TECHNIQUE FOR AQUIFER EVALUATION,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05612

DIGITAL SIMULATION OF A STREAM-AQUIFER SYSTEM,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-05620

EFFECT OF CO2 ON THE CHEMICAL EQUILIBRIUM OF SOIL SOLUTION AND GROUND WATER,
Arizona Univ., Tuscon. Dept. of Hydrology.
For primary bibliographic entry see Field 2G.
W75-05623

ADJUSTMENT OF LOGARITHMIC FLOOD-FREQUENCY STATISTICS FOR GAGED CALIFORNIA STREAMS TO MINIMIZE THE TIME SAMPLING ERROR,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W75-05630

WATER-QUALITY DATA OF THE SACRAMENTO RIVER, CALIFORNIA, MAY 1972 TO APRIL 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W75-05635

SUMMARY OF MULTISPECTRAL FLOOD INUNDATION MAPPING IN IOWA,
Iowa State Geological Survey, Iowa City.
B. E. Hoyer, G. R. Hallberg, and J. V. Taranik.
Public Information Circular No 7, September 1974. 57 p, 6 fig, 3 tab, 9 ref.

Descriptors: *Floods, *Iowa, *Mapping, *Remote sensing, Flood data, Satellites(Artificial), Aerial photography, Infrared radiation.
Identifiers: *ERTS.

Multispectral imagery from three floods occurring at different times of year in Iowa was used to develop methods of mapping flood inundation several days after flood waters have returned to the main channel of rivers. Color infrared film provides flood inundation data for floodplain management planning. Winter floods may be mapped by identifying ice remaining after flood recession. Evaluation of multispectral imagery from mid-spring floods indicates that significant flooding may be mapped for at least 5 days following flood recessing. Late summer floods may be mapped for at least 7 days following flood crest using color-infrared imagery. Best flood inundation mapping was accomplished by multispectral color-additive viewing utilizing the blue and infrared bands. ERTS-1 satellite data supported the basic conclusions of the low-altitude studies and extended the time for acquisition of infrared imagery in late summer. The satellite imagery also allowed rapid appraisal of the areal extent of flood inundation on a regional scale. (Knapp-USGS)
W75-05639

GROUND-WATER RESOURCES OF GRIMES COUNTY, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W75-05641

ANALOG-MODEL STUDIES OF GROUND-WATER HYDROLOGY IN THE HOUSTON DISTRICT, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W75-05642

LAND-SURFACE SUBSIDENCE IN THE HOUSTON-GALVESTON REGION, TEXAS,
Geological Survey, Houston, Tex.
For primary bibliographic entry see Field 4B.
W75-05643

DERIVATION OF HOMOGENEOUS STREAM FLOW RECORDS IN THE UPPER KENTUCKY RIVER BASIN, SOUTHEASTERN KENTUCKY,
Geological Survey, Louisville, Ky.
For primary bibliographic entry see Field 2E.
W75-05644

LAKES MARION-MOULTRIE STREAM SYSTEM INVESTIGATION: PART I--MODEL SELECTION, CALIBRATION, AND ERROR ANALYSIS,
Geological Survey, Columbia, S.C.
For primary bibliographic entry see Field 2E.
W75-05646

APPLICATION OF STATISTICAL TECHNIQUES TO THE ESTIMATION OF GROUND-WATER WITHDRAWALS IN NORTHWESTERN KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W75-05651

STOCHASTIC MODELING OF THE PASSAIC RIVER FLOW,
Rutgers - the State Univ., New Brunswick, N. Dept. of Chemical Engineering; and Rutgers - the State Univ., New Brunswick, N.J. Dept. Biochemical Engineering.
For primary bibliographic entry see Field 2E.
W75-05660

MARINE ATLAS OF HAWAII: BAYS AND HARBORS.
Hawaii Univ., Honolulu. Sea Grant Program.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-11451, $8.50 in paper copy, $2.25 in microfic Sea Grant Miscellaneous Report UNI SEAGRANT-MR-74-01, January 1974. 241 p, fig, 179 ref, 10 append. Grace, J.M., editor. Grant 04-3-158-29.

Descriptors: *Maps, *Hawaii, *Bays, *Harb Data collections, Economics, Geology, W resources, Weather, Temperature, Precip tion(Atmospheric), Humidity, Geographical gions, Islands, Estuaries, Wildlife, Aquatic Oceans, Coasts, Social aspects, Winds, Tsuna Facilities.
Identifiers: *Hawaiian archipelago.

Knowledge available prior to August 1972 provided about bays and harbors of Hawaii basic information needed by governm scientists, and members of industry for plan research, and development. Subjects discusse the Hawaiian Archipelago and each county cluded culture and society, economy, geogra flora and fauna, geology and water resou weather, the ocean, coasts, ports, and har (Humphreys-ISWS)
W75-05665

A FORTRAN IV COMPUTER PROGRAM TABULATE AND GRAPH MICRO-CLIMA DATA,
Illinois Univ., Urbana. Dept. of Forestry.
D. T. Bell, and S. G. Pallardy.
Transactions of the Illinois State Academ Science, Vol 67, No 2, p 166-174, June 1974. 2 ref, 1 append. Army DACW-23-73-C 0020.

Descriptors: *Computer programs, processing, *Climatic data, Computers, gramming languages.
Identifiers: *FORTRAN IV.

A computer program was described which facilitates the tabulation and presentation in graphic form of the micro-climatic parameters of temperature, relative humidity, solar radiation, and precipitation. The computer program is written in FORTRAN IV language for the University of Illinois IBM 360/75 computer and uses the CalComp Model 763 Digital Incremental Plotter. Parts of the program can be modified to meet special requirements and needs. The complete program was given in the appendix. (Humphreys-ISWS)
W75-05671

TABLES AND CONVERSIONS FOR MICROCLIMATOLOGY,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
J. M. Brown.
General Technical Report NC-8, 1973. 31 p, 10 fig, 11 tab, 6 ref.

Descriptors: *Meteorology, *Microclimatology, *Climatology, *Meteorogical data, *Climatic data, Equations, Charts, Solar radiation, Thermal radiation, Hygrometry.
Identifiers: *Conversion factors, Radiant energy exchange.

A series of tables, charts, and conversion factors have been prepared for use in microclimatic and ecological studies. Included are: the solution to various equations of radiant energy exchange; solar radiation diagrams; psychometric and precipitation data; and unit conversion factors. (Forest Service)
W75-05717

PROBABILISTIC MODEL OF RARE HYDROLOGIC EVENTS,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2A.
W75-05766

8. ENGINEERING WORKS

8A. Structures

REVIEW OF THE ENGINEERING ASPECTS OF POWER PLANT DISCHARGES,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5B.
W75-05386

DRAINAGE PLANS WITH ENVIRONMENTAL BENEFITS.
Poertner (Herbert G.), Bolingbrook, Ill.
H. G. Poertner.
Landscape Architecture, Vol 64, No 5, p 391-393, October 1974. 1 fig. Owrt C-3380 (no. 3722(2)) Dept. Interior No. 14-31-0001-3722.

Descriptors: *Detention reservoirs, *Flood control, *Urban runoff, *Drainage systems, *Multiple-purpose reservoirs, *Environmental effects, Aesthetics, Storm drains, Planning, Storage, Drainage engineering, Storm runoff, Flow control, Peak discharge, Storm water, Urbanization, Drainage programs, Drainage practices.
Identifiers: Environmental benefits.

Three land developments incorporating urban stormwater detention facilities are described. Each has been designed to provide multiple-purpose uses and aesthetic enhancement in addition to the primary objective of peak runoff flow reduction. One of these is a new town, Earth City, under development in the Missouri River Bottoms near St. Louis, Missouri. Flood protection is provided by a levee. Providing for drainage of stormwater without providing storage was found to be uneconomical because of the large facilities required to handle peak flows. Several plans for detention storage were studied and a system of interconnected, oblong finger lakes having a total area of 51 acres was selected. Besides providing for storage of stormwater runoff, the lakes will enhance the esthetics of the community and serve for boating, fishing and passive recreation. The use of rooftops, pedestrian arcades and plazas for stormwater detention in the Skyline Urban Renewal Project in Denver is described. Also described is the Melvina Ditch Detention Reservoir constructed by the Metropolitan Sanitary District of Greater Chicago to serve both recreation purposes and local flooding. The author concludes that stormwater detention facilities can often be provided with appreciable costs savings over conventional drainage systems--and that, aesthetics and recreational opportunities can sometimes be added at little additional cost. (Poertner)
W75-05422

THE RISE OF POROUS PAVING.
American Society of Landscape Architects, Louisville, Ky.
Landscape Architecture, Vol 64, No 5, p 385-387, October 1974. 3 fig.

Descriptors: *Asphaltic concrete, *Induced infiltration, *Paving, *Storm runoff, *Drainage systems, *Surface drainage, Concrete construction, Drainage engineering, Engineering design, Surface runoff, Sheet flow, Storage, Groundwater recharge, Flood control, Storm drains.
Identifiers: *Parking lots, *Vehicle parking areas, *Porous asphalt.

Applications are described of the use of porous asphalt paving and special latticed concrete paving blocks for use on vehicle parking areas. The open structure of the surfacing material permits the inflow of stormwater into the base material and subsequent infiltration into the subgrade. The purpose is to reduce peak runoff rates resulting from precipitation. Such measures can reduce urban flooding and the surcharging of storm drainage systems serving such parking areas. Recent new developments of special paving blocks are beginning to have an impact on landscape design. Varieties of porous pre-cast concrete paving block with perforations have long been used in Europe. The parking lot at the Stuttgart, Germany international exhibition grounds is 'paved' in these perforated blocks. The use of porous asphalt paving on a parking lot at the University of Delaware, Newark, and at the new town of Woodlands, Texas has been given special recognition and publicity. Porous asphalt is similar to convention asphalt mixes, except that no fine aggregate is used in the mix and a slightly higher asphalt content is specified, about 51/2 to 6% by weight. Experience to date has not revealed any problems not experienced by usual asphalt pavements. The physical nature of the subgrade should first be studied to help determine what design is suitable for removal of collected water from the base course. (Poertner)
W75-05423

HYDROLOGICAL BALANCING ACT ON A TEXAS NEW TOWN SITE.
American Society of Landscape Architects Louisville, Ky.
Landscape Architecture, Vol 64, No 5, p 394-395, October 1974. 3 fig.

Descriptors: *Storage, *Drainage engineering, *Urban runoff, *Ponding, *Hydrologic equation, Flood control, Storm runoff, Surface runoff, Runoff, Equilibrium, Texas, Urbanization, Planning, Detention reservoirs, Regimen, Environment, Drainage systems, Controlled drainage.
Identifiers: *New town, *Woodlands(Texas).

The new town of Woodlands, Texas is being constructed on a flat and difficult 18,000 acre site, chiefly pine-oak forest, near Houston. One-third of the site is within the 100-year floodplain of three major creeks; and poorly drained soils cover much of the project. The crucial issue then was how to preserve the woodland environment while draining the land for human habitation. It became evident that the natural balance of the hydrologic regimen was the key to successful environmental planning and an organizing concept for development. In order to understand the quantitative aspects of water occurrence, distribution and movement on the site, it was necessary to evaluate solutions of the equation of hydrologic balance or equilibrium. This equation is expressed most simply as: inflow-outflow = plus or minus change in storage. The drainage system designed utilizes the properties of soils, vegetation, and the hydrologic system to drain the site and store runoff during storms. Existing swales, the excess storage capacity of existing ponds and of permeable soils are exploited to: reduce runoff, prevent erosion and siltation, protect natural vegetation, minimize cost, promote recharge, protect wildlife habitats, increase base flow in streams, maintain water quality, enhance scenic amenity, and reduce maintenance. The estimated costs of the 'natural' drainage system being constructed is $4.2 million. Savings were $14.5 million. (Poertner)
W75-05424

PONDING AGAINST THE STORM,
Obrist, (Alfred), Syracuse, N.Y.
A. Obrist.
Landscape Architecture, Vol 64, No 5, p 388-390, October 1974. 6 fig.

Descriptors: *Storage, *Storm runoff, *Drainage systems, *Drainage engineering, *Detention reservoirs, *Ponding, New York, Storm drains, Flood control, Sewers, Application methods, Urban runoff, Surface runoff, Runoff.
Identifiers: Syracuse(New York).

Three examples of stormwater detention facilities are described. At the Community General Hospital in suburban Syracuse, New York, the natural stormwater runoff route had been blocked by an athletic field and high school. A detention pond having a storage capacity of 202,000 cubic feet was constructed by damming a narrow ravine, using site materials. An emergency spillway was also provided. The maximum impoundment is eight feet. However, since esthetic considerations were important, a minimum water level is retained in the pond at all times. Seeding, planting of the slopes, and retaining all the existing vegetative cover possible were prime design concepts. At Adirondack High School an .82-acre pond retains the peak flow of storm waters before they reach an adjoining stream. The existing high water table keeps the pond filled to its normal level. Excavated earth from the pond was used to raise the level of the athletic fields above flood level of the adjacent stream. Thus, the pond solved a storm water problem and also provides students with an opportunity for nature study, ice skating in winter and visual enhancement. Loretto Rest Geriatrics Center is located on a sloping plateau bonded on the west by a steep hillside with residential properties below. To correct sewer backups from stormwater, a ponding basin of 12,000 cubic feet capacity was built. Design was based on 25-year rainfall frequency. (Poertner)
W75-05425

SMOOTHER WATERS FOR THE NEXT 110,000,
Northampton Development Corp. (England).
B. J. W. Smith.
Landscape Architecture, Vol 64, No 5, p 382-384, October 1974. 4 fig.

Descriptors: *Detention reservoirs, *Urban runoff, *Storage, *Drainage systems, *Landscaping, Storm runoff, Land forming, Land development, Multiple-purpose reservoirs, Urbanization, Flood control, Drainage engineering, Aesthetics.
Identifiers: England.

The use of man-made lakes to detain stormwater runoff in an urbanizing area of a historic town in England is described. The town, midway between London and Birmingham is expected to increase in population by 110,000 during the 13-year period, 1968-1981. The Welland and Nene River Authority stipulated that the flow of Billing Brook through the site of a major new housing development should not be more than 11,640 litres per second. In order to achieve this, three balancing lakes were constructed along the length of Billing Brook to catch stormwater runoff from roads and roofs. This flows into the stream and lakes via gasoline interceptors, which prevent pollution by floating off and segregating oil and gasoline wastes. The alternative would have been colverts which although similar in cost could not provide the amenity values of lakes and open water. Although the flood-control system alone is not unique, the extent of landscape design and provision of amenities-plus flood control is unusual. The construction of the banks was either shingle beach or Malayan Kerume revetment. In order to provide a more suitable habitat for fish the centers were deepened, their clay bottoms not requiring lining. Footpaths around the lakes are linked to other facilities, such as schools and shops. (Poertner)
W75-05427

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN NORTHERN NEVADA IN RELATION TO DAM SAFETY,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 8B.
W75-05468

DIAMOND DRILLING TERMS AND EQUIPMENT STANDARDS.
Dresser Industries, Inc., Dallas, Tex. Mining Services and Equipment Div.
(1974). 32 p, 5 tab.

Descriptors: *Drilling equipment, *Core drilling, *Drill holes, Operation and maintenance, Boreholes, Well casings, Construction materials, Instrumentation, Specifications, Technology, Industries, Documentation.
Identifiers: Corebarrel, Hole, Rod, Casing, Size, *Glossary, *Drill terminology.

Development of diamond drilling equipment standards for industry was a joint effort between the Canadian Diamond Drilling Association, the Diamond Core Drill Manufacturers Association of the U.S.A. and the British Standards Institution of Great Britain and was backed by the Australian Diamond Drilling Association and the South African Core Drilling Association, The basic requirements for diamond drilling such as hole, rod, casing and conventional corebarrel sizes are identical for all the international organizations involved but localizations occur in geologically and economically different areas. The four conventional corebarrel designs, WT, WM, WF and WG, are explained and tables of nomenclature for corebarrels are included. Tables also present specific data on the decided upon parameters for drill rods and casings, corebarrels, bits and reaming shells. A glossary of over 700 terms used in diamond drilling is included. (Bradbeer-NWWA)
W75-05516

FLOOD FREQUENCIES AND BRIDGE AND CULVERT SIZES FOR FORESTED MOUNTAINS OF NORTH CAROLINA,
Forest Service (USDA), Franklin, N.C. Coweeta Hydrologic Lab.
For primary bibliographic entry see Field 2E.
W75-05715

8B. Hydraulics

THE THREE DIMENSIONAL HEATED SURFACE JET IN A CROSS FLOW,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W75-05360

EXPERIMENTAL MEASUREMENTS OF PARTICLE MOTION IN A TURBULENT PIPE FLOW,
Illinois Univ., Urbana. Dept. of Nuclear Engineering.
N. M. Howard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 993, $7.25 in paper copy; $2.25 in microfiche. PhD thesis, 1974. 202 p, 88 fig, 16 tab, 40 ref, 3 append. OWRT B-067-ILL(1). 14-31-0001-3582.

Descriptors: *Dispersion, Turbulence, Sedimentation, *Pipe flow, *Reynolds number, Measurement, *Turbulent flow, Particle size, Data processing, Correlation analysis.
Identifiers: *Particle transport(Pipes).

An experimental study of the motion of single spherical particles in turbulent pipe flow at 50,000 Reynolds number has been conducted. The study consisted of four basic parts: (1) The extension of present particle theory valid for homogeneous flow into the realm of nonhomogeneous pipe flow by allowing the fluid convected time scale to exhibit radial dependence; (2) Measurements of two-point space-time correlations in the pipe to determine the fluid convected frame time macroscale, which is used as an input to the theory and to evaluate the axial spatial macroscale both of which showed the same dependence on radius; (3) Experimental measurements of particle trajectories in the turbulent pipe flow parameterizing on particle size from 2 mm to 6.5 mm diameter and density, from heavier to lighter than fluid values, and (4) An evaluation of the errors involved in the experimental procedure and methods of data processing and smoothing considering both statistical variation and electronic noise.
W75-05462

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN NORTHERN NEVADA IN RELATION TO DAM SAFETY,
Nevada Univ., Reno. Desert Research Inst.
A. B. Cunningham.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 995, $3.75 in paper copy; $2.25 in microfiche. Project Report No 29, January 1975. 41 p, 3 fig, 9 tab, 12 ref, 2 append. OWRT A-055-NEV(1). 14-31-0001-4028.

Descriptors: *Dam design, Safety, *Spillways, *Flood frequency, *Nevada, Watersheds(Basins), *Flood peak, *Forecasting, Regional analysis, *Distribution patterns, *Probability, Hydrologic data, Evaluation.
Identifiers: Sierra Nevada(Nev), *Dam safety.

Commonly used methods of flood peak prediction were analyzed for 24 Nevada Watersheds representing a wide spectrum of hydrologic, climatic, and geologic conditions. The primary objective was to compare predicted flood peak values with historic flood peak sequences in order to establish guidelines for application of the various prediction methods in the design of dam spillways and other hydraulic structures in Nevada. As a first step, a regional flood frequency analysis was conducted using historic streamflow data from all study basins. Using a computerized technique, 10 different probability distributions were fitted to the historic set of annual peak flow observations obtained from each study basin gage. The particular probability distribution yielding the highest coefficient of correlation with the observed data was the one selected and used to construct a flood frequency diagram for each study basin. From these diagrams, floods of 2, 10, and 50 years recurrence intervals were determined. However, because long term streamflow records were not available at many stations, estimates of the higher recurrence intervals could not always be made with confidence. The second study phase consisted of obtaining predictions of the 2, 10, and 50 year flood peaks for each study basin using various commonly accepted methods with those of the same frequency as given by the flood-frequency diagrams. Results demonstrated that certain methods of prediction should be favored over others depending on the location within Nevada and size of the drainage are being considered. Guidelines for use of flood peak prediction methods in spillway design, particularly for small earth fill dams, were subsequently developed.
W75-05468

SECURITY AIR MEASURING AND DRILL WEIGHING GUIDE.
Dresser Industries, Inc., Dallas, Tex. Mining Services and Equipment Div.
For primary bibliographic entry see Field 8G.
W75-05515

SIMULATION OF STORM VELOCITY EFFECTS ON FLOW FROM DISTRIBUTED CHANNEL NETWORKS,
Nebraska Univ., Lincoln. Dept. of Computer Science.
For primary bibliographic entry see Field 2E.
W75-05518

METER FOR SEWER FLOW MEASUREMENT
Illinois Univ., Urbana. Dept. of Civil Engineering
For primary bibliographic entry see Field 5G.
W75-05522

FORM AND FLUVIAL PROCESSES IN ALLUVIAL STREAM CHANNELS. STUDIES IN FLUVIAL GEOMORPHOLOGY NO. 2,
Purdue Univ., Lafayette, Ind. Dept. Geosciences.
For primary bibliographic entry see Field 2E.
W75-05526

STUDY OF FLUID MOVEMENTS THROUGH CAUSEWAY,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 2F.
W75-05610

ANALYSIS OF SHALLOW HARD ROCK WELL PUMPING AND RECOVERY TEST DATA,
Kaunasskii Politekhnicheskii Institut (USSR). Hydraulic Div.
For primary bibliographic entry see Field 8G.
W75-05615

PRESSURE BUILDUP AND DRAWDOWN BEHAVIOR IN UNDERSATURATED RESERVOIRS OF DISCONTINUOUS PERMEABILITY
Stanford Univ., Calif. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 4B.
W75-05617

TRANSVERSE MIXING OF HEATED EFFLUENTS IN OPEN-CHANNEL FLOW,
State Univ. of Iowa, Iowa City. Dept. of Mechanics and Hydraulics.
For primary bibliographic entry see Field 5B.
W75-05657

REVERSE FLOW ROUTING BY THE IMPLICIT METHOD,
State Univ. of Iowa, Iowa City. Dept. of Mechanics and Hydraulics.
For primary bibliographic entry see Field 2E.
W75-05675

DESIGN OF CULVERT FISHWAYS,
Idaho Univ., Moscow. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8I.
W75-05782

INVESTIGATIONS ON FILTER HEADLOSS,
Indian Inst. of Tech., Kharagpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-05809

MOSQUITO LAGOON BARRIER BEACH STUDY,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W75-05829

8C. Hydraulic Machinery

BIOLOGICAL FILTERS, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W75-05537

WATER OR AIR, WHICH DO YOU PUMP,
FMC Corp., Indianapolis, Ind. Pump Div.
S. Hoeppner.
Water and Wastes Engineering, Vol 11, No 9, p 67-68, 70, September, 1974. 1 fig.

Descriptors: *Pumps, *Centrifugal pumps, Air, Deep wells, *Deep well pumping, Installation, Pipes, Corrosion, Design.

In an efficiently designed system, vapors of air or gas should not be allowed to enter centrifugal pumps. When air or gas get into the pump, liquids are displaced and the pump becomes air bound, wearing out rings, bearings, shafts, and even impellers from lack of lubrication. In addition, if carbon dioxide from water in deep wells is allowed to escape, these gas bubbles form a film of highly concentrated carbonic acid. This acid corrodes the vital metal parts of a pump, causing severe damage. Solutions to problems of pumping and deep wells are discussed. For horizontal pumps, installation techniques are stressed. To prevent formation of air pockets on the suction side of a pump, an eccentric increaser should be used, suction piping should be laid out so that no high spots exist where air might collect, and all suction piping joints or connections should be air tight. In deep well situations, falling water must be eliminated, either by construction of wells with no well casing perforations or by the installation of baffles or of a liner within the well. When gas of any type becomes entrained in well water, one special suction device may be used to separate the gas from the water. This is a normal suction pipe enclosed in a second pipe, useful when the well is of sufficient diameter. Other modifications to the pump and its impeller to prevent gas from entering the systems are described. (Prague-FIRL)
W75-05542

DISCHARGE DEVICE FOR A VACUUM SEWAGE SYSTEM,
Aktiebolaget Cenenta, Malmo (Sweden).
A. Andersson.
Canadian Patent 952,789. Issued August 13, 1974. Patent Office Record, Vol 102, No 33, p 30, August 1974.

Descriptors: *Patents, *Sewers, *Sewerage, Equipment, Wastes, Sewage, Water pollution sources.
Identifiers: *Vacuum sewers.

A discharge device for a vacuum sewage system is described. It consists of a minimum of two sewage collection tanks, each with valve controlled inlet and outlet ducts, a vacuum source and valve controlled passages which connect each of the tanks alternatively to the vacuum source and to a source of ventilation air. The inlet duct of each tank is connected to the vacuum sewer which feeds the sewage to the discharge device. The valves controlling the inlet ducts operate so that at any time there is at least one tank receiving sewage and simultaneously connected to the vacuum source. When the tank becomes filled with sewage, it is disconnected from the sewage system and from the vacuum source and another tank is connected in its place. Removal of the sewage from the full tank is effected by connecting it to the source of ventilation air and opening the outlet duct so that sewage flows out through the outlet duct. The outlet ducts may be connected to a collecting tank under atmospheric pressure, to a sewer pit or to a conventional gravity sewer. (Orr-FIRL)
W75-05553

THE DESIGN AND CONSTRUCTION OF AYCLIFFE SEWAGE WORKS EXTENSIONS,
For primary bibliographic entry see Field 5D.
W75-05565

FUNDAMENTAL STUDIES IN THE USE OF SONIC POWER FOR ROCK CUTTING,
Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
T. Lo.
PhD Dissertation 1972. 119 p, 52 fig, 6 tab, 30 ref.

Descriptors: *Drilling equipment, *Drilling Instrumentation, Engineering, Rates of application, Equipment, Rock mechanics.
Identifiers: Tool-rock impact, *Sonic drill equipment, *Rock cutting equipment.

The impact of a short sonic tool on rock was analyzed and it was established that a rigid mass-spring model of the sonic tool is reasonable for such conditions of impact. Impact-rebound relationships and the energy loss characteristics were established for an experiment in which sonic tools were propelled into a single impact with the rock surface. A study of tool impact on the transducer has been made where tools of various geometries were used to impact directly on sonic lines. Impact and rebound velocities and the transmitted stress were measured. Modeling of the recovery of transducer internal energy was made with knowledge of energy dissipation and the observed transducer vibration characteristics from previous works. A detailed analysis on the effects of various parameters, such as drive voltage, transducer energy storage, static force, tool-lead and tool-line parameters, has been conducted. The analyses were united in the prediction of sonic drilling rate of rocks and a numerical example is given. (Campbell-NWWA)
W75-05621

DESIGN OF AN EXPERIMENTAL SYSTEM FOR STUDYING PHYSICAL-CHEMICAL TREATMENT OF WASTEWATER AT ELEVATED TEMPERATURES,
Arizona Univ., Tucson. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5D.
W75-05682

CONTROL APPARATUS FOR A WATER SUPPLY SYSTEM,
Weil-McLain Co., Inc., Dallas, Tex. (assignee)
E. M. Deters.
U.S. Published Patent Application B 405,305, 6 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 930, No 4, p 1555, January 28, 1975.

Descriptors: *Patents, *Water supply, *Control systems, *Water delivery, Pumping, Equipment, Water distribution(Applied).

A control apparatus for a water supply system has a motor operated pump for pumping water through a delivery line to one or more valved outlets. The control apparatus includes a pressure switch responsive to the pressure in the delivery line and operable at preselected upper and lower pressure limits to respectively stop and start the pump motor and a main flow control valve which regulates flow from the pump to the delivery line and having a pressure responsive operator. Also included is a pressure regulating pilot valve responsive to the pressure at the outlet of the main flow control valve for controlling the pressure on the pressure responsive operator of the main flow control valve to actuate the latter and maintain the pressure in the delivery line substantially constant at a value intermediate the upper and lower pressure limits during normal flow from the delivery line. A penumatic pressure tank connects with the outlet of the main flow control valve and a bypass passes a restricted flow to the pressure tank and delivery line when the main valve is closed to build up the pressure in the tank and delivery line to the upper pressure limit at which the pressure switch stops the pump motor. (Sinha-OEIS)
W75-05817

8E. Rock Mechanics and Geology

FUNDAMENTAL STUDIES IN THE USE OF SONIC POWER FOR ROCK CUTTING,
Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
For primary bibliographic entry see Field 8C.
W75-05621

BEDROCK INTENSITY ATTENUATION AND SITE FACTORS FROM SAN FERNANDO EARTHQUAKE RECORDS,
California Univ., Los Angeles. Dept. of Mechanics and Structures.
K. W. Campbell, and C. M. Duke.
Bulletin of the Seismological Society of America, Vol 64, No 1, (California Water Resources Center Project W-339).

Descriptors: *Attenuation, *Intensity, *Bedrock, *Earthquakes, *California, Classification, Sites, Zoning.
Identifiers: *San Fernando(Calif).

An attenuation formula was derived for the Arias instrumental intensity on bedrock based, in part on the source spectrum function obtained by Aki. The constants in the formula were calibrated for the San Fernando earthquake by using eight bedrock spectra derived from surface accelerograms. The calibrated formula was then used to compute the Arias bedrock intensities at most of the sites of the ground-level accelerographs and seismoscopes that recorded the earthquake. Maxima accelerations from accelerograms and spectral accelerations from seismoscope records were then used to compute the Arias intensities at the surface by using an empirical relation obtained by Arias. After the instrument sites were classified into four groups, (1) crystalline rock, (2) sedimentary rock, (3) shallow alluvium, and (4) deep alluvium, surface-to-bedrock intensity ratios were correlated with these site classifications which leads to four surface attenuation curves constrained to have the

same slope. From the constant differences between these curves, it is possible to define site factors to be applied to bedrock intensity in order to estimate surface intensity for zoning purposes. Conversely , these factors can be applied to surface intensities for deriving bedrock attenuation curves for other earthquakes in which the geology of the instrument sites is only generally known. The site factors relative to unweathered, unfractured crystalline rock outcrops are 1.80 3.63, 3.74, and 5.12 for classifications 1 through 4, respectively. (Snyder-California-Davis)
W75-05684

8F. Concrete

THE PARTITION OF CALCIUM AMONG CEMENTING COMPOUNDS IN AGING HIGHWAY CONCRETES,
Iowa State Univ., Ames. Dept. of Geology.
D. E. Simon.
MSc Thesis, 1968, 82 p, 11 fig, 4 tab, 41 ref.

Descriptors: *Concrete construction, *Aggregate, *Cementing material, *Paving, Concrete testing, Road construction, Calcium compounds, Deterioration, *Aging, *Iowa.
Identifiers: Concrete deterioration, State highway system.

New approaches to sampling, analysis and preparation were devised for this study of the aging of highway concretes in Iowa. Techniques developed included a chemical partition of silica and insoluble residue, a calcium balance of the major phases present in hydrated cement and a method of recalculating the chemical data to an additive basis. The conclusions from the study are: (1) a major chemical process of aging is carbonation of the calcium-bearing phases contained in hydrated cement of concretes; (2) the primary source of CO2 is the atmosphere; (3) C3ACSH12 is the most stable phase present; (4) C6AFH12 is slowly attacked by CO2; (5) alkalis with high mobilities are concentrated at the highway surface due to the upward movement of pore water; (6) the quartz grains of the fine aggregate are being fractured and broken by carbonation of hydrated cement material at the highway surface; (7) a material balance for the calcium-bearing phases shows it is possible to establish a calcium balance for the phases in hydrated cement. This study provides a general path which chemical reactions related to aging follow to account for observed changes, as well as a chemical background for understanding the changes in concrete deterioration. (Bradbeer-NWWA)
W75-05611

8G. Materials

THE RISE OF POROUS PAVING.
American Society of Landscape Architects, Louisville, Ky.
For primary bibliographic entry see Field 8A.
W75-05423

EXPERIMENTAL MEASUREMENTS OF PARTICLE MOTION IN A TURBULENT PIPE FLOW,
Illinois Univ., Urbana. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 8B.
W75-05462

AQUIFER TESTS IN LARGE DIAMETER WELLS IN INDIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W75-05501

SECURITY AIR MEASURING AND DRILL WEIGHING GUIDE.
Dresser Industries, Inc., Dallas, Tex. Mining Services and Equipment Div.
(1974). 11 p, 6 fig, 9 tab.

Descriptors: *Drilling equipment, *Equipment testing, Drilling, Technology, Evaluation, Instrumentation.
Identifiers: Bit design, Testing equipment, Blast hole bits, *Air measuring, *Drill weighing.

Detailed instructions on the procedure for measuring air volume in blast hole drilling with Dresser equipment and examples are provided. Charts indicating the relation between the hole size in inches and the drill steel diameter in inches, and the relation between the compressor output and the bailing velocity are provided. A table of the discharge area of jet nozzles related to the diameter, and tables indicating the pressure drop across the bit with the compressor output and the air course size for three different pin lengths are included. Eight tables give orifice meter flow rates for temperatures between 60 degrees F and 200 degrees F, pressures from 10 to 60 PSIG and orifice sizes from .75 to 2.25. Altitude correction factors, suggestions for longer bit life and procedures for the use of the Security Weight-on-Bit measuring kit and specific bit designs by Dresser are included. (Bradbeer-NWWA)
W75-05515

METER FOR SEWER FLOW MEASUREMENT,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-05522

INFILTRATION SMOKED-OUT,
Gardner Water and Sewer Dept., Ill.
J. Bexson.
Water and Wastes Engineering, Vol 11, No 9, p 59-60, September, 1974.

Descriptors: *Sewers, *Pipelines, *Sewerage, Plumbing, Separated sewers, Storm drains, *Testing, *Illinois, Infiltration.
Identifiers: *Smoke testing, Gardner(Ill), *Sewer overloads.

The Village of Gardner, Illinois, solved problems of sewer overloads by smoke testing. Although the sanitary system in the town was less than 10 years old and completely separated from the storm sewers, overloads occurred even during moderately heavy rain. The overloads caused floods in many home basements, and forced bypass of any sanitary treatment. Smoke testing of the sewers was chosen because of its ability to locate problem areas in mains, laterals, and building drains. Actual testing was done by the National Power Rodding Corporation. Advance notice was given to the residents before the testing started. It was explained that smoke entering houses indicated faulty plumbing that should be corrected because sewer gas could back up the same way. The equipment for the test consisted of a portable 1500 cfm blower placed on each manhole and a plywood manhole ring lined with a 0.75 inch thick sponge rubber gasket for sealing the connection. Smoke was forced through the sewers. The smoke was a high-moisture zinc chloride which created a dense, grayish white or white mist. The smoke issued from all downspout gutters connected the sewer, from breaks, storm sewer connections and cracked house laterals. All household violators were required to attend a meeting and had the trouble explained. All but 10 households have satisfactorily repaired their violations. Repair of broken lines and illegal connections has reduced the maximum overload on the treatment plant from 1.5 mgd to 3000,000 gpd. Electricity and chlorine usage have also been reduced. (Orr-FIRL)
W75-05541

AUTOMATED MONITORING OF RECOVERED WATER QUALITY,
For primary bibliographic entry see Field 5A.
W75-05545

SMOKE TESTS DETECT SOURCES OF ILLEGAL INFLOW,
Cincinnati Dept. of Sewers, Ohio.
F. S. Welker, and D. J. Miller.
Public Works, Vol 105, No 9, p 90-91, September, 1974.

Descriptors: *Sewers, *Sewage, *Smoke, *Separated sewers, *Testing, Sanitary engineering, Manholes, Domestic water, Piplines, Pipes.
Identifiers: *Smoke testing.

A program of smoke testing was used by the Metropolitan Sewer District of Greater Cincinnati to correct the problem of illiegal connections to its sanitary sewers. Before the tests were conducted, the sewers were visually inspected and residents were notified of the test to prevent anyone from becoming alarmed at seeing smoke. Fire departments were also alerted. The tests were permormed by sealing off a manhole and pumping smoke through the area of the line being tested. Any groundsmoke observed would indicate a cracked main sewer pipe or customer service laterals, illegal downspouts, or outside drains connected to the sanitary line. Property owners were notified of any connections in violation of the rules of the Sewer Department. A four-man crew, on a typical day, was able to smoke test 1907 feet of sewer lines at a total cost of $0.063 per foot. (Orr-FIRL)
W75-05546

ANALYSIS OF SHALLOW HARD ROCK WELL PUMPING AND RECOVERY TEST DATA,
Kaunasskii Politekhnicheskii Institut (USSR). Hydraulic Div.
N. T. Zdankus.
Ground Water, Vol 12, No 5, p 310-317, September-October, 1974. 3 fig, 4 tab, 5 ref.

Descriptors: *Pump testing, Safe yield, Specific capacity, *Aquifer testing, Dug wells, Shallow well, *Data collection, *Well data, Bore wells, Hydrologic data, Groundwater, Flow, Equations.
Identifiers: Mathematical approach.

Equations for steady, unsteady, confined and unconfined radial ground water flow to wells are combined to a single general equation whose validity is expanded by applying it to a shallow hard rock aquifer whose hydraulic conductivity varies with depth. The suggested method is based on the principle used by Jacob (1950) in his method. Drawdown function as a function of time is used for graphical analysis of test data. The drawdown function should be computed from the measurements in the aquifer and not in the well due to seepage face phenomena. Hydraulic conductivity is determined from dug well test data. It is a function of ground water inflow into the well discharge, which varies with the specific capacity of the well. Specific yield is assumed for the rock type and the radius of influence is expressed as a function of time. (Bradbeer-NWWA)
W75-05615

A THEORETICAL STUDY ON THE INTERPRETATION OF RESISTIVITY SOUNDING DATA MEASURED BY THE WENNER ELECTRODE SYSTEM,
Missouri Univ., Rolla. Dept. of Geophysical Engineering.
S. H. Chan.
PhD Dissertation 1969. 193 p, 69 fig, 10 tab, 24 ref.

Descriptors: *Resistivity, *Logging(Recording), Analysis, Electrical well logging, Geophysics, Borehole geophysics, Groundwater.
Identifiers: *Wenner electrode system, Kernel, Associated kernel.

The solution of the boundary value problem associated with an n-layered earth model leads to an integral equation for the Wenner electrode system. This integral equation relates the apparent resistivity function to an unknown function, termed the kernel, which is dependent on the layer resistivities and thicknesses. By solving this integral equation, the kernel is not obtained directly, but a related function is, from which an explicit integral expression for the kernel can be derived. Formulas for numerical integration are developed for the calculation of both the kernel and associated kernel from apparent resistivity data. These formulas give satisfactory results. A numerical-graphical method is developed for the analysis of the kernel and the associated kernel. A further technique based on the principle of logrithmic curve matching is developed for the decomposition of the kernel alone. These methods yield reasonably accurate values for the layer resistivities and thicknesses. (Bradbeer-NWWA)
W75-05618

FOULING OF HEAT EXCHANGERS FROM COOLING WATER AND PROCESS MATERIALS,
Dearborn Chemicals Ltd., Widnes (England).
For primary bibliographic entry see Field 5B.
W75-05810

8H. Rapid Excavation

NUMERICAL STUDIES OF CRATERING IN BEARPAW SHALE: TWO-DIMENSIONAL RESULTS,
California Univ., Livermore. Lawrence Livermore Lab.
J. B. Bryan, D. E. Burton, and M. D. Denny.
Available from NTIS Springfield Va. as REPT. No. UCRL-51659. Report UCRL-51659, October 1974. 52 p, 37 fig, 3 tab, 25 ref.

Descriptors: *Nuclear explosions, *Explosives, *Excavations, *Craters, *Research and development, Channels, *Model studies, Mathematical models, Simulation, Engineering, Comparative, Benefits, Comparative productivity, Design criteria.
Identifiers: Bearpaw clay shale.

Computer calculations were performed to simulate cratering phenomena associated with subsurface detonations in Bearpaw clay shale. These calculations and a complementary field program were part of Project Diamond Ore. A cratering equivalence between nuclear and high explosives was established using the SOC and TENSOR stress-wave-progagation computer codes for dynamic modeling. Late-time ballistic and fallback modeling were utilized to define the final crater configurations. It was found necessary to run each calculation at least 20 ms to get an accurate final representation. Stemmed cratering calculations made at three burial depths (6, 12.5, and 17 m) and two source energies defined calculated nitromethane cratering curves which closely matched empirical curves. A hypothetical 20-ton nuclear source was analyzed in stemmed and unstemmed configurations. The cratering dynamics and final crater shpaes were nearly the same for the 20-ton nuclear and 10-ton nitromethane stemmed sources, the crater dimensions and volumes differing by less than plus or minus 5%. (Houser-ORNL)
W75-05385

8I. Fisheries Engineering

FISH PROTECTION AT INTAKE STRUCTURES AND DAMS: GUIDANCE, SCREENS AND COLLECTION DEVICES. A SELECTED BIBLIOGRAPHY WITH ABSTRACTS,
Oak Ridge National Lab., Tenn.
Available from NTIS, Springfield, Va. as REPT. No. ORNL-EIS-74-67. ORNL-EIS-74-67, March 1974. 75 p.

Descriptors: *Bibliography, *Engineering structures, *Dams, *Fish, *Damages, Ecology, Powerplants, Aquatic environment, Documentation, Abstracts, Screens, Canals, Design criteria, Locks, Pumps, Animal sounds, Light, Chemicals.

This annotated bibliography of 195 references was prepared in connection with the Environmental Impact Reports Project at Oak Ridge National Laboratory. Published and unpublished material available from libraries or government agencies was included. A complete file of all materials referenced is available in the Environmental Information System Office Resource Center files. The collection contains selected material relating to the protection of fish under adverse conditions created by man-made diversions and obstacles such as dams, canals, intake structures for power plants, and irrigation projects. It is particularly concerned with screening fish from intake structures and methods for guiding fish around obstacles or out of danger zones. It covers all types of fish screens, louvers, fish pumps, fish locks, elevators, barriers, and the use of sound, light and chemicals to guide fish. Some material on the design and used of fishways and bypasses has been included, but this subject is not covered in depth. The bibliography is categorized by primary and secondary subject. Author, taxonomy, keywork, and permuted title indices are included. (Houser-ORNL)
W75-05372

RESPONSES OF PENAEUS JAPONICUS BATE TO FISHING NET AND ELECTRICAL STIMULATION FOR THE IMPROVEMENT OF FISHING EFFICACY, (IN KOREAN),
Pusan Fisheries Coll. (Republic of Korea). Dept. of Fisheries Technology.
K. S. Ko.
Publ Mar Lab Pusan Fish Coll. 5: 1-20. Illus. 1972.
Identifiers: *Electrical stimulation(Fish), *Fishing nets, Penaeus-Japonicus, *Brown shrimp, Fish management.

In order to improve the efficiency of the fishing gear, fundamental studies on the reaction of the oriental brown shrimp, Penaeus japonicus Bate to fishing nets in motion and their reactions to electrical stimuli were made in the field and laboratory. The reactions of P. japonicus to moving fishing nets in a seawater tank could be classified into 4 major types, i.e., jumping backward, swimming forward, sticking on the net and crawling. The herding ability of the fish net showed better efficiency when the net was towed at angles of 30, 40 and 60 degrees to the towing direction. It is desirable to adjust the towing speed of the shrimp trawl net to about 0.5 m/s. It is also desirable to make a wing net of at least 4 m in width to prevent the shrimp from jumping out of the net. Most of the shrimp caught by the trammel net were within a meter from the sea bottom. The diural fishing operation of the shrimp trawl equipped with an electrical device achieved up to 89-96% of the efficiency of the catch in the nocturnal fishing operation. --Copyright 1974, Biological Abstracts, Inc.
W75-05394

HYDROBIOLOGICAL AND ICHTHYOLOGICAL STUDIES ON THE COASTAL LAKES TASAUL AND GARGALIC IN VIEW OF THEIR USE FOR FISH MANAGEMENT, (IN RUMANIAN),
E. Costea, and V. Cure.
Bul Cercet Pisc Ic, Vol 30, No 3/4, p 117-151, 1971, English summary.
Identifiers: Abramis-ballerus, Abramis-brama, Aristichthys-nobilis, Benthos, Bighead, Bream, Carassius-carassius, Carp, Clupeonella-cultriventris, Coastal lakes, Cyprinus-carpio, Esox-lucius, *Fish management, *Hydrobiological studies, *Ichthyological studies, Lakes, Perca-fluviatilis, Perch, Pike, Plankton, Roach, Rutilus-rutilus-carpathorossicus, Stizostedion-lucioperca, Tench, Tinca-tinca, *Romania(Tasaul-Gargalic Lakes).

Tasaul Lake (2700 ha) is a continuation of the Casimcea river (USSR) and represents the ancient minor bed of this river, which has been flooded at its mouth by the Black Sea's waters. The Gargalic Lake, 530 ha wide, is situated near Tasaul lake, in the ancient gulf of Constanta. Natural fish productivity, estimated by quantities of the plankton and benthos, was 220 kg/ha for Tasaul Lake and 300 kg/ha for Gargalic Lake. Until management, near Tasaul, of the carp hatchery, which had to stock both lakes, the average catch in the 2 lakes was 41 kg/ha, a very low one. The fish species living in the lakes are: the carp (Cyprinus carpio L.), the roach (Rutilus rutilus carpathorossicus Vlad.), the tench (Tinca tinca(Linnaeus), the crucian carp (Carassi carassius (L.), Abramis ballerus (L.), the common bream (Abramis brama (L.)), and the big-head (Aristichthys nobilis (Rich.)). Predatory fishes include: the Perch (Perca fluviatilis Linnaeus), the perch-pike (Stizostedion lucioperca (Linnaeus)) and the pike (Esox lucius (L.)); from the sea comes Clupeonella cultriventris (Nordmann). After 1964, when the lakes were stocked yearly, Tasaul Lake, with large-scale fish rearing, gave an average yield of 80 kg/ha and Gargalic, with intensive rearing, 768 kg/ha, the carp representing 71-97.8% of the catch.--Copyright 1974, Biological Abstracts, Inc.
W75-05495

DESIGN OF CULVERT FISHWAYS,
Idaho Univ., Moscow. Dept. of Civil Engineering.
F. J. Watts.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 480, $4.25 in paper copy, $2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, May 1974. 62 p, 28 fig, 2 tab, 30 ref, append. OWRT A-027-IDA(3).

Descriptors: *Culverts, Hydraulic structures, *Orifices, *Fish ladders, Fish barriers, *Fish behavior, *Fish passage, *Fish migration, Hydrology, *Design.
Identifiers: Corrugated metal pipe culverts, Box culverts.

Types of fish migration and typical fish blockage problems associated with culverts are reviewed. Swimming capability of fish as a function of specie, fish length and water temperature are discussed. The hydrologic characteristics of streams and the importance of considering the timing of fish runs and peak discharge are reviewed. A procedure for analyzing cmp and pipe arches for recommended swimming velocities is presented. Slot orifice fishways for box culverts (slot orifice placed perpendicular to the flow and skewed wingwall slot orifice) are discussed. Design aids developed for hydraulic analysis are presented. Instream construction in or near prime fish habitat is discussed.
W75-05782

THE FRESHWATER FISHES AND FISHERIES OF SOUTH FLORIDA,
Bureau of Sport Fisheries and Wildlife, Atlanta, Ga.
For primary bibliographic entry see Field 5C.
W75-05802

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

TENTH ANNUAL REPORT WATER RESOURCES RESEARCH CENTER,
Minn. Univ., St. Paul. Water Resources Research Center.

For primary bibliographic entry see Field 9D.
W75-05439

UNDERSTANDING THE WATER RESOURCES RESEARCH CENTER, GRADUATE SCHOOL, UNIVERSITY OF MINNESOTA,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 6E.
W75-05443

AN EVALUATION OF THE RESEARCH PROGRAM FOR THE STATE OF WASHINGTON WATER RESEARCH CENTER.
Washington State Water Research Center, Pullman.
For primary bibliographic entry see Field 6B.
W75-05455

INFORMATION CONCERNING WATER RESOURCES RESEARCH CENTER PROJECTS, 1964-1974,
Minnesota Univ., St. Paul. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W75-05467

DELAWARE WATER RESOURCES CENTER, ANNUAL REPORT/FISCAL YEAR 1974.
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 9D.
W75-05781

9D. Grants, Contracts, and Research Act Allotments

TENTH ANNUAL REPORT WATER RESOURCES RESEARCH CENTER,
Minn. Univ., St. Paul. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 207, $5.75 in paper copy, $2.25 in microfiche. Bulletin 71, July 1974, 123 p. OWRT-A-999-MINN(30), 14-31-0001-4023.

Descriptors: *Research, *Water resources, *Minnesota, Education, Projects, Expenditures, Manpower, Water management, Water pollution, Water Resources Research Act.
Identifiers: *Researchers, *Applied research, *Basic research, Physical-biological-economic-social aspects, Faculty.

The fiscal year 1974 budget of the Minnesota Water Resources Research Center was $441,680. The Center supported 16 research projects involving 15 faculty members. These projects were concerned with: monitoring the effects of stopping the flow of sewage on the productivity of Lake Minnetonka; determining whether optimum levels of investigations can be set for such groundwater reservoirs as the Twin Cities Artesian basin; developing a water resources research plan for Minnesota; developing indices for establishing water supply quality status and trends in Minnesota; analyses of organic carbon as a pollution index in Minnesota; spatial variation in the perception of water resources and water problems in South Central Minnesota; estimating thermal pollution and increased nitrate and phosphate levels associated with alternative forest management systems in Minnesota; delineating the more immediate and crucial sets of water and related land resources planning policy alternative being considered by the people of Minnesota; determining the feasibility of utilizing irrigation and groundwater recharge as means for disposal of heated water from power plants in Minnesota; the role of scientist-technician in water policy decisions at the community level; spatial and temporal variation of precipitation in Minnesota; forecasting rainfall and snowmelt floods; determining the geochemical and biostratigraphic record of natural and pollutional eutrophication of Minnesota lakes; biomanipulation of Minnesota lakes for elimination of blue-green algae; determining the thermal pollution and second trophic level fauna in Lake Superior; and inventorying computer programs and simulation models in water resources. About 49 students received employment throught the Center's program. During fiscal year 1974, 39 reports were generated through research projects. (Walton-Minnesota)
W75-05439

UNDERSTANDING THE WATER RESOURCES RESEARCH CENTER, GRADUATE SCHOOL, UNIVERSITY OF MINNESOTA,
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 6E.
W75-05443

AN EVALUATION OF THE RESEARCH PROGRAM FOR THE STATE OF WASHINGTON WATER RESEARCH CENTER.
Washington State Water Research Center, Pullman.
For primary bibliographic entry see Field 6B.
W75-05455

INFORMATION CONCERNING WATER RESOURCES RESEARCH CENTER PROJECTS, 1964-1974,
Minnesota Univ., St. Paul. Water Resources Research Center.
W. C. Walton.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 205, $4.75 in paper copy; $2.25 in microfiche. Bulletin 19, April 1974, 77 p. OWRT A-999-MINN(31).

Descriptors: *Research, *Water resources, *Minnesota, *Projects, *Water Resources Institute, Education, Universities, Grants, Contracts.

Information concerning completed reports, projects underway, and authorized projects funded during the period 1964-74 by the Minnesota Water Resources Rearch Center through the Federal Office of Water Resources Research is summarized. Since 1964, thirty-nine projects have been completed; research results are described in 141 reports and 21 theses.
W75-05467

DELAWARE WATER RESOURCES CENTER, ANNUAL REPORT/FISCAL YEAR 1974.
Delaware Univ., Newark. Water Resources Center.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 474, $4.25 in paper copy, $2.25 in microfiche. 1974. 62 p. OWRT A-999-DEL(6).

Descriptors: *Delaware, *Water Resources Institute, *Demands, Aquifers, *Energy, Land development, Microorganisms, Sewage treatment, Viruses(Indicators), Waste water treatment, Water conservation, Water pollution.
Identifiers: Christina River Basin(Del), *Delaware River Valley.

There is not enough readily-available water in Delaware and the Delaware Valley to meet the energy-water requirements projected for 1985. This demands increased efficiency in using water and energy, and development of untapped aquifers in the coastal area. Sewage sludge treatment and disposal are being attacked by chemical engineering and catalytic oxidation methods. LPP-1 viruses may be practical indicators of water and wastewater treatment plant efficiencies. Inorganic and organic contaminants in estuarial waters have been identified. Control of short-term BOD upsets in the Delaware river is shown to be not worth the effort and expense. The Delaware Division of Environmental Control and the Delaware River Basin Commission already are using these findings. The Christina River Basin Study produced a handbook of over 50 water resources protection measures in land development. Longer-range projects include a study of the electronic properties of pure and doped water, and an investigation of oil-water mixtures as a 'curtain' for segregating waste or brackish water from an aquifer. (Varrin-Delaware)
W75-05781

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

WAMIS ABSTRACTS, NO. 1,
Arizona Univ., Tucson. Dept. of Watershed Management.
L. M. White, D. B. Thorud, and P. F. Ffolliott.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 291, $5.25 in paper copy, $2.25 in microfiche. June 1974, 111 p. OWRT A-042-ARIZ(3). 14-31-0001-4003.

Descriptors: *Information retrieval, *Bibliographies, *Water yield improvement, *Vegetation effects, *Land management, Watershed management, Forest management, Clear-cutting, Water yield, Water sources, Arizona, Southwest U.S., Abstracts.
Identifiers: *Vegetation conversion.

Abstracts, compiled in four separate searches, show a sample of the materials retrievable through the WAMIS system, developed by the Department of Watershed Management, University of Arizona in cooperation with the Arid Lands Information System on the same campus.
W75-05767

10B. Reference and Retrieval

BIBLIOGRAPHY OF PUBLISHED PAPERS OF THE ATOMIC BOMB CASUALTY COMMISSION,
Atomic Bomb Casualty Commission, Hiroshima (Japan); and Atomic Bomb Casualty Commission, Nagasaki (Japan).
For primary bibliographic entry see Field 5C.
W75-05366

BIBLIOGRAPHY ON PUBLISHED PAPERS OF THE ATOMIC BOMB CASUALTY COMMISSION.
Atomic Bomb Casualty Commission, Hiroshima (Japan); and Atomic Bobm Casualty Commission, Nagasaki (Japan).
For primary bibliographic entry see Field 5C.
W75-05367

FISH PROTECTION AT INTAKE STRUCTURES AND DAMS: GUIDANCE, SCREENS AND COLLECTION DEVICES. A SELECTED BIBLIOGRAPHY WITH ABSTRACTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8I.
W75-05372

MICROBIOLOGY OF WATER, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 5B.
W75-05400

THE IMPACT OF ENERGY DEVELOPMENT ON WATER RESOURCES IN ARID LANDS, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 3E.
W75-05471

AN ANNOTATED BIBLIOGRAPHY OF THE EFFECTS OF LOGGING ON FISH OF THE WESTERN UNITED STATES AND CANADA,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 5C.
W75-05500

BIOLOGICAL FILTERS, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W75-05537

10C. Secondary Publication And Distribution

DIAMOND DRILLING TERMS AND EQUIPMENT STANDARDS.
Dresser Industries, Inc., Dallas, Tex. Mining Services and Equipment Div.
For primary bibliographic entry see Field 8A.
W75-05516

GLOSSARY, WATER AND WASTEWATER CONTROL ENGINEERING.
American Society of Civil Engineers, United Engineering Center, New York, N.Y. 1969. 387 p.

Descriptors: *Engineering, *Water quality control, *Thesauri, Documentation, Publications.
Identifiers: *Glossary, *Waste water control.

This publication was a joint effort of American Society of Civil Engineers, American Water Works Association, Water Pollution Control Federation, and American Public Health Association. The Glossary contains terms that are regularly used or that have special meaning in water and wastewater engineering. As a result of this limitation, Glossary users will find it necessary on occasion to consult other source books. Other source books that may be helpful were listed. (Humphreys-ISWS)
W75-05670

10F. Preparation Of Reviews

ANALYTICAL MODELING OF THERMAL DISCHARGES: A REVIEW OF THE STATE OF THE ART,
Vanderbilt Univ., Nashville, Tenn.
For primary bibliographic entry see Field 5B.
W75-05370

MICROBIOLOGY OF WATER, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 5B.
W75-05400

EVALUATION OF QUALITY PARAMETERS IN WATER RESOURCE PLANNING (A STATE-OF-THE-ART SURVEY OF THE ECONOMICS OF WATER QUALITY),
For primary bibliographic entry see Field 5G.
W75-05483

BIOLOGICAL FILTERS, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 05D.
W75-05537

LITERATURE SURVEY OF INSTRUMENTAL MEASUREMENTS OF BIOCHEMICAL OXYGEN DEMAND FOR CONTROL APPLICATION 1960-1973,
National Environmental Research Center, Cincinnati, Ohio. Methods Development and Quality Assurance Research Lab.
For primary bibliographic entry see Field 05D.
W75-05753

SUBJECT INDEX

ABSORPTION
Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

Iron Absorption by Humans from Veal Liver,
W75-05706 5C

ACCELERATED EROSION
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

ACCIDENTS
Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974,
W75-05361 5C

Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

ACID MINE WATER
Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

Acid Mine Drainage Water Made Fit to Drink,
W75-05688 5D

ACIDIC SOILS
Performance of Red Pine and Japanese Larch Planted on Anthracite Coal-Breaker Refuse,
W75-05597 4D

ACIDIC WASTES
Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

ACTINIDES
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

ACTIVATED SLUDGE
Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5D

Sewage Treatment Plant Dependability with Special Reference to the Activated Sludge Process,
W75-05751 5D

ADMINISTRATION
Ground Water Activities in the USGS,
W75-05503 4B

ADSORPTION
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

Peat Moss: An Alternative Adsorption Medium.
W75-05557 5D

Diel Periodicity in Uptake of Nitrate and Nitrite by Reservoir Plankton,
W75-05739 5C

AERATION
Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed,
W75-05821 5D

Liquid Treatment Apparatus,
W75-05826 5D

AERIAL PHOTOGRAPHY
Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

AEROBIC TREATMENT
Comparison of Septic Tank and Aerobic Treatment Units: The Impact of Wastewater Variations on These Systems,
W75-05459 5D

Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed,
W75-05821 5D

AESTHETIC OPPORTUNITY
Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

Indicators for Aesthetic Opportunity,
W75-05479 6A

AESTHETIC QUANTIFICATION
On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

AESTHETICS
A Study of Aesthetic Preferences,
W75-05359 6B

Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

Indicators for Aesthetic Opportunity,
W75-05479 6A

AGGREGATE
The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

AGING
The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

AGRICULTURAL RUNOFF
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

Laboratory Studies on Feedlot Runoff,
W75-05607 5D

AGRICULTURE
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

AGROCLIMATOLOGY
Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

AGRONOMY
A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

AIR MEASURING
Security Air Measuring and Drill Weighing Guide.
W75-05515 8G

AIR POLLUTION
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

AIR POLLUTION

Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

Problems with the use of Cascade Impactors,
W75-05574 5A

Industrial Source Sampling for Trace Metals,
W75-05575 5A

Characterizing Steel Mill Dust,
W75-05577 5A

Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

AIR PURIFICATIONS

Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

AIR TEMPERATURE

Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

ALABAMA

The Vital Role of Protozoa in Mobile Bay,
W75-05525 2L

ALASKA

Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Water-Quality Changes During a Salmon Run in an Interior Alaskan Stream,
W75-05628 5B

Suspended-Sediment Transport Relationships for Four Alaskan Glacier Streams,
W75-05762 2J

The Microclimates of the Arctic Tundra,
W75-05830 2C

ALESTES-BAREMOZE

Qualitative Study of the Nutrition of Alestes Baremoze (Pisces, Characidae),
W75-05512 2I

ALGAE

Measurements of Mercury Sorption by Algae,
W75-05415 5A

The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

Multiplication of Algae in Sewage Water,
W75-05539 5G

ALGAL CONTROL

Some Ecological Effects of Artificial Circulation on a Small Eutrophic Lake with Particular Emphasis on Phytoplankton. 1. Kezar Lake Experiment, 1968,
W75-05609 5C

ALGORITHMS

Optimum Design of Mountainous Raingage Networks Using Bayesian Decision Theory,
W75-05524 2B

ALKALINE SOILS

Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

ALLUVIAL CHANNELS

Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

ALTERNATIVE COSTS

Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

Management of Subsiding Lands: An Economic Evaluation,
W75-05765 4B

ALTERNATIVE PLANNING

An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

Management of Subsiding Lands: An Economic Evaluation,
W75-05765 4B

ALUMINUM SULFATE

The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

AMMONIUM

Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

Effects of Ammonium Nutrition on Water Stress, Water Uptake, and Root Pressure in Lycopersicon Esculentum Mill,
W75-05548 3F

ANAEROBIC CONDITIONS

Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

ANALOG MODELS

Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

ANALYTICAL TECHNIQUE

Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

ANALYTICAL TECHNIQUES

Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

Description of a New Waste Water Analyzer for Laboratories (Respirometer) (In Hungarian),
W75-05398 5A

Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

Flameless Atomic Absorption Determination of Cobalt Nickel, and Copper - A Comparison of Tantalum and Molybdenum Evaporation Surfaces,
W75-05487 5A

Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

Comparison of Continuous Wave and Pulsed Continuum Sources for Atomic Fluorescence Flame Spectrometry,
W75-05489 5A

Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

Problems with Modeling Transport and Biological Translocation,
W75-05568 5B

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

Determining Volatile Organics at Microgram Per-Liter Levels by Gas Chromatography,
W75-05838 5A

Nitrochromeazo Titrimetric Determination of Sulfate in Irrigation and Other Saline Waters,
W75-05848 5A

ANIMAL CONTROL

Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5

ANIMAL DISEASES

Electronic Identification and Temperature Monitoring,
W75-05381 7

ANIMAL METABOLISM
Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

ANIMAL PATHOLOGY
Electronic Identification and Temperature Monitoring,
W75-05381 7B

Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
W75-05696 5C

ANIMAL PHYSIOLOGY
Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

Ecological and Physiological Characteristics of the Most Abundant Species of Zooplankton and Zoobenthos in Two Northern Lakes,
W75-05759 5C

ANION ADSORPTION
Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

APPALACHIAN MOUNTAIN REGION
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Factors Affecting the Establishment of Direct-Seeded Pine on Surface-Mine Spoils,
W75-05493 4D

Avoid Problem Spoils Through Overburden Analysis,
W75-05494 5A

Lime Retention in Anthracite Coal-Breaker Refuse,
W75-05496 4D

Toxicity of Acid Coal-Mine Spoil to Plants,
W75-05591 5C

Moisture and Density Relations on Graded Strip-Mine Spoils,
W75-05592 4C

Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

Genetic Variability in Survival and Growth of Virginia Pine Planted on Acid Surface-Mine Spoil,
W75-05594 4D

Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

Fertilizer and Herbaceous Cover Influence Establishment of Direct-Seeded Black Locust on Coal-Mine Spoils,
W75-05596 4D

Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky,
W75-05598 5C

Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

Vegetating Strip-Mine Spoils for Runoff and Erosion Control,
W75-05603 4D

APPLIED RESEARCH
Tenth Annual Report Water Resources Research Center,
W75-05439 9D

AQUATIC BACTERIA
The Effect of a Municipal Effluent on the Microbial Populations of the Williamantic/Shetucket Rivers,
W75-05438 5C

Effect of Temperature on the Mineralization of Organic Phosphorus Compounds by Certain Aquatic Bacteria,
W75-05745 5C

AQUATIC ENVIRONMENT
Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

AQUATIC PLANT CONTROL
Control of Water Chestnut with 2,4-D Amine.
W75-05806 4A

AQUATIC PLANTS
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

Ohio Biological Survey Biological Notes No. 6. Effects of Ecological Changes on Buckeye Lake, Ohio, with Emphasis on Largemouth Bass and Aquatic Vascular Plants,
W75-05505 5C

Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

AQUEOUS SOLUTIONS
Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

AQUIFER CHARACTERISTICS
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida,
W75-05633 2F

AQUIFER TESTING
Aquifer Tests in Large Diameter Wells in India,
W75-05501 4B

Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

Analysis of Shallow Hard Rock Well Pumping and Recovery Test Data,
W75-05615 8G

AQUIFERS
Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

Sedimentary Facies of the Aquia Formation in the Subsurface of the Maryland Coastal Plain,
W75-05638 2F

Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

ARCTIC
Eutrophication in the High Arctic--Meretta Lake, Cornwallis Island (75 Degree N Lat.),
W75-05799 5C

The Microclimates of the Arctic Tundra,
W75-05830 2C

ARID LANDS
The Impact of Energy Development on Water Resources in Arid Lands, Literature Review and Annotated Bibliography,
W75-05471 3E

ARIZONA
Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

Management of Subsiding Lands: An Economic Evaluation,
W75-05765 4B

Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

Procedures for Developing a Model for Planning Waterbased Linear Parks along Stream Channels in Semiarid Urban Regions,
W75-05769 6B

A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

ARMORING
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

ARSENIC COMPOUNDS
Workers' Deaths Point to Exposure to Arsenics,
W75-05705 5C

ARTESIAN AQUIFERS
Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

ARTIFICIAL LAKES
Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

ARTIFICIAL RECHARGE
Artificial Recharge - A Potential Solution for Many Water Problems,
W75-05511 4B

Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

ASBESTOS
Asbestos Removal Systems Perfected,
W75-05543 5D

ASPHALTIC CONCRETE
The Rise of Porous Paving.
W75-05423 8A

ASSAY
Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

Environmental Levels of Radioactivity at Atomic Energy Commission Istallation,
W75-05375 5A

ASSESSMENT
Environmental Levels of Radioactivity at Atomic Energy Commission Istallation,
W75-05375 5A

Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

Nuclear Power Facility Performance Characteristics for Making Environmental Impact Assessments.
W75-05395 6G

ATLANTA (GA)
Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

ATMOSPHERE
Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

ATOMIC ABSORPTION SPECTROMETRY
Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

ATOMIC ABSORPTION SPECTROSCOPY
Flameless Atomic Absorption Determination of Cobalt Nickel, and Copper - A Comparison of Tantalum and Molybdenum Evaporation Surfaces,
W75-05487 5A

ATTENUATION
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

ATTITUDES
A Study of Aesthetic Preferences,
W75-05359 6B

Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
W75-05461 5G

Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

ATTRACTIVENESS
An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

AUSTRALIA
Planning the Development of Water Resources,
W75-05832 6B

Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

AUTOMATIC CONTROL
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

AUTOMATION
Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

AUTOREGRESSIVE MODELS
Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

AVALANCHES
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

BACTERIA
The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

New Water Works for Sutton.
W75-05554 5F

Annual Dynamics of Vertical Distribution of the Number of Heterotrophic Bacteria in Southern Baikal, (In Russian),
W75-05636 5C

Oxygen Utilization, Dark Assimilation of Carbon Dioxide and the Rate of Photosynthesis in Nautral and Filtered Water Samples. (In Russian),
W75-05846 5G

BALANCE OF NATURE
Ecological Effects of Heat in the River,
W75-05797 5C

BALLOONS
Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

BANK EROSION
Micro-Topographic Profile Gage,
W75-05599 7B

BARK
Salty Bark as a Soil Amendment,
W75-05718 2G

BARRIERS
Floating Anti-Pollution Device,
W75-05825 5G

Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

BASE FLOW
Combining Estimates of Low-Flow Characteristics of Streams in Massachusetts and Rhode Island,
W75-05629 2E

BASIC RESEARCH
Tenth Annual Report Water Resources Research Center,
W75-05439 9D

BAY OF NAPLES (ME)
Report on Bay of Naples and Sebago Lake, Cumberland County, Maine,
W75-05731 5C

BAYS
Marine Atlas of Hawaii: Bays and Harbors.
W75-05665 7C

Recommendations of the Galveston Bay Enforcement Conference.
W75-05801 5C

BEACH EROSION
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

BED LOAD
Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

BEDROCK
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

BELLINGHAM BAY (WASH)
The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

BENEFICIAL USE
Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

BENEFITS
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

Evaluation of Quality Parameters in Water Resource Planning (A State-of-the-Art Survey of the Economics of Water Quality),
W75-05483 5G

Criteria for Evaluation of Urban Drainage and Flood Control,
W75-05778 4A

BENTHIC FAUNA
A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

The Distribution of the Bottom Fauna in Several Streams of the Middle Balkan in the Summer Period,
W75-05666 2E

Ecological and Physiological Characteristics of the Most Abundant Species of Zooplankton and Zoobenthos in Two Northern Lakes,
W75-05759 5C

BENTHIC FLORA
Phytobenthos and Primary Production of a High Mountain Lake in the Central Pyrenees. (In French),
W75-05672 2H

BENTHOS
Benthos Production of a High-Mountain Lake: Nematoda,
W75-05746 5C

BIBLIOGRAPHIES
Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

Bibliography on Published Papers of the Atomic Bomb Casualty Commission.
W75-05367 5C

Microbiology of Water, (Literature Review),
W75-05400 5B

The Impact of Energy Development on Water Resources in Arid Lands, Literature Review and Annotated Bibliography,
W75-05471 3E

An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada,
W75-05500 5C

Biological Filters, (Literature Review),
W75-05537 5D

Wamis Abstracts, No. 1,
W75-05767 10A

IBLIOGRAPHY
Fish Protection at Intake Structures and Dams: Guidance, Screens and Collection Devices. A Selected Bibliography with Abstracts,
W75-05372 8I

IG CYPRESS SWAMP (FLA)
The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

The Effects of Drainage and Associated Development in the Big Cypress Swamp,
W75-05807 6G

OASSAY
The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

OCHEMICAL OXYGEN DEMAND
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Nitrification Effects in Waste Treatment Processes,
W75-05661 5D

Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

Literature Survey of Instrumental Measurements of Biochemical Oxygen Demand for Control Application 1960-1973,
W75-05753 5D

BIOCHEMISTRY
Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

BIODEGRADATION
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

BIOINDICATORS
Biological Pollution Indicators in Underground Waters. (In Slovenian),
W75-05616 5A

BIOLOGICAL COMMUNITIES
Nearshore Zooplankton of Southeastern Lake Michigan, 1972,
W75-05761 5C

BIOLOGICAL TREATMENT
Aerobic Biostabilization of Sanitary Landfill Leachate,
W75-05507 5D

Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

Plastic Filter Trickling Bed Waste Water Treatment (In Japanese),
W75-05813 5D

Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed,
W75-05821 5D

BIOMASS
Number, Biomass and Production of Planktonic Bacteria in the Shallow Lake Balaton,
W75-05719 2H

BIORTHYMS
Diel Periodicity in Uptake of Nitrate and Nitrite by Reservoir Plankton,
W75-05739 5C

Vertical Patterns of Primary Productivity in Castle Lake, California,
W75-05755 5C

BIRDS
Status of Colonies of Land Wading Birds in South Florida,
W75-05803 4C

BLACK LOCUST TREES
Fertilizer and Herbaceous Cover Influence Establishment of Direct-Seeded Black Locust on Coal-Mine Spoils,
W75-05596 4D

BLUE RIDGE PROVINCE (NC)
Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina,
W75-05715 2E

BOOMS
Flexible Oil Boom,
W75-05824 5G

BOREHOLES
The Measurement of Vertical Strain in Glacier Bore Holes,
W75-05674 7B

BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE (NMEX)
The Relationship Between Waterfowl and Nitrogen Species in the Waters of the Bosque Del Apache,
W75-05469 5B

BOTTOM SEDIMENTS
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

BOUNDARIES (SURFACES)
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

BOUNDING WELLS
The Use of Bounding Wells to Control Flux in Underground Water Storage Projects,
W75-05464 4B

BRADLEY COUNTY (TENNESSEE)
Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

BRAZIL
Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
W75-05461 5G

BRINES
Study of Fluid Movements Through Causeway,
W75-05610 2F

BROWN SHRIMP
Responses of Penaeus Japonicus Bate to Fishing Net and Electrical Stimulation for the Improvement of Fishing Efficacy, (In Korean),
W75-05394 8I

BUCKEYE LAKE (OHIO)
Ohio Biological Survey Biological Notes No. 6. Effects of Ecological Changes on Buckeye Lake, Ohio, with Emphasis on Largemouth Bass and Aquatic Vascular Plants,
W75-05505 5C

BUFFALO (NY)
Chlorides in Lake Erie Basin,
W75-05355 5B

BUOYANCY
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

BURNING
The Effects of Prescribed Burning on Sawgrass, Cladium Jamaicense Crantz, In South Florida,
W75-05740 6G

CADMIUM
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

Cadmium and Zinc Binding in Mammalian Liver and Kidneys,
W75-05485 5A

Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

Cadmium in Plants,
W75-05709 2I

Mercury, Cadmium, and Chromium in the Netherlands, (Le Mercure, Le Cadmium Et Le Chrome Aux Pays-Bas),
W75-05710 5B

CALCIUM
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

CALIFORNIA
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error,
W75-05630 4A

Water-Quality Data of the Sacramento River, California, May 1972 to April 1973,
W75-05635 5A

Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

CANADA
Phytoplankton Production in Char Lake, A Natural Polar Lake, and in Meretta Lake, A Polluted Polar Lake, Cornwallis Island, Northwest Territories,
W75-05396 5C

A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

Eutrophication in the High Arctic--Meretta Lake, Cornwallis Island (75 Degree N Lat.),
W75-05799 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

CANALS
Geological Survey, Tallahassee, Fla.
W75-05640 4A

Mid-1971 Ground-Water Conditions at Yankeetown Well Field, Levy County, Florida,
W75-05649 2F

CANNERIES
Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

CARBON-14 TECHNIQUE
The Relation Between Primary Productivity, Nutrients, and the Trout Environment in Some New Zealand Lakes,
W75-05419 5C

CARBON DIOXIDE
Effect of CO2 on the Chemical Equillibrium of Soil Solution and Ground Water,
W75-05623 2G

CARBON DIOXIDE EXCHANGE
Drought Adaptation in Opuntia Basilaris: Significance of Recycling Carbon Through Crassulacean Acid Metabolism,
W75-05547 2I

CARBONATES
Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

CARP
Effect of Fertilizers and Dense Stocking in Fattening Ponds on the Hydrochemical Regime and Natural Food Base, (In Russian),
W75-05601 2H

CARRIZO AQUIFER (TEX)
Groundwater Models for Texas,
W75-05508 2F

Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

CASTLE LAKE (CALIF)
Vertical Patterns of Primary Productivity in Castle Lake, California,
W75-05755 5C

CATALYSTS
Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

CATALYTIC REACTIONS
Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

CATFISHES
Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning,
W75-05402 5C

CATION EXCHANGE
Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

CATIONS
Removal of Cations from Leachate by Interaction with Subsurface Soils,
W75-05589 5G

CATTLE
Electronic Identification and Temperature Monitoring,
W75-05381 7B

CAUSEWAYS
Study of Fluid Movements Through Causeway,
W75-05610 2F

CAYUGA LAKE (N.Y.)
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

CEMENTING MATERIAL
The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

CENTRIFUGAL PUMPS
Water or Air, Which Do You Pump,
W75-05542 8C

CENTRIFUGAL SEPARATION
Liquid Purification Apparatus and Process,
W75-05552 5D

CENTRIFUGATION
Sewage Sludge Centrifuging Gets Scottish OK.
W75-05562 5D

CHAD (CHARI-LOGONE RIVERS)
Qualitative Study of the Nutrition of Alestes Baremoze (Pisces, Characidae),
W75-05512 2I

CHANNEL MORPHOLOGY
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

CHANNELS
Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

CHARLESTON DAM SITE (ARIZ)
Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

CHELATION
Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

CHEMICAL
Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

CHEMICAL ANALYSIS
Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

CHEMICAL INDUSTRY
Flocculants Flourishing.
W75-05561 5D

CHEMICAL REACTIONS
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

CHEMICAL TREATMENT
The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

CHEMISTRY OF PRECIPITATION
Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

CHENANGO RIVER (NY)
Flood-Flow Characteristics of the Chenango River at Proposed Interstate Highway in Towns of Fenton and Chenango, Broome County, New York,
W75-05655 4A

CHESAPEAKE BAY
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

Ingestion and Assimilation Rates of Chesapeake Bay Zooplankton: Preliminary Report,
W75-05735 5C

Phosphorus Cycling in the Plankton of Chesapeake Bay,
W75-05736 5C

The Ecology of the Plankton of the Chesapeake Bay Estuary,
W75-05792 5C

CHINOOK SALMON
Stress of Formalin Treatment in Juvenile Spring Chinook Salmon (Oncorhynchus Tshawytscha) and Steelhead Trout (Salmo Gairdneri),
W75-05506 5C

CHLORIDES
Chlorides in Lake Erie Basin,
W75-05355 5B

CHLORINATED HYDROCARBON PESTICIDES
Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

CHLORINATION
New Water Works for Sutton.
W75-05554 5F

Disinfection: The Last Line of Defense for Potable Water,
W75-05564 5F

CHLOROPHYLL
Phytoplankton Production in Char Lake, A Natural Polar Lake, and in Meretta Lake, A Polluted Polar Lake, Cornwallis Island, Northwest Territories,
W75-05396 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

CHROMATOGRAPHY
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

CHROMIUM
Mercury, Cadmium, and Chromium in the Netherlands, (Le Mercure, Le Cadmium Et Le Chrome Aux Pays-Bas),
W75-05710 5B

CITIES
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

CITY PLANNING
Criteria for Evaluation of Urban Drainage and Flood Control,
W75-05778 4A

CIVIL DEFENSE
Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

Bibliography on Published Papers of the Atomic Bomb Casualty Commission.
W75-05367 5C

A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

CLARIFIERS
The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applications en papeterie),
W75-05726 5D

CLIMATIC DATA
A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

A Climatic Model of Urban Energy Budgets,
W75-05683 4C

Tables and Conversions for Microclimatology,
W75-05717 7C

CLIMATIC MODELS
A Climatic Model of Urban Energy Budgets,
W75-05683 4C

CLIMATOLOGY
Tables and Conversions for Microclimatology,
W75-05717 7C

CLOGGING
Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

COAGULATION
The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

COAL INDUSTRY
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

COALS
Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

COASTAL WATERS
Estuarial and Coastal Pollution,
W75-05811 5B

COBALT
Flameless Atomic Absorption Determination of Cobalt Nickel, and Copper - A Comparison of Tantalum and Molybdenum Evaporation Surfaces,
W75-05487 5A

Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

COLIFORMS
The Effect of a Municipal Effluent on the Microbial Populations of the Williamantic/Shetucket Rivers,
W75-05438 5C

COLLOIDS
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

COLOR
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

COLORADO
An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5B

Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

Implementation of the Federal Water Project Recreation Act in Colorado,
W75-05772 6E

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

COLORIMETRY
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

COMBINED SEWERS
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

COMBINED WASTEWATER
Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

COMBUSTION
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

COMPATIBILITY
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

COMPUTER MODELS
Groundwater Models for Texas,
W75-05508 2F

Optimum Design of Mountainous Raingage Networks Using Bayesian Decision Theory,
W75-05524 2B

Overview of a Unified Transport Model,
W75-05569 5B

Overview of a Unified Transport Model,
W75-05569 5B

A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

COMPUTER PROGRAMS
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

CONCRETE CONSTRUCTION
The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

CONDENSATE TRAPPING
Condensate Trapping Alleviates Pollution,
W75-05563 5D

CONFINED WATER
Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

CONNECTICUT
Connecticut Water Law: Summary and Index of Statutes,
W75-05437 6E

The Effect of a Municipal Effluent on the Microbial Populations of the Willimantic/Shetucket Rivers,
W75-05438 5C

CONNECTICUT RIVER
River Flow Increases in Central New England After the Hurricane of 1938,
W75-05720 2E

CONST4AINTS
Measures Taken Against Water Pollution in Basic Non-Ferrous Metal Industries,
W75-05484 5D

CONSTRUCTION
The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

CONSUMPTIVE USE
Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

CONTAMINATION
Tri-University Report on the Status of Environmental Contamination by Lead,
W75-05567 5B

CONTROL SYSTEMS
Control Apparatus for a Water Supply System,
W75-05817 8C

CONVERSION FACTORS
Tables and Conversions for Microclimatology,
W75-05717 7C

COOLING WATER
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

Some Aspects of the Effects of Elevated Water Temperature on the Ramshorn Snail,
W75-05387 5C

COPEPODS
On the Distribution of Eurytermora Affinis (Poppe) (Copepoda) in the Western Scheldt Estuary,
W75-05748 5C

COPPER
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

Flameless Atomic Absorption Determination of Cobalt Nickel, and Copper - A Comparison of Tantalum and Molybdenum Evaporation Surfaces,
W75-05487 5A

Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

CORE DRILLING
Avoid Problem Spoils Through Overburden Analysis,
W75-05494 5A

Diamond Drilling Terms and Equipment Standards.
W75-05516 8A

CORN (FIELD)
Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

COST-BENEFIT ANALYSIS
Planning the Development of Water Resources,
W75-05832 6B

COST REPAYMENT
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

COSTS
Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

Evaluation of Quality Parameters in Water Resource Planning (A State-of-the-Art Survey of the Economics of Water Quality),
W75-05483 5G

COTTON
Protection of the Environment from Contamination with Pesticides Used in Cotton Growing, (In Russian),
W75-05408 5G

CRATERS
Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

CRITERIA
On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

CROP PRODUCTION
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

CROP YIELD
Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

CROPS RESPONSE
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

CRYOPEDOLOGY
Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

CULTURAL IMPACT
Diatoms in Lakes and Lake Sediments as an Index to Environment. Part 1. Diatom Stratigraphy and Human Settlement in Minnesota,
W75-05805 5C

CULTURES
Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

CULVERTS
Design of Culvert Fishways,
W75-05782 8I

CURRENTS (WATER)
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

CYCLING NUTRIENTS
Phosphorus Cycling in the Plankton of Chesapeake Bay,
W75-05736 5C

DAIRY INDUSTRY
Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

DAM DESIGN
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

DAM SAFETY
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

DAMAGES
Fish Protection at Intake Structures and Dams: Guidance, Screens and Collection Devices. A Selected Bibliography with Abstracts,
W75-05372 8I

Procedure for Estimating Total Flood Damage in Urban Areas,
W75-05776 4A

DAMS
Fish Protection at Intake Structures and Dams: Guidance, Screens and Collection Devices. A Selected Bibliography with Abstracts,
W75-05372 8I

DARCY'S LAW
Investigations on Filter Headloss,
W75-05809 5D

DARCY'S PERMEABILITY COEFFICIENT
Investigations on Filter Headloss,
W75-05809 5D

DATA COLLECTION
Analysis of Shallow Hard Rock Well Pumping and Recovery Test Data,
W75-05615 8G

DATA COLLECTIONS
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

Aquifer Tests in Large Diameter Wells in India,
W75-05501 4B

Problems with the use of Cascade Impactors,
W75-05574 5A

Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

DATA PROCESSING
Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

DAVIS COUNTY (UTAH)
Davis County Comprehensive Study: Culinary Water, Pressure Irrigation Water, Sanitary Sewerage.
W75-05418 3F

DDT
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning,
W75-05402 5C

DEBRIS AVALANCHES
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

DECISION MAKING
Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

DECOMPOSITION TECHNIQUES
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

DECONTAMINATION
Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

DECONTAMINATION (SOIL)
Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

DEEP WELL PUMPING
Water or Air, Which Do You Pump,
W75-05542 8C

DEGRADATION (DECOMPOSITION)
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

DELAWARE
Delaware Water Resources Center, Annual Report/Fiscal Year 1974.
W75-05781 9D

DELAWARE RIVER VALLEY
Delaware Water Resources Center, Annual Report/Fiscal Year 1974.
W75-05781 9D

DEMANDS
Delaware Water Resources Center, Annual Report/Fiscal Year 1974.
W75-05781 9D

DENITRIFICATION
Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

DENSITY CURRENTS
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

DEPOSITIONS (SEDIMENTS)
A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

DESALINATION
Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

DESERT PLANTS
Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

DESERTS
Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

DESIGN
The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

Sewage Treatment Plant Dependability with Special Reference to the Activated Sludge Process,
W75-05751 5D

Design of Culvert Fishways,
W75-05782 8I

DESIGN CRITERIA
Design Criteria for Waste Stabilization Ponds,
W75-05559 5D

DESIGN FLOOD
Flood-Flow Characteristics of the Chenango River at Proposed Interstate Highway in Towns of Fenton and Chenango, Broome County, New York,
W75-05655 4A

Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina,
W75-05715 2E

DESTRATIFICATION
Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

Some Ecological Effects of Artificial Circulation on a Small Eutrophic Lake with Particular Emphasis on Phytoplankton. 1. Kezar Lake Experiment, 1968,
W75-05609 5C

DETENTION RESERVOIRS
Drainage Plans with Environmental Benefits.
W75-05422 8A

Ponding Against the Storm,
W75-05425 8A

Smoother Waters for the Next 110,000,
W75-05427 8A

DEWATERING
Sewage Sludge Centrifuging Gets Scottish OK.
W75-05562 5D

DIAL CREEK WATERSHED (NC)
Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

DIATOMS
Diatoms in Lakes and Lake Sediments as an Index to Environment. Part 1. Diatom Stratigraphy and Human Settlement in Minnesota,
W75-05805 5C

DIETS
Genetic Influence on Response to Dietary Manganese Deficiency in Mice,
W75-05692 5C

Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
W75-05696 5C

Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

DIFFUSION
Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

DIGESTION
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

DIGITAL SIMULATION
Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5D

DILLON RESERVOIR (COLO)
Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5B

DIMENSIONS
On the Space/Time Scale Questions in Limnological Systems Analysis,
W75-05794 5C

DIRECT BENEFITS
A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

DISAGGREGATION
Quantifying Aesthetic Opportunity,
W75-05476 6A

DISCHARGE MEASUREMENT
Meter for Sewer Flow Measurement,
W75-05522 5G

DISINFECTION
Disinfection: The Last Line of Defense for Potable Water,
W75-05564 5F

DISPERSION
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

Modeling Inflows into Stratified Lakes with Vertical Scale Distortion,
W75-05448 2H

Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

DISSOLVED ORGANIC CARBON
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

DISSOLVED SOLIDS
4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

DISTRIBUTION
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

Cadmium in Plants,
W75-05709 2I

On the Distribution of Eurytermora Affinis (Poppe) (Copepoda) in the Western Scheldt Estuary,
W75-05748 5C

DISTRIBUTION PATTERNS
Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

Techniques for Determining Amounts and Distribution of Precipitation in Mountain Valleys of Idaho,
W75-05783 2B

DIURNAL
Diel Periodicity in Uptake of Nitrate and Nitrite by Reservoir Plankton,
W75-05739 5C

DIVERSION
Geological Survey, Tallahassee, Fla.
W75-05640 4A

DOMESTIC WASTES
Design Criteria for Waste Stabilization Ponds,
W75-05559 5D

DOMESTIC WATER
Socio-Economic Impacts of Rural Water Supplies,
W75-05407 6B

DOUGLAS FIR TREES
Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

Salty Bark as a Soil Amendment,
W75-05718 2G

DRAINAGE
Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

Procedure for Estimating Total Flood Damage in Urban Areas,
W75-05776 4A

Criteria for Evaluation of Urban Drainage and Flood Control,
W75-05778 4A

DRAINAGE EFFECTS
The Effects of Drainage and Associated Development in the Big Cypress Swamp,
W75-05807 6G

DRAINAGE ENGINEERING
Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

Ponding Against the Storm,
W75-05425 8A

DRAINAGE NET
Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

DRAINAGE PRACTICES
Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

DRAINAGE SYSTEMS
Drainage Plans with Environmental Benefits.
W75-05422 8A

The Rise of Porous Paving.
W75-05423 8A

Ponding Against the Storm,
W75-05425 8A

Smoother Waters for the Next 110,000,
W75-05427 8A

DRAWDOWN
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

Pressure Buildup and Drawdown Behavior in Undersaturated Reservoirs of Discontinuous Permeability,
W75-05617 4B

Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

DRILL HOLES
Diamond Drilling Terms and Equipment Standards.
W75-05516 8A

DRILL TERMINOLOGY
Diamond Drilling Terms and Equipment Standards.
W75-05516 8A

DRILL WEIGHING
Security Air Measuring and Drill Weighing Guide.
W75-05515 8G

DRILLING EQUIPMENT
Security Air Measuring and Drill Weighing Guide.
W75-05515 8G

Diamond Drilling Terms and Equipment Standards.
W75-05516 8A

Fundamental Studies in the Use of Sonic Power for Rock Cutting,
W75-05621 8C

DRILLING INSTRUMENTATION
Fundamental Studies in the Use of Sonic Power for Rock Cutting,
W75-05621 8C

DROUGHT RESISTANCE
Some Regularities of the Xerophilization of Plants. (In Russian),
W75-05800 2I

DUSTS
Characterizing Steel Mill Dust,
W75-05577 5A

DYE RELEASES
Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

DYNAMIC PROGRAMMING
A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

EARTHQUAKES
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

ECOLOGY
Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

Careful Renewal of a Campus Loch,
W75-05426 5G

An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

ECONOMETRICS
A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

ECONOMIC ANALYSIS
Evaluation of Quality Parameters in Water Resource Planning (A State-of-the-Art Survey of the Economics of Water Quality),
W75-05483 5G

ECONOMIC EFFICIENCY
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

ECONOMIC IMPACT
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

ECONOMIC PREDICTION
A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

ECONOMICS
Industrial Water Pretreatment,
W75-05695 5D

ECOSYSTEMS
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

EDINBURGH (SCOTLAND)
Careful Renewal of a Campus Loch,
W75-05426 5G

EDUCATION
Understanding the Water Resources Research Center, Graduate School, University of Minnesota,
W75-05443 6E

EDWARDS AQUIFER (TEX)
Groundwater Models for Texas,
W75-05508 2F

EFFECTS
Ecological Effects of Heat in the River,
W75-05797 5C

EFFLUENTS
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

Radiation Data. Section IV. Other data. Environmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

Treated Effluent Goes 'Underground',
W75-05544 5D

A Close Look at London's Waters,
W75-05550 5G

ELECTRICAL STIMULATION (FISH)
Responses of Penaeus Japonicus Bate to Fishing Net and Electrical Stimulation for the Improvement of Fishing Efficacy, (In Korean),
W75-05394 8I

ELECTROCHEMISTRY
Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

ELK RIVER (MINN)
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

ENDRIN
Influence of Endrin on Soil Microbial Populations and their Activity,
W75-05497 5B

ENDRIN

Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

ENERGY
Digest of Energy Facts for Water Resources Studies in Minnesota,
W75-05352 3E

The Impact of Energy Development on Water Resources in Arid Lands, Literature Review and Annotated Bibliography,
W75-05471 3E

Delaware Water Resources Center, Annual Report/Fiscal Year 1974.
W75-05781 9D

ENERGY BUDGET
A Climatic Model of Urban Energy Budgets,
W75-05683 4C

ENERGY CONVERSION
Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

ENERGY EQUATION
Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

ENERGY TRANSFER
Ingestion and Assimilation Rates of Chesapeake Bay Zooplankton: Preliminary Report,
W75-05735 5C

ENERGY-WATER RELATIONSHIPS
Digest of Energy Facts for Water Resources Studies in Minnesota,
W75-05352 3E

ENGINEERING
Glossary, Water and Wastewater Control Engineering.
W75-05670 10C

ENGINEERING STRUCTURES
Fish Protection at Intake Structures and Dams: Guidance, Screens and Collection Devices. A Selected Bibliography with Abstracts,
W75-05372 8I

ENVIRONMENT
Radiation Data: Section II. Water.
W75-05374 5A

Radiation Data. Section II. Water,
W75-05377 5A

Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

Indicators for Aesthetic Opportunity,
W75-05479 6A

ENVIRONMENTAL CONTROL
Protesting Pollution.
W75-05560 5D

ENVIRONMENTAL EFFECTS
Nuclear Power Facility Performance Characteristics for Making Environmental Impact Assessments.
W75-05395 6G

Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

Drainage Plans with Environmental Benefits.
W75-05422 8A

Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

Tri-University Report on the Status of Environmental Contamination by Lead,
W75-05567 5B

The Biological Impact of Residential Real Estate Developments in the South Florida Coastal Wetlands.
W75-05752 5C

The Effects of Drainage and Associated Development in the Big Cypress Swamp,
W75-05807 6G

Planning the Development of Water Resources,
W75-05832 6B

ENVIRONMENTAL QUALITY
On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

EQUIPMENT
Automated Monitoring of Recovered Water Quality,
W75-05545 5A

A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

EQUIPMENT TESTING
Security Air Measuring and Drill Weighing Guide.
W75-05515 8G

EROSION
An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada,
W75-05500 5C

Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

EROSION CONTROL
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

Vegetating Strip-Mine Spoils for Runoff and Erosion Control,
W75-05603 4D

Erosion Control on Logging Roads in the Appalachians,
W75-05713 2J

ERTS
Summary of Multispectral Flood Inundation Mapping in Iowa,
W75-05639 7C

Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

ESTES LAKE (ME)
Report on Estes Lake, York County, Maine.
W75-05729 5C

ESTIMATING
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina,
W75-05715 2E

The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

ESTUARIES
Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay Washington,
W75-05578 5B

Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

On the Distribution of Eurytermora Affini (Poppe) (Copepoda) in the Western Scheld Estuary,
W75-05748 5C

The Ecology of the Plankton of the Chesapeak Bay Estuary,
W75-05792 5C

Preliminary Model of Potomac Estuar Phytoplankton,
W75-05798 5C

Estuarial and Coastal Pollution,
W75-05811 5C

EUGENE (OREGON)
Sewage Treatment Division Report, 1970-197 1972, City of Eugene (Oregon).
W75-05429 5D

EUROPE
Measures Taken Against Water Pollution Basic Non-Ferrous Metal Industries,
W75-05484 5C

EUROPEAN USSR
Combined Use of Satellite, Radar, an Aerosynoptic Information for Forecastin Heavy Precipitation, Taking the Snowfall

October 14-16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

EURYTEMORA AFFINIS
On the Distribution of Eurytermora Affinis (Poppe) (Copepoda) in the Western Scheldt Estuary,
W75-05748 5C

EUTROPHICATION
Some Ecological Effects of Artificial Circulation on a Small Eutrophic Lake with Particular Emphasis on Phytoplankton. 1. Kezar Lake Experiment, 1968,
W75-05609 5C

Chemical and Biological Conditions of Lake Okeechobee, Florida, 1969-72,
W75-05634 5C

Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

Eutrophication,
W75-05749 5C

The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

Eutrophication in the High Arctic--Meretta Lake, Cornwallis Island (75 Degree N Lat.),
W75-05799 5C

EUTROPHIEATION
A Phytoplankton Bloom in the Lagoon of Venice,
W75-05699 2L

EVALUATIN
An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

EVALUATION
Nuclear Power Facility Performance Characteristics for Making Environmental Impact Assessments.
W75-05395 6G

Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

Indicators for Aesthetic Opportunity,
W75-05479 6A

Evaluation of Quality Parameters in Water Resource Planning (A State-of-the-Art Survey of the Economics of Water Quality),
W75-05483 5G

Regional Wastewater Management: A Water Quality Evaluation of System Centralization,
W75-05775 5D

EVALUATON
Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

EVAPORATION
Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

EVAPORATIVE DEMAND
Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

EVAPOTRANSPIRATION
Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

Evaporative Water Loss from Large Land Areas in the Finger Lakes,
W75-05532 2D

A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

EVERGLADES (FLA)
Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

EVERGLADES (FLORIDA)
Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

EXCAVATIONS
Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

EXPLOSIVES
Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

FALLOUT
Significance of Stable Iodine-127 in Milk,
W75-05373 5B

A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

FARM WASTES
Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

Laboratory Studies on Feedlot Runoff,
W75-05607 5D

FARMERS HOME ADMINISTRATION
Socio-Economic Impacts of Rural Water Supplies,
W75-05407 6B

FEASIBILITY STUDIES
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

Planning the Development of Water Resources,
W75-05832 6B

FEDERAL GOVERNMENT
Water Quality in the Great Lakes: A New Timetable,
W75-05694 5G

FEDERAL WATER PROJECT RECREATION ACT
Implementation of the Federal Water Project Recreation Act in Colorado,
W75-05772 6E

FEED LOTS
Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

Laboratory Studies on Feedlot Runoff,
W75-05607 5D

FERMENTATION
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

FERTILITY
A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

FERTILIZATION
Fertilizer and Herbaceous Cover Influence Establishment of Direct-Seeded Black Locust on Coal-Mine Spoils,
W75-05596 4D

FERTILIZERS
Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

FILTER FABRICS
Filtration Analysis of Four Different Filter Fabrics,
W75-05460 4B

FILTERATION
Biological Filters, (Literature Review), W75-05537 5D

FILTERS
Biological Filters, (Literature Review), W75-05537 5D

Investigations on Filter Headloss, W75-05809 5D

The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov), W75-05815 5D

FILTRATION
Filtration Analysis of Four Different Filter Fabrics, W75-05460 4B

Reverse Osmosis and Ultraviltration, W75-05556 5D

Peat Moss: An Alternative Adsorption Medium. W75-05557 5D

Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed, W75-05821 5D

FILTRATION TECHNIQUES
A Close Look at London's Waters, W75-05550 5G

FINGER LAKES (NY)
Evaporative Water Loss from Large Land Areas in the Finger Lakes, W75-05532 2D

FISH
Fish Protection at Intake Structures and Dams: Guidance, Screens and Collection Devices. A Selected Bibliography with Abstracts, W75-05372 8I

Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning, W75-05402 5C

An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada, W75-05500 5C

Water Management: The Key to Fish and Wildlife Values in South Florida, W75-05742 6G

FISH BEHAVIOR
Design of Culvert Fishways, W75-05782 8I

FISH CREEK (ALASKA)
Water-Quality Changes During a Salmon Run in an Interior Alaskan Stream, W75-05628 5B

FISH DIETS
Qualitative Study of the Nutrition of Alestes Baremoze (Pisces, Characidae), W75-05512 2I

FISH FARMING
Pond Phytoplankton of the Tedzhen Fish-Breeding Farm. (In Russian), W75-05850 2H

FISH FOOD ORGANISIUM
The Ecosystem of the Arctic Lake Nordlaguna, Jan Mayen Island: III. Ecology of Arctic Char, Salvelinus Alpinus (L.), W75-05676 2H

FISH FOOD ORGANISMS
Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky, W75-05598 5C

FISH LADDERS
Design of Culvert Fishways, W75-05782 8I

FISH MANAGEMENT
Hydrobiological and Ichthyological Studies on the Coastal Lakes Tasaul and Gargalic in View of Their Use for Fish Management, (In Rumanian), W75-05495 8I

FISH MIGRATION
Design of Culvert Fishways, W75-05782 8I

FISH PASSAGE
Design of Culvert Fishways, W75-05782 8I

FISH REPRODUCTION
Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky, W75-05598 5C

FISHERIES
The Freshwater Fishes and Fisheries of South Florida, W75-05802 5C

FISHING NETS
Responses of Penaeus Japonicus Bate to Fishing Net and Electrical Stimulation for the Improvement of Fishing Efficacy, (In Korean), W75-05394 8I

FISHKILL
How to Read a Fish Kill, W75-05812 5A

FJORDS
Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974, W75-05403 5B

FLAME PHOTOMETRY
Comparison of Continuous Wave and Pulsed Continuum Sources for Atomic Fluorescence Flame Spectrometry, W75-05489 5A

FLAMELESS PHOTOMETRY
Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry, W75-05405 5A

FLOATS
Floating Anti-Pollution Device, W75-05825 5G

FLOCCULANTS
Flocculants Flourishing. W75-05561 5D

FLOCCULATION
Flocculants Flourishing. W75-05561 5D

The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov), W75-05815 5D

FLOOD CONTROL
Drainage Plans with Environmental Benefits. W75-05422 8A

Geological Survey, Tallahassee, Fla. W75-05640 4A

Procedure for Estimating Total Flood Damage in Urban Areas, W75-05776 4A

Criteria for Evaluation of Urban Drainage and Flood Control, W75-05778 4A

A Systems Approach to the Operation of Flood Control Reservoirs, W75-05784 4A

FLOOD DAMAGE
Procedure for Estimating Total Flood Damage in Urban Areas, W75-05776 4A

Criteria for Evaluation of Urban Drainage and Flood Control, W75-05778 4A

FLOOD DISCHARGE
Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina, W75-05715 2E

FLOOD FREQUENCY
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety, W75-05468 8B

Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error, W75-05630 4A

Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina, W75-05715 2E

FLOOD PEAK
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety, W75-05468 8B

FLOOD PLAINS
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains, W75-05481 4A

Floodplain Meadows of the Lower Course of the Pripyat' River, (In Byelorussian), W75-05723 2G

FLOOD PROTECTION
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains, W75-05481 4A

FLOODING
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida, W75-05737 6G

FLOODS
Summary of Multispectral Flood Inundation Mapping in Iowa, W75-05639 7C

A Manual for Estimating the Magnitude and Frequency of Floods on Ungaged Streams in Indiana,
W75-05645 4A

Flood-Flow Characteristics of the Chenango River at Proposed Interstate Highway in Towns of Fenton and Chenango, Broome County, New York,
W75-05655 4A

FLORIDA
The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

Treated Effluent Goes 'Underground',
W75-05544 5D

Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida,
W75-05633 2F

Chemical and Biological Conditions of Lake Okeechobee, Florida, 1969-72,
W75-05634 5C

Geological Survey, Tallahassee, Fla.
W75-05640 4A

Mid-1971 Ground-Water Conditions at Yankeetown Well Field, Levy County, Florida,
W75-05649 2F

Tar Pollution Survey at Golden Beach, Florida,
W75-05667 5B

The Effects of Prescribed Burning on Sawgrass, Cladium Jamaicense Crantz, In South Florida,
W75-05740 6G

Water Management: The Key to Fish and Wildlife Values in South Florida,
W75-05742 6G

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

The Freshwater Fishes and Fisheries of South Florida,
W75-05802 5C

Status of Colonies of Land Wading Birds in South Florida,
W75-05803 4C

Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

FLORIDAN AQUIFER (FLA)
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

FLOTSAM
Floating Anti-Pollution Device,
W75-05825 5G

FLOW
The Use of Bounding Wells to Control Flux in Underground Water Storage Projects,
W75-05464 4B

Storage of Fresh Water in Saline Aquifers Using a Well Field,
W75-05465 4B

FLOW MEASUREMENT
Meter for Sewer Flow Measurement,
W75-05522 5G

FLOW PROFILES
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

FLOW SIMULATION
Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

FLOW SYSTEM
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

FLOWMETERS
Meter for Sewer Flow Measurement,
W75-05522 5G

FLUID MOVEMENT
Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

FLUIDIZED-BED
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

FLUORESCENCE
Comparison of Continuous Wave and Pulsed Continuum Sources for Atomic Fluorescence Flame Spectrometry,
W75-05489 5A

FLUORESCENT DYE
Stream Gaging by Continuous Injection of Tracer Elements,
W75-05619 2E

FOAM FRACTIONATION
Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

FOOD PROCESSING INDUSTRY
Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

FOODS
Iron Absorption by Humans from Veal Liver,
W75-05706 5C

FORAGE PALATABILITY
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

FORECASTING
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

A Technique for Predicting the Movement of Oil Spills in New York Harbor,
W75-05668 5B

A Climatic Model of Urban Energy Budgets,
W75-05683 4C

Combined Use of Satellite, Radar, and Aerosynoptic Information for Forecasting Heavy Precipitation, Taking the Snowfall of October 14-16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

FOREST MANAGEMENT
A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

FOREST OPENINGS
A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

FORMALIN
Stress of Formalin Treatment in Juvenile Spring Chinook Salmon (Oncorhynchus Tshawytscha) and Steelhead Trout (Salmo Gairdneri),
W75-05506 5C

FORTRAN IV
A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

FOSSIL FUELS
Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

FOULING
Fouling of Heat Exchangers from Cooling Water and Process Materials,
W75-05810 5B

FREQUENCY ANALYSIS
Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

FRESHWATER FISH
The Freshwater Fishes and Fisheries of South Florida,
W75-05802 5C

FROGS
Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

FROZEN GROUND
Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

FROZEN SOILS
Thermal Conductivity of a Frozen Hubbard Loamy Sandy,
W75-05442 2G

Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

FUMIGATION
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

FUNGI
The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

FUTURE PLANNING (PROJECTED)
An Evaluation of the Research Program for the State of Washington Water Research Center.
W75-05455 6B

GAGES
Micro-Topographic Profile Gage,
W75-05599 7B

GAGING STATIONS
Stream Gaging by Continuous Injection of Tracer Elements,
W75-05619 2E

GALVESTON BAY (TEXAS)
Recommendations of the Galveston Bay Enforcement Conference.
W75-05801 5C

GALVESTON ISLAND (TEX)
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

GALVESTON (TEX)
Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

GAMMA RAYS
First Installation in the World for the Sterilization of Sewage by Gamma Rays (Premier installation du monde pour l'hygienisation des boues d'epuration aux rayons gamma).
W75-05814 5D

GAS CHROMATOGRAPHY
Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

GASES
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

GENETICS
Genetic Influence on Response to Dietary Manganese Deficiency in Mice,
W75-05692 5C

GEOCHEMISTRY
Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

GEOLOGIC HISTORY
Diatoms in Lakes and Lake Sediments as an Index to Environment. Part 1. Diatom Stratigraphy and Human Settlement in Minnesota,
W75-05805 5C

GEOMORPHOLOGY
Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

GEORGIA
Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

GEOSTROPHIC DRAG
Evaporative Water Loss from Large Land Areas in the Finger Lakes,
W75-05532 2D

GEOTHERMAL STUDIES
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

GLACIAL DRIFT
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

GLACIER SEDIMENTS
Suspended-Sediment Transport Relationships for Four Alaskan Glacier Streams,
W75-05762 2J

GLACIERS
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

GLACIOLOGY
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

GLOSSARY
Diamond Drilling Terms and Equipment Standards.
W75-05516 8A

Glossary, Water and Wastewater Control Engineering.
W75-05670 10C

GOLD
Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

GRADING
Moisture and Density Relations on Graded Strip-Mine Spoils,
W75-05592 4C

GRASSES
The Effects of Prescribed Burning on Sawgrass, Cladium Jamaicense Crantz, In South Florida,
W75-05740 6G

GRASSLANDS
Floodplain Meadows of the Lower Course of the Pripyat' River, (In Byelorussian),
W75-05723 2G

GREAT BASIN (NEV)
Valuation of a Ground-Water Supply for Management and Development,
W75-05613 4B

GREAT LAKES
Water Quality in the Great Lakes: A New Timetable,
W75-05694 5G

GREEN PEAS
Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

GREENHOUSES
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

GRIMES COUNTY (TEX)
Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

GROUND-WATER
Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

Biological Pollution Indicators in Underground Waters. (In Slovenian),
W75-05616 5A

GROUNDWATER
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

Ground Water Activities in the USGS,
W75-05503 4B

Geology and Ground Water Resources of Sussex County and the Warren County Portion of the Tocks Island Impact Area,
W75-05513 4B

Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

Valuation of a Ground-Water Supply for Management and Development,
W75-05613 4B

Effect of CO2 on the Chemical Equillibrium of Soil Solution and Ground Water,
W75-05623 2G

Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

Mid-1971 Ground-Water Conditions at Yankeetown Well Field, Levy County, Florida,
W75-05649 2F

Management of Subsiding Lands: An Economic Evaluation,
W75-05765 4B

New Priorities for Ground-Water Quality Protection,
W75-05827 5E

GROUNDWATER MANAGEMENT
A Tax System for Groundwater Management,
W75-05654 6C

GROUNDWATER MINING
Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

GROUNDWATER MOVEMENT
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

Study of Fluid Movements Through Causeway,
W75-05610 2F

Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

GROUNDWATER RESOURCES
A Tax System for Groundwater Management,
W75-05654 6C

GROUNDWATER-RIVER WATER INTERCHANGE
An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

GULF OF MEXICO
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

HAFNIUM
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

HARBORS
Marine Atlas of Hawaii: Bays and Harbors.
W75-05665 7C

HAWAII
Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

Marine Atlas of Hawaii: Bays and Harbors.
W75-05665 7C

HAWAIIAN ARCHIPELAGO
Marine Atlas of Hawaii: Bays and Harbors.
W75-05665 7C

HAWTHORN AQUICLUDE (FLA)
Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

HAZARDS
A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

HEAD LOSS
Investigations on Filter Headloss,
W75-05809 5D

HEAT
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

HEAT EXCHANGE
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

HEAT EXCHANGERS
Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

Fouling of Heat Exchangers from Cooling Water and Process Materials,
W75-05810 5B

HEAT TRANSFER
Thermal Conductivity of a Frozen Hubbard Loamy Sandy,
W75-05442 2G

HEATED SEWAGE
Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

Physical-Chemical Treatment at Elevated Temperatures,
W75-05763 5D

HEATED WATER
Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

Ecological Effects of Heat in the River,
W75-05797 5C

HEAVY METALS
Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

Measures Taken Against Water Pollution in Basic Non-Ferrous Metal Industries,
W75-05484 5D

Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

HERBICIDES
Control of Water Chestnut with 2,4-D Amine.
W75-05806 4A

HETEROTROPHIC BACTERIA
Annual Dynamics of Vertical Distribution of the Number of Heterotrophic Bacteria in Southern Baikal, (In Russian),
W75-05636 5C

HIERARCHICAL CONTROL
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

HISTORIC FLOODS
Flood of August 2, 1972, in the Littel Maquoketa River Basin, Dubuque County, Iowa,
W75-05648 2E

HORTICULTURAL CROPS
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

HOUSTON (TEX)
Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

HUMAN PATHOLOGY
Iron Absorption by Humans from Veal Liver,
W75-05706 5C

HUMAN POPULATION
Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

HUMBOLDT RIVER (NEV)
An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

HUMIC ACIDS
Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

HUMIC ACIDS

Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

HUMIC SUBSTANCES
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

HURRICANES
River Flow Increases in Central New England After the Hurricane of 1938,
W75-05720 2E

HYDRAULIC CONDUCTIVITY
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

HYDRAULIC MODELS
Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

HYDROBIOLOGICAL STUDIES
Hydrobiological and Ichthyological Studies on the Coastal Lakes Tasaul and Gargalic in View of Their Use for Fish Management, (In Rumanian),
W75-05495 8I

HYDRODYNAMICS
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

HYDROGASIFICATION
Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

HYDROGEN FLUORIDE
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

HYDROGEOLOGY
Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

HYDROGRAPHS
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

HYDROLOGIC EQUATION
Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

Derivation of a Three Dimensional Numerical Water Quality Model for Estuary and Continental Shelf Application,
W75-05738 5B

HYDROLOGY
Geology and Ground Water Resources of Sussex County and the Warren County Portion of the Tocks Island Impact Area,
W75-05513 4B

HYDROLYSIS
Effect of Temperature on the Mineralization of Organic Phosphorus Compounds by Certain Aquatic Bacteria,
W75-05745 5C

HYDROTHERMAL STUDIES
Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

ICE
The Measurement of Vertical Strain in Glacier Bore Holes,
W75-05674 7B

Froude Criterion for Ice-Block Stability,
W75-05677 2C

Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

ICE-BLOCK STABILITY
Froude Criterion for Ice-Block Stability,
W75-05677 2C

ICE COVER
Froude Criterion for Ice-Block Stability,
W75-05677 2C

ICHTHYOLOGICAL STUDIES
Hydrobiological and Ichthyological Studies on the Coastal Lakes Tasaul and Gargalic in View of Their Use for Fish Management, (In Rumanian),
W75-05495 8I

IDAHO
Chemical and Physical Data for Disposal Wells, Eastern Snake River Plain, Idaho,
W75-05632 5B

Techniques for Determining Amounts and Distribution of Precipitation in Mountain Valleys of Idaho,
W75-05783 2B

IDAHO BATHOLITH
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

ILLINOIS
Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
W75-05461 5G

Infiltration Smoked-Out,
W75-05541 8G

Regional Wastewater Management: A Water Quality Evaluation of System Centralization,
W75-05775 5D

IMPLICIT METHOD
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

IMPOUNDMENTS
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

INCOME
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

INDIA
Aquifer Tests in Large Diameter Wells in India,
W75-05501 4B

INDIA (KASHMIR)
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

INDIANA
Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

A Manual for Estimating the Magnitude and Frequency of Floods on Ungaged Streams in Indiana,
W75-05645 4A

A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

INDICATION
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

INDUCED INFILTRATION
The Rise of Porous Paving.
W75-05423 8A

INDUSTRIAL EFFLUENTS
Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

INDUSTRIAL WASTES
Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 5B

Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

Transport Mechanisms of Lead Industrial Wastes,
W75-05486 5B

Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5D

Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

Asbestos Removal Systems Perfected,
W75-05543 5D

A Close Look at London's Waters,
W75-05550 5D

The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

Industrial Source Sampling for Trace Metals,
W75-05575 5A

Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

INDUSTRIAL WATER
Industrial Water Pretreatment,
W75-05695 5D

INFILTRATION
Removal of Cations from Leachate by Interaction with Subsurface Soils,
W75-05589 5G

Experiments of Infiltration with Air Effects in a Vertical Rectangular Slab of Soil,
W75-05777 2G

Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

INFLOW
Modeling Inflows into Stratified Lakes with Vertical Scale Distortion,
W75-05448 2H

INFORMATION EXCHANGE
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

INFORMATION RETRIEVAL
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

Wamis Abstracts, No. 1,
W75-05767 10A

INFRARED IMAGERY
An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

INFRARED RADIATION
An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

INJECTION WELLS
Treated Effluent Goes 'Underground',
W75-05544 5D

INLAND WATERWAYS
Commercial Navigation on the Upper Mississippi River: An Economic Review of Its Development and Public Policy Issues Affecting Minnesota,
W75-05353 4A

INSTITUTIONAL CONSTRAINTS
Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

INSTITUTIONS
Understanding the Water Resources Research Center, Graduate School, University of Minnesota,
W75-05443 6E

INSTRUMENTATION
Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

Problems with the use of Cascade Impactors,
W75-05574 5A

The Measurement of Vertical Strain in Glacier Bore Holes,
W75-05674 7B

Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

Literature Survey of Instrumental Measurements of Biochemical Oxygen Demand for Control Application 1960-1973,
W75-05753 5D

Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

INTANGIBLE BENEFITS
Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

INTENSITY
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

INTERCEPTION
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

INVENTORY MODELS
Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

INVERTEBRATES
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

IODINE
Significance of Stable Iodine-127 in Milk,
W75-05373 5B

ION EXCHANGE
Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

Acid Mine Drainage Water Made Fit to Drink,
W75-05688 5D

IOWA
The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

Summary of Multispectral Flood Inundation Mapping in Iowa,
W75-05639 7C

Flood of August 2, 1972, in the Littel Maquoketa River Basin, Dubuque County, Iowa,
W75-05648 2E

IRON
Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
W75-05696 5C

Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

Iron Absorption by Humans from Veal Liver,
W75-05706 5C

IRON OXIDES
The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

IRRIGATED LAND
Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

IRRIGATION
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

IRRIGATION EFFECTS
Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

IRRIGATION WATER
Davis County Comprehensive Study: Culinary Water, Pressure Irrigation Water, Sanitary Sewerage.
W75-05418 3F

Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

ISOTROPY
Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

ISRAEL (NEGEV DESERT)
Multivariate Analysis of Desert Vegetation III. the Relation of Vegetation Units to Habitat Classes,
W75-05698 2I

ITALY
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

JAPAN
Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

Bibliography on Published Papers of the Atomic Bomb Casualty Commission.
W75-05367 5C

Flocculants Flourishing.
W75-05561 5D

JAPANESE QUAIL
Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

JETS
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

JUNIPER TREES
Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

KANSAS
Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

KARST HYDROLOGY
Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

KENTUCKY
Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky,
W75-05598 5C

Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

KENTUCKY RIVER
Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

KEZAR LAKE (NH)
Some Ecological Effects of Artificial Circulation on a Small Eutrophic Lake with Particular Emphasis on Phytoplankton. 1. Kezar Lake Experiment, 1968,
W75-05609 5C

KINETICS
Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

KOLAHOI GLACIER (INDIA)
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

LABORATORY ANIMALS
Effect of Zinc Repletion Late in Gestation on Parturition in the Zinc-Deficient Rat,
W75-05708 5C

LABORATORY EQUIPMENT
Description of a New Waste Water Analyzer for Laboratories (Respirometer) (In Hungarian),
W75-05398 5A

LABORATORY TESTS
Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

Effect of Zinc Repletion Late in Gestation on Parturition in the Zinc-Deficient Rat,
W75-05708 5C

LAGOONS
The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

LAKE CHAD
Qualitative Study of the Nutrition of Alestes Baremoze (Pisces, Characidae),
W75-05512 2I

LAKE ERIE
Chlorides in Lake Erie Basin,
W75-05355 5B

LAKE MARION (S.C.)
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

LAKE MICHIGAN
Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

Nearshore Zooplankton of Southeastern Lake Michigan, 1972,
W75-05761 5C

LAKE MICHIGAN AQUIFER
Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

LAKE MODELS
Modeling Inflows into Stratified Lakes with Vertical Scale Distortion,
W75-05448 2H

Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

LAKE MORPHOLOGY
Careful Renewal of a Campus Loch,
W75-05426 5G

Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

LAKE MORPHOMETRY
Careful Renewal of a Campus Loch,
W75-05426 5G

Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

LAKE MOULTRIE (S.C.)
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

LAKE OKEECHOBEE (FLA)
Chemical and Biological Conditions of Lake Okeechobee, Florida, 1969-72,
W75-05634 5C

LAKE RESTORATION
Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

LAKE SEDIMENTS
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W75-05689 2H

Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

LAKE SEVAN (ARMENIA)
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

LAKE SUPERIOR
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

LAKES
Modeling of Particulates in Gary, Indiana Area
W75-05586 5I

Some Ecological Effects of Artificial Circula tion on a Small Eutrophic Lake with Particula Emphasis on Phytoplankton. 1. Kezar Lake Ex periment, 1968,
W75-05609 5

Chemical and Biological Conditions of Lak Okeechobee, Florida, 1969-72,
W75-05634 5

Report on Moosehead Lake, Piscataquis an Somerset Counties, Maine.
W75-05728 5

Report on Estes Lake, York County, Maine.
W75-05729 5

Report on Long Lake, Cumberland Count Maine.
W75-05730 5

Report on Bay of Naples and Sebago Lak Cumberland County, Maine,
W75-05731

Report on Rangeley Lake, Franklin Coun Maine,
W75-05732

Report on Long Lake, Aroostook Coun Maine,
W75-05733

Report on Mattawamkeag Lake, Aroosto County, Maine,
W75-05734

A Mathematical Modelling of Lake Ecologi Systems,
W75-05744

Benthos Production of a High-Mountain Lake: Nematoda,
W75-05746 5C

On the Space/Time Scale Questions in Limnological Systems Analysis,
W75-05794 5C

A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

LAND CLASSIFICATION
Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

LAND DEVELOPMENT
The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

The Biological Impact of Residential Real Estate Developments in the South Florida Coastal Wetlands.
W75-05752 5C

The Effects of Drainage and Associated Development in the Big Cypress Swamp,
W75-05807 6G

LAND DISPOSAL
Protesting Pollution.
W75-05560 5D

LAND MANAGEMENT
A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

Wamis Abstracts, No. 1,
W75-05767 10A

LAND SUBSIDENCE
Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

Management of Subsiding Lands: An Economic Evaluation,
W75-05765 4B

LAND-USE
Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

LAND VALUES
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

LANDFILLS
Aerobic Biostabilization of Sanitary Landfill Leachate,
W75-05507 5D

Transpiration Drying of Sanitary Landfills,
W75-05523 5E

Removal of Cations from Leachate by Interaction with Subsurface Soils,
W75-05589 5G

LANDSCAPE AESTHETICS
Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

LANDSCAPING
Smoother Waters for the Next 110,000,
W75-05427 8A

LARGEMOUTH BASS
Ohio Biological Survey Biological Notes No. 6. Effects of Ecological Changes on Buckeye Lake, Ohio, with Emphasis on Largemouth Bass and Aquatic Vascular Plants,
W75-05505 5C

LEACHATE
Aerobic Biostabilization of Sanitary Landfill Leachate,
W75-05507 5D

Transpiration Drying of Sanitary Landfills,
W75-05523 5E

Removal of Cations from Leachate by Interaction with Subsurface Soils,
W75-05589 5G

LEACHING
Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

LEAD
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

Transport Mechanisms of Lead Industry Wastes,
W75-05486 5B

Tri-University Report on the Status of Environmental Contamination by Lead,
W75-05567 5B

Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

LEAF WATER POTENTIAL
Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

LEAVES
A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

LEECHES
The Life Cycle and Production of the Leach Eropobdella Octoculata (L.) (Hirudinea: Eropobdellidae) in Lake District Stream,
W75-05480 2H

The Diel Activity Pattern, Drifting and Food of the Leech Erpobdella Octoculata (I.) (Hirudinea: Erpobdellidae) in a Lake District Stream,
W75-05498 2H

LEGAL ASPECTS
Disposal of Hazardous Wastes,
W75-05504 5G

Technological Limitations to Ground-Water Management,
W75-05510 6E

LEGISLATION
Connecticut Water Law: Summary and Index of Statutes,
W75-05437 6E

LEMNA MINOR L
The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

LEOPOLD MATRIX
Planning the Development of Water Resources,
W75-05832 6B

LIFE CYCLES
The Life Cycle and Production of the Leach Eropobdella Octoculata (L.) (Hirudinea: Eropobdellidae) in Lake District Stream,
W75-05480 2H

LIME
Lime Retention in Anthracite Coal-Breaker Refuse,
W75-05496 4D

LIMESTONE
Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

LIMESTONES
Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

LIMNOLOGY
Careful Renewal of a Campus Loch,
W75-05426 5G

Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

Chemical and Biological Conditions of Lake Okeechobee, Florida, 1969-72,
W75-05634 5C

LINEAR PROGRAMMING
A Computerized Model for Determining the Optimal Water Utilization for Agriculture,
W75-05356 6A

A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

LIQUID WASTES
Liquid Purification Apparatus and Process,
W75-05552 5D

Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

LIQUIDS
Quarterly Progress Report: Research and Development Activities, Waste Fixation Program, April Through June 1974,
W75-05393 5D

LITHIUM
Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

LITHOSPHERE
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

LITTLE MAQUOKETA RIVER BASIN (IOWA)
Flood of August 2, 1972, in the Littel Maquoketa River Basin, Dubuque County, Iowa,
W75-05648 2E

LITTLE MIAMI RIVER (NJ)
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

LOBSTERS
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

LOGGING (RECORDING)
A Theoretical Study on the Interpretation of Resistivity Sounding Data Measured by the Wenner Electrode System,
W75-05618 8G

LONG ISLAND (NY)
Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

LONG ISLAND SOUND
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

LONG LAKE (MAINE)
Report on Long Lake, Cumberland County, Maine.
W75-05730 5C

LONG LAKE (ME)
Report on Long Lake, Aroostook County, Maine,
W75-05733 5C

LOS ALAMOS (NM)
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

LOUISIANA
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

LOW FLOW
Combining Estimates of Low-Flow Characteristics of Streams in Massachusetts and Rhode Island,
W75-05629 2E

LOXAHATCHEE NATL. WILDLIFE REFUGE (FLA)
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

LUMBERING
An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada,
W75-05500 5C

Erosion Control on Logging Roads in the Appalachians,
W75-05713 2J

LYSIMETERS
A Procedure for Placing Large Undistrubed Monoliths in Lysimeters,
W75-05517 2G

MAGNESIUM
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

MAINE
Report on Moosehead Lake, Piscataquis and Somerset Counties, Maine.
W75-05728 5C

Report on Estes Lake, York County, Maine.
W75-05729 5C

Report on Long Lake, Cumberland County, Maine.
W75-05730 5C

Report on Bay of Naples and Sebago Lake, Cumberland County, Maine,
W75-05731 5C

Report on Rangeley Lake, Franklin County, Maine,
W75-05732 5C

Report on Long Lake, Aroostook County, Maine,
W75-05733 5C

MAMMALS
Cadmium and Zinc Binding in Mammalian Liver and Kidneys,
W75-05485 5A

Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

MANAGEMENT
Quarterly Progress Report: Research and Development Activities, Waste Fixation Program, April Through June 1974,
W75-05393 5D

Technological Limitations to Ground-Water Management,
W75-05510 6E

Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5E

Valuation of a Ground-Water Supply fo Management and Development,
W75-05613 4E

A Mathematical Modelling of Lake Ecologic Systems,
W75-05744 5

Management of Subsiding Lands: A Economic Evaluation,
W75-05765 4

MANGANESE
The Scavenging of Silver by Manganese a Iron Oxides in Stream Sediments Collect from Two Drainage Areas of Colorado,
W75-05652

Manganese Nodules (II): Prospects for De Sea Mining,
W75-05690

Genetic Influence on Response to Dietary Ma ganese Deficiency in Mice,
W75-05692

MAPPING
Summary of Multispectral Flood Inundati Mapping in Iowa,
W75-05639

Remote Sensing as a Vegetation Mapping T in the Proposed Charleston Dam Site Area,
W75-05722

MAPS
Marine Atlas of Hawaii: Bays and Harbors.
W75-05665

MARAMEC SPRING (MO)
Norman Creek, a Source of Recharge Maramec Spring, Phelps County, Missouri,
W75-05627

MARINE ALGAE
Experimental Study of the Accumulation Silver 110M in Various Marine Organis (Etude Experimentale De L'Accumulation L'argent 110M Chez Divers Organis Marins),
W75-05711

MARINE ANIMALS
Experimental Study of the Accumulation Silver 110M in Various Marine Organis (Etude Experimentale De L'Accumulation L'argent 110M Chez Divers Organis Marins),
W75-05711

MARINE GEOLOGY
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

MARKET VALUE
Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

MARSHES
Assessing the Capability of the Everglades Marsh Environment for Renovating Wastewater,
W75-05743 5D

MARYLAND
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

Sedimentary Facies of the Aquia Formation in the Subsurface of the Maryland Coastal Plain,
W75-05638 2F

MASS
Derivation of a Three Dimensional Numerical Water Quality Model for Estuary and Continental Shelf Application,
W75-05738 5B

MASS TRANSPORT MODEL
Derivation of a Three Dimensional Numerical Water Quality Model for Estuary and Continental Shelf Application,
W75-05738 5B

MASSACHUSETTS
Combining Estimates of Low-Flow Characteristics of Streams in Massachusetts and Rhode Island,
W75-05629 2E

MATHEMATICAL MODELS
A Computerized Model for Determining the Optimal Water Utilization for Agriculture,
W75-05356 6A

Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

Study of Fluid Movements Through Causeway,
W75-05610 2F

Pressure Buildup and Drawdown Behavior in Undersaturated Reservoirs of Discontinuous Permeability,
W75-05617 4B

Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

Derivation of a Three Dimensional Numerical Water Quality Model for Estuary and Continental Shelf Application,
W75-05738 5B

A Mathematical Modelling of Lake Ecological Systems,
W75-05744 5C

Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

On the Space/Time Scale Questions in Limnological Systems Analysis,
W75-05794 5C

A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

Preliminary Model of Potomac Estuary Phytoplankton,
W75-05798 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

MATHEMATICAL STUDIES
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

Froude Criterion for Ice-Block Stability,
W75-05677 2C

Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

MATTAWAMKEAG LAKE (ME)
Report on Mattawamkeag Lake, Aroostook County, Maine,
W75-05734 5C

MAYFLIES
Mayfly Larvae in Current Habitats of Bela Creek (The Northwestern Part of Moravia, Czechoslovakia).
W75-05687 2E

MAYORELLA OCLAWAHA
The Vital Role of Protozoa in Mobile Bay,
W75-05525 2L

MEANDERS
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

MEASUREMENT
Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

MEDITERRANEAN BASIN (WESTERN AREA)
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

MELT WATER
Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

MEMBRANE PROCESSES
4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

MERCURY
Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

Measurements of Mercury Sorption by Algae,
W75-05415 5A

Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

Influence of Salinity and Temperature on the Toxicity of Mercury to Marine and Brackish Water Isopods (Crustacea),
W75-05420 5C

Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

Mercury, Cadmium, and Chromium in the Netherlands, (Le Mercure, Le Cadmium Et Le Chrome Aux Pays-Bas),
W75-05710 5B

MERETTA LAKE (CORNWALLIS ISLAND)
Eutrophication in the High Arctic--Meretta Lake, Cornwallis Island (75 Degree N Lat.),
W75-05799 5C

MERRIMACK RIVER
River Flow Increases in Central New England After the Hurricane of 1938,
W75-05720 2E

METABOLISM
The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

Drought Adaptation in Opuntia Basilaris: Significance of Recycling Carbon Through Crassulacean Acid Metabolism,
W75-05547 2I

Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

METALS
Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

METALS

Comparison of Continuous Wave and Pulsed Continuum Sources for Atomic Fluorescence Flame Spectrometry,
W75-05489 5A

Relative Toxicities of Selenite and Selenate in the Drinking Water of Rats,
W75-05490 5C

Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

METEOROGICAL DATA

Tables and Conversions for Microclimatology,
W75-05717 7C

METEOROLOGY

Tables and Conversions for Microclimatology,
W75-05717 7C

METHODOLOGY

Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

METHYLATION

Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

METHYLMERCURY

Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

MEXICO

Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

MIAMI (FLA)

Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida,
W75-05633 2F

MICROBIAL DEGRADATION

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

MICROBIAL POPULATIONS

The Effect of a Municipal Effluent on the Microbial Populations of the Willimantic/Shetucket Rivers,
W75-05438 5C

MICROBIOLOGICAL STUDIES

Direct Photometric Determination of Soluble Proteins in Natural Waters, (In Russian),
W75-05409 2K

MICROBIOLOGY

Microbiology of Water, (Literature Review),
W75-05400 5B

MICROCLIMATOLOGY

Tables and Conversions for Microclimatology,
W75-05717 7C

The Microclimates of the Arctic Tundra,
W75-05830 2C

MICROORGANISMS

Microbiology of Water, (Literature Review),
W75-05400 5B

Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

The Role of Microorganisms in Eco-Toxicology,
W75-05760 5C

MIGRATORY BIRDS

The Relationship Between Waterfowl and Nitrogen Species in the Waters of the Bosque Del Apache,
W75-05469 5B

MINE ACIDS

Acid Mine Drainage Water Made Fit to Drink,
W75-05688 5D

MINE WASTES

Lime Retention in Anthracite Coal-Breaker Refuse,
W75-05496 4D

Performance of Red Pine and Japanese Larch Planted on Anthracite Coal-Breaker Refuse,
W75-05597 4D

MINERAL WATER

Application of the Aleksandra Mineral Water from Wysowa and its Salt Tablets in the Treatment of Duodenal Ulcers, (In Polish),
W75-05712 6D

MINERALOGY

Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

MINING

Transport Mechanisms of Lead Industry Wastes,
W75-05486 5B

Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

Acid Mine Drainage Water Made Fit to Drink,
W75-05688 5D

Manganese Nodules (II): Prospects for Deep Sea Mining,
W75-05690 5B

MINING WASTES

Manganese Nodules (II): Prospects for Deep Sea Mining,
W75-05690 5B

MINNESOTA

Digest of Energy Facts for Water Resour
Studies in Minnesota,
W75-05352

Commercial Navigation on the Upper Miss
sippi River: An Economic Review of
Development and Public Policy Issues Affe
ing Minnesota,
W75-05353

The Response of Nearshore Periphyton
Western Lake Superior to Thermal Addition
W75-05354

Tenth Annual Report Water Resour
Research Center,
W75-05439

Use of Thermally Enriched Water for Grow
Field Crops in Minnesota,
W75-05440

Understanding the Water Resources Rese
Center, Graduate School, University of
nesota,
W75-05443

Use of Waste Heat for Soil Warming and
rigation in Northern Climates,
W75-05444

Aquatic Plants from Minnesota, Part
Digestibility and Fermentation of Aq
Plants,
W75-05466

Information Concerning Water Resou
Research Center Projects, 1964-1974,
W75-05467

Commercial Navigation on the Upper M
sippi: Economic and Environmental Choic
W75-05788

MISSISSIPPI RIVER

Commercial Navigation on the Upper M
sippi River: An Economic Review o
Development and Public Policy Issues A
ing Minnesota,
W75-05353

Commercial Navigation on the Upper M
sippi: Economic and Environmental Choic
W75-05788

MISSOURI

Transport Mechanisms of Lead In
Wastes,
W75-05486

Norman Creek, a Source of Rechar
Maramec Spring, Phelps County, Missou
W75-05627

MIXING

Some Ecological Effects of Artificial C
tion on a Small Eutrophic Lake with Par
Emphasis on Phytoplankton. 1. Kezar La
periment, 1968,
W75-05609

MOBILE BAY (ALA)

The Vital Role of Protozoa in Mobile Bay
W75-05525

MODEL STUDIES

The Three Dimensional Heated Surface
Cross Flow,
W75-05360

Analytical Modeling of Thermal Discha
Review of the State of the Art,
W75-05370

Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

Modeling Inflows into Stratified Lakes with Vertical Scale Distortion,
W75-05448 2H

Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

Groundwater Models for Texas,
W75-05508 2F

Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

Problems with Modeling Transport and Biological Translocation,
W75-05568 5B

Overview of a Unified Transport Model,
W75-05569 5B

A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

MOISTURE CONTENT
Moisture and Density Relations on Graded Strip-Mine Spoils,
W75-05592 4C

MOISTURE DEFICIT
The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

MOISTURE UPTAKE
Transpiration Drying of Sanitary Landfills,
W75-05523 5E

MOLECULAR STRUCTURE
Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

MOLLUSKS
Ecologic and Adaptive Aspects of Some Bivalves of The Sao Paulo Seacoast, (In Portuguese),
W75-05714 2L

MOLYBDENUM
Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5B

MONITORING
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

Radiation Data: Section II. Water.
W75-05374 5A

Environmental Levels of Radioactivity at Atomic Energy Commission Istallation,
W75-05375 5A

Radiation Data. Section II. Water,
W75-05377 5A

Radiation Data. Section IV. Other data. Environmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

Electronic Identification and Temperature Monitoring,
W75-05381 7B

Automated Monitoring of Recovered Water Quality,
W75-05545 5A

Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

MOOSEHEAD LAKE (MAINE)
Report on Moosehead Lake, Piscataquis and Somerset Counties, Maine.
W75-05728 5C

MOSQUITO LAGOON (FLA)
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

MT. BAKER (WASH)
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

MULTI-VARIATE ANALYSIS
Multivariate Analysis of Desert Vegetation III. the Relation of Vegetation Units to Habitat Classes,
W75-05698 2I

MULTIPLE-PURPOSE RESERVOIRS
Drainage Plans with Environmental Benefits.
W75-05422 8A

MUNICIPAL WASTES
Sewage Treatment Division Report, 1970-1971-1972, City of Eugene (Oregon).
W75-05429 5D

The Effect of a Municipal Effluent on the Microbial Populations of the Williamantic/Shetucket Rivers,
W75-05438 5C

Industrial Source Sampling for Trace Metals,
W75-05575 5A

MUNICIPAL WATER
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

MUSQUODOBOIT HARBOUR (NOVA SCOTIA)
A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

MUSQUODOBOIT RIVER (NOVA SCOTIA)
Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

NAVAL ARCHITECTURE
Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

NAVIGATION
Commercial Navigation on the Upper Mississippi River: An Economic Review of Its Development and Public Policy Issues Affecting Minnesota,
W75-05353 4A

Commercial Navigation on the Upper Mississippi: Economic and Environmental Choices,
W75-05788 6E

NEMATODES
Benthos Production of a High-Mountain Lake: Nematoda,
W75-05746 5C

NETHERLANDS
Mercury, Cadmium, and Chromium in the Netherlands, (Le Mercure, Le Cadmium Et Le Chrome Aux Pays-Bas),
W75-05710 5B

NETWORK DESIGN
Optimum Design of Mountainous Raingage Networks Using Bayesian Decision Theory,
W75-05524 2B

NEUTRALIZATION
Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

NEVADA
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

Valuation of a Ground-Water Supply for Management and Development,
W75-05613 4B

NEVADA AEC TEST SITE
Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

NEW ENGLAND
River Flow Increases in Central New England After the Hurricane of 1938,
W75-05720 2E

NEW HAMPSHIRE
Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

Some Ecological Effects of Artificial Circulation on a Small Eutrophic Lake with Particular Emphasis on Phytoplankton. 1. Kezar Lake Experiment, 1968,
W75-05609 5C

NEW JERSEY
Geology and Ground Water Resources of Sussex County and the Warren County Portion of the Tocks Island Impact Area,
W75-05513 4B

Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

Nitrification Effects in Waste Treatment Processes,
W75-05661 5D

Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

NEW MEXICO
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

The Relationship Between Waterfowl and Nitrogen Species in the Waters of the Bosque Del Apache,
W75-05469 5B

Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

NEW TOWN
Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

NEW YORK
Chlorides in Lake Erie Basin,
W75-05355 5B

The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

Evaporative Water Loss from Large Land Areas in the Finger Lakes,
W75-05532 2D

Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

Flood-Flow Characteristics of the Chenango River at Proposed Interstate Highway in Towns of Fenton and Chenango, Broome County, New York,
W75-05655 4A

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

Control of Water Chestnut with 2,4-D Amine.
W75-05806 4A

NEW YORK HARBOR
A Technique for Predicting the Movement of Oil Spills in New York Harbor,
W75-05668 5B

NEW ZEALAND
The Relation Between Primary Productivit
Nutrients, and the Trout Environment in Son
New Zealand Lakes,
W75-05419 5

The Estimation of Soil Moisture Deficits
Penman's and Thornthwaite's Method in M
Canterbury,
W75-05831 2

NEW ZEALAND (OTAGO)
Random and Systematic Errors in Precipitati
at an Exposed Site,
W75-05845

NICKEL
Flameless Atomic Absorption Determination
Cobalt Nickel, and Copper - A Comparison
Tantalum and Molybdenum Evaporation S
faces,
W75-05487

Characterization of Cadmium and Nickel C
taminated Sediments from Foundry Cove, N
York,
W75-05579

Life-Term Effects of Nickel in Rats: Survi
Tumors, Interactions with Trace Elements
Tissue Levels,
W75-05691

Spectropolarimetric Determination of Co
(II), Nickel (II) and Iron (III) Ions with N-
boxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704

NITRATES
Nitrate Movement in Soil Under Early Sp
Conditions,
W75-05457

Diel Periodicity in Uptake of Nitrate
Nitrite by Reservoir Plankton,
W75-05739

Analysis of the Yield-Determining Process
its Application to Yield Prediction and Cu
Improvement of Lowland Rice: CXIV. O
Increase of Nitrate Nitrogen Utilization
at the Tillering Stage of Rice Plants
Japanese),
W75-05849

NITRIFICATION
Instream Aeration and Parameters of St
and Estuarine Nitrification,
W75-05530

The Detection and Study of Nitrificati
Streams and Estuaries,
W75-05659

Nitrification Effects in Waste Trea
Processes,
W75-05661

Distribution of Autotrophic Nitrifying Ba
in the Passaic River,
W75-05663

An Experiment in the Eutrophication o
restrial Ecosystems with Sewage: Evide
Nitrification in a Late Successional Fores
W75-05804

NITRIFYING BACTERIA
Distribution of Autotrophic Nitrifying B
in the Passaic River,
W75-05663

NITRITES
Diel Periodicity in Uptake of Nitrate and Nitrite by Reservoir Plankton,
W75-05739 5C

NITROBACTER
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

NITROGEN
Multiplication of Algae in Sewage Water,
W75-05539 5G

Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

NITROGEN COMPOUNDS
The Relationship Between Waterfowl and Nitrogen Species in the Waters of the Bosque Del Apache,
W75-05469 5B

NITROGEN CYCLE
Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

NITROGENOUS OXYGEN DEMAND
Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

NITROSOMONAS
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

NON-RESIDENTIAL WATER USE
Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

NONPOLAR ANALOG MODELS
Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

NORTH CAROLINA
Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina,
W75-05715 2E

NUCELAR SUBMARINES
Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

NUCLEAR ENERGY
Radiation Data. Section IV. Other data. Environmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

NUCLEAR EXPLOSIONS
Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

Bibliography on Published Papers of the Atomic Bomb Casualty Commission.
W75-05367 5C

Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

NUCLEAR POWERPLANTS
Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

Radiation Data. Section IV. Other data. Environmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

Some Aspects of the Effects of Elevated Water Temperature on the Ramshorn Snail,
W75-05387 5C

Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

Nuclear Power Facility Performance Characteristics for Making Environmental Impact Assessments.
W75-05395 6G

NUCLEAR WASTES
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

NUMERICAL ANALYSIS
A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

NUTRIENT REMOVAL
Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

NUTRIENT REQUIREMENTS
Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

NUTRIENTS
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

The Relation Between Primary Productivity, Nutrients, and the Trout Environment in Some New Zealand Lakes,
W75-05419 5C

The Ecology of the Plankton of the Chesapeake Bay Estuary,
W75-05792 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

OCEANOGRAPHY
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

OCEANS
Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Manganese Nodules (II): Prospects for Deep Sea Mining,
W75-05690 5B

ODOR
Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organolepticheskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

OGALLALA FORMATION (KAN)
Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

OHIO
Ohio Biological Survey Biological Notes No. 6. Effects of Ecological Changes on Buckeye Lake, Ohio, with Emphasis on Largemouth Bass and Aquatic Vascular Plants,
W75-05505 5C

OIKOMONAS TERMO
The Vital Role of Protozoa in Mobile Bay,
W75-05525 2L

OIL POLLUTION
Tar Pollution Survey at Golden Beach, Florida,
W75-05667 5B

A Technique for Predicting the Movement of Oil Spills in New York Harbor,
W75-05668 5B

Evaluation Test of a Small Harbor Oil Spill Retrieval System,
W75-05669 5B

Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

Boat for Collecting Oil Slicks and Other Contaminants from the Surface of Water,
W75-05816 5G

Flexible Oil Boom,
W75-05824 5G

OIL SHALES
Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

OIL SPILLS
A Technique for Predicting the Movement of Oil Spills in New York Harbor,
W75-05668 5B

Evaluation Test of a Small Harbor Oil Spill Retrieval System,
W75-05669 5B

Boat for Collecting Oil Slicks and Other Contaminants from the Surface of Water,
W75-05816 5G

Flexible Oil Boom,
W75-05824 5G

OIL WASTES
Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

Removing Oil from Waste Water with Sulfur,
W75-05820 5D

Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

ON-SITE DATA COLLECTIONS
Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

OPEN CHANNEL FLOW
Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

Reverse Flow Routing by the Implicit Method,
W75-05675 2E

OPERATION AND MAINTENANCE
Sewage Treatment Division Report, 1970-1971-1972, City of Eugene (Oregon).
W75-05429 5D

OPTIMAL DEVELOPMENT PLANS
A Computerized Model for Determining the Optimal Water Utilization for Agriculture,
W75-05356 6A

OPTIMIZATION
Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

OPTIMUM DEVELOPMENT PLANS
A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

OPUNTIA-BASILARIS
Drought Adaptation in Opuntia Basilaris: Significance of Recycling Carbon Through Crassulacean Acid Metabolism,
W75-05547 2I

OREGON
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

ORGANIC COMPOUNDS
Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

ORGANIC MATTER
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

ORGANIC WASTES
Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

ORIFICES
Design of Culvert Fishways,
W75-05782 8I

OVERFLOW
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

OXIDATION LAGOONS
Design Criteria for Waste Stabilization Ponds,
W75-05559 5D

Liquid Treatment Apparatus,
W75-05826 5D

OXIDES
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

OXYGEN DEMAND
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

OZONE
Sewage Ozonizing Unit,
W75-05819 5D

PACIFIC OCEAN
Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2

PAMLICO RIVER (NC)
Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

PARASITE CONTROL
Stress of Formalin Treatment in Juvenile Spring Chinook Salmon (Oncorhynchus Tshawytscha) and Steelhead Trout (Salmo Gairdneri),
W75-05506 5C

PARKING LOTS
The Rise of Porous Paving.
W75-05423 8A

PARTICLE SIZE
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Problems with the use of Cascade Impactors,
W75-05574 5A

Characterizing Steel Mill Dust,
W75-05577 5A

PARTICLE TRANSPORT (PIPES)
Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

PASSAIC RIVER (NJ)
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Stochastic Modeling of the Passaic River Flow
W75-05660 2

Nitrification Effects in Waste Treatment Processes,
W75-05661 5D

Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5C

PASTURE MANAGEMENT
Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

PATENTS
Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

Method and Apparatus for Purifying Fluids,
W75-05551 5D

Liquid Purification Apparatus and Process,
W75-05552 5D

Discharge Device for a Vacuum Sewage System,
W75-05553 8C

Boat for Collecting Oil Slicks and Other Contaminants from the Surface of Water,
W75-05816 5G

Control Apparatus for a Water Supply System,
W75-05817 8C

Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

Sewage Ozonizing Unit,
W75-05819 5D

Removing Oil from Waste Water with Sulfur,
W75-05820 5D

Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed,
W75-05821 5D

Automatic Water Sampler,
W75-05822 5A

Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

Flexible Oil Boom,
W75-05824 5G

Floating Anti-Pollution Device,
W75-05825 5G

Liquid Treatment Apparatus,
W75-05826 5D

PATH OF POLLUTANTS

Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

Significance of Stable Iodine-127 in Milk,
W75-05373 5B

Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

Microbiology of Water, (Literature Review),
W75-05400 5B

Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

Transport Mechanisms of Lead Industry Wastes,
W75-05486 5B

Influence of Endrin on Soil Microbial Populations and their Activity,
W75-05497 5B

Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

Tri-University Report on the Status of Environmental Contamination by Lead,
W75-05567 5B

Problems with Modeling Transport and Biological Translocation,
W75-05568 5B

Overview of a Unified Transport Model,
W75-05569 5B

A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

PATHOLOGY

Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

Bibliography on Published Papers of the Atomic Bomb Casualty Commission.
W75-05367 5C

PAVING

The Rise of Porous Paving.
W75-05423 8A

The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

PEAK DISCHARGE

A Manual for Estimating the Magnitude and Frequency of Floods on Ungaged Streams in Indiana,
W75-05645 4A

Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina,
W75-05715 2E

PEARSON TYPE III DISTRIBUTION

Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error,
W75-05630 4A

PEAT

Peat Moss: An Alternative Adsorption Medium.
W75-05557 5D

PEAT MOSS

Peat Moss: An Alternative Adsorption Medium.
W75-05557 5D

PENMAN METHOD

The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

PENNSYLVANIA

Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

PERIPHYTON
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

PERMEABILITY
Pressure Buildup and Drawdown Behavior in Undersaturated Reservoirs of Discontinuous Permeability,
W75-05617 4B

PESTICIDE RESIDUES
Protection of the Environment from Contamination with Pesticides Used in Cotton Growing, (In Russian),
W75-05408 5G

Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

PESTICIDE TOXICITY
Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning,
W75-05402 5C

PESTICIDES
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

Influence of Endrin on Soil Microbial Populations and their Activity,
W75-05497 5B

PETROLOGY
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

PHOSPHORUS
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

Phosphorus Cycling in the Plankton of Chesapeake Bay,
W75-05736 5C

Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

Effect of Temperature on the Mineralization of Organic Phosphorus Compounds by Certain Aquatic Bacteria,
W75-05745 5C

Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

PHOTOGRAPHY
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

PHOTOMETRIC METHOD
Direct Photometric Determination of Soluble Proteins in Natural Waters, (In Russian),
W75-05409 2K

PHOTOSYNTHESIS
Phytoplankton Production in Char Lake, A Natural Polar Lake, and in Meretta Lake, A Polluted Polar Lake, Cornwallis Island, Northwest Territories,
W75-05396 5C

Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

PHOTOSYNTHETIC OXYGEN
Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

PHREATOPHYTES
Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

PHTOPLANKTON
Phytoplankton Production in Char Lake, A Natural Polar Lake, and in Meretta Lake, A Polluted Polar Lake, Cornwallis Island, Northwest Territories,
W75-05396 5C

PHYSICAL CHEMICAL TREATMENT
Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

Physical-Chemical Treatment at Elevated Temperatures,
W75-05763 5D

PHYSICAL PROPERTIES
Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

PHYSICOCHEMICAL PROPERTIES
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

PHYTOPLANKTION
A Phytoplankton Bloom in the Lagoon of Venice,
W75-05699 2L

PHYTOPLANKTON
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

Phytoplankton and Primary Production of a High Lake in the Pyrenees: A Fractorial Analysis of 'Correspondences' Applied to Data from Lake Port-Bielh. (In French),
W75-05622 2H

Hydrology and Phytoplankton of a Continental Shelf Transect of Campeche Bay, Mexico (August, 1972). (In Spanish),
W75-05673 2L

Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

Preliminary Model of Potomac Estuary Phytoplankton,
W75-05798 5C

The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

Pond Phytoplankton of the Tedzhen Fish-Breeding Farm. (In Russian),
W75-05850 2H

PICEANCE BASIN (COLO)
Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

PINE TREES
Genetic Variability in Survival and Growth of Virginia Pine Planted on Acid Surface-Mine Spoil,
W75-05594 4D

Performance of Red Pine and Japanese Larch Planted on Anthracite Coal-Breaker Refuse,
W75-05597 4D

PIPE FLOW
Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

PIPELINES
Infiltration Smoked-Out,
W75-05541 8G

PLANKTON
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

Number, Biomass and Production of Planktonic Bacteria in the Shallow Lake Balaton,
W75-05719 2H

Ingestion and Assimilation Rates of Chesapeake Bay Zooplankton: Preliminary Report,
W75-05735 5C

Plankton Development During the First Years of Inundation of the Van Blommestein (Brokopondo) Reservoir in Suriname, S. America,
W75-05754 5C

PLANNING
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

PLANT BREEDING
Genetic Variability in Survival and Growth of Virginia Pine Planted on Acid Surface-Mine Spoil,
W75-05594 4D

PLANT GROWTH
Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

PLANT PHYSIOLOGY
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

PLANT POPULATIONS
Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

PLANT TISSUES
Cadmium in Plants,
W75-05709 2I

PLANTING MANAGEMENT
Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

PLATTE RIVER BASIN (WYO)
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

PLESITOCENE
Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

PLUTONIUM
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

POLAND
Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

POLAROGRAPHIC ANALYSIS
Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

POLLUTANT IDENTIFICATION
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

Description of a New Waste Water Analyzer for Laboratories (Respirometer) (In Hungarian),
W75-05398 5A

Microbiology of Water, (Literature Review),
W75-05400 5B

Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

Measurements of Mercury Sorption by Algae,
W75-05415 5A

A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

Cadmium and Zinc Binding in Mammalian Liver and Kidneys,
W75-05485 5A

Flameless Atomic Absorption Determination of Cobalt Nickel, and Copper - A Comparison of Tantalum and Molybdenum Evaporation Surfaces,
W75-05487 5A

Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

Comparison of Continuous Wave and Pulsed Continuum Sources for Atomic Fluorescence Flame Spectrometry,
W75-05489 5A

Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

Automated Monitoring of Recovered Water Quality,
W75-05545 5A

Developing Water Sampling Standards.
W75-05555 5A

Industrial Source Sampling for Trace Metals,
W75-05575 5A

Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

Characterizing Steel Mill Dust,
W75-05577 5A

Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

Cadmium in Plants,
W75-05709 2I

Experimental Study of the Accumulation of Silver 110M in Various Marine Organisms, (Etude Experimentale De L'Accumulation de L'argent 110M Chez Divers Organismes Marins),
W75-05711 5A

Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organolepticheskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

How to Read a Fish Kill,
W75-05812 5A

Automatic Water Sampler,
W75-05822 5A

Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

POLLUTANTS
A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

POLLUTION ABATEMENT
Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

Transport Mechanisms of Lead Industry Wastes,
W75-05486 5B

A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

Recommendations of the Galveston Bay Enforcement Conference.
W75-05801 5C

Boat for Collecting Oil Slicks and Other Contaminants from the Surface of Water,
W75-05816 5G

Flexible Oil Boom,
W75-05824 5G

Floating Anti-Pollution Device,
W75-05825 5G

Liquid Treatment Apparatus,
W75-05826 5D

POLLUTION DETECTION
Automatic Water Sampler,
W75-05822 5A

Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

POLYELECTROLYTES
Sewage Sludge Centrifuging Gets Scottish OK.
W75-05562 5D

PONDEROSA PINE TREES
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

PONDING
Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

Ponding Against the Storm,
W75-05425 8A

Experiments of Infiltration with Air Effects in a Vertical Rectangular Slab of Soil,
W75-05777 2G

PONDS
The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

POOLS
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

PORE WATER
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

POROSITY
Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

POROUS ASPHALT
The Rise of Porous Paving.
W75-05423 8A

POTABLE WATER
Relative Toxicities of Selenite and Selenate in the Drinking Water of Rats,
W75-05490 5C

Asbestos Removal Systems Perfected,
W75-05543 5D

Automated Monitoring of Recovered Water Quality,
W75-05545 5A

Acid Mine Drainage Water Made Fit to Drink,
W75-05688 5D

Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

POTASSIUM
Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

POTATOES
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

POTOMAC RIVER
Preliminary Model of Potomac Estuary Phytoplankton,
W75-05798 5C

POULTRY
Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

POULTRY FEED
Multiplication of Algae in Sewage Water,
W75-05539 5G

POWER PLANTS
Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

POWERPLANTS
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

PRE-TREATMENT
The Effect of Chemical Water Treatmen Technology on the Efficiency of Filter (Vliyaniye tekhnologii reagentnoy obrabotk vody na effektivnost' raboty fil'trov),
W75-05815 5I

PRECIPITATION (ATMOSPHERIC)
The Analysis of Monthly Hydrologic Time Se ries,
W75-05436 2I

Heavy Metal Concentrations and Deposition i Bulk Precipitation in Montane Ecosystems o New Hampshire,
W75-05509 5I

Random and Systematic Errors in Precipitatio at an Exposed Site,
W75-05845 2

PRECIPITATION DISTRIBUTION
Techniques for Determining Amounts and Di tribution of Precipitation in Mountain Valley of Idaho,
W75-05783 2

PRECIPITATION GAGES
Techniques for Determining Amounts and Di tribution of Precipitation in Mountain Valley of Idaho,
W75-05783 2

PRESSURE
Pressure Buildup and Drawdown Behavior Undersaturated Reservoirs of Discontinuou Permeability,
W75-05617 4

PRETREATMENT (WATER)
Industrial Water Pretreatment,
W75-05695 5

PRIMARY PRODUCTIVITY
The Relation Between Primary Productivit Nutrients, and the Trout Environment in Som New Zealand Lakes,
W75-05419 5

Phytoplankton and Primary Production of High Lake in the Pyrenees: A Fractorial Anal sis of 'Correspondences' Applied to Data fro Lake Port-Bielh. (In French),
W75-05622 2

Phytobenthos and Primary Production of High Mountain Lake in the Central Pyrenee (In French),
W75-05672 2

Number, Biomass and Production of Plan tonic Bacteria in the Shallow Lake Balaton,
W75-05719 2

Vertical Patterns of Primary Productivity Castle Lake, California,
W75-05755 5

The Ecology of the Plankton of the Chesapeal Bay Estuary,
W75-05792 5

PRIORITIES
New Priorities for Ground-Water Quality Pr tection,
W75-05827 5

PROBABILITY
Evaluation of Flood Peak Prediction Metho in Northern Nevada in Relation to Dam Safet
W75-05468 8

PROBABILITY MODELS
Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

PROBABLE MAXIMUM PRECIPITATION
Combined Use of Satellite, Radar, and Aerosynoptic Information for Forecasting Heavy Precipitation, Taking the Snowfall of October 14-16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

PRODUCTIVITY
Benthos Production of a High-Mountain Lake: Nematoda,
W75-05746 5C

Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

PROJECT PLANNING
Planning the Development of Water Resources,
W75-05832 6B

PROJECTS
Information Concerning Water Resources Research Center Projects, 1964-1974,
W75-05467 9D

PROPERTY VALUES
A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

PRORODON OPALESCENS
The Vital Role of Protozoa in Mobile Bay,
W75-05525 2L

PROTEINS
Cadmium and Zinc Binding in Mammalian Liver and Kidneys,
W75-05485 5A

Multiplication of Algae in Sewage Water,
W75-05539 5G

PROTEINS (SOLUBLE)
Direct Photometric Determination of Soluble Proteins in Natural Waters, (In Russian),
W75-05409 2K

PROTOZOA
The Vital Role of Protozoa in Mobile Bay,
W75-05525 2L

PSYCHOLOGICAL ASPECTS
Indicators for Aesthetic Opportunity,
W75-05479 6A

Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

PUBLIC HEALTH
Workers' Deaths Point to Exposure to Arsenics,
W75-05705 5C

Application of the Aleksandra Mineral Water from Wysowa and its Salt Tablets in the Treatment of Duodenal Ulcers, (In Polish),
W75-05712 6D

PUBLIC IMAGES
Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

PUBLIC PERCEPTION
Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

PUBLIC POLICY
Commercial Navigation on the Upper Mississippi: Economic and Environmental Choices,
W75-05788 6E

PUBLIC REGULATION
Connecticut Water Law: Summary and Index of Statutes,
W75-05437 6E

PUBLIC UTILITIES
Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

PULP WASTES
The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applications en papeterie),
W75-05726 5D

Problem-Free Clarifier Sludge Treatment (Problemlose Klarschlammbehandlung),
W75-05727 5D

PUMP TESTING
Analysis of Shallow Hard Rock Well Pumping and Recovery Test Data,
W75-05615 8G

PUMPING
Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

PUMPS
Water or Air, Which Do You Pump,
W75-05542 8C

PYRITE
Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

PYRROLIDONE
Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

QUALITY CONTROL
Developing Water Sampling Standards.
W75-05555 5A

Automatic Water Sampler,
W75-05822 5A

RADIATION
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

RADIATION CHAMBERS
Method and Apparatus for Purifying Fluids,
W75-05551 5D

RADIOACTIVE WASTE
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

RADIOACTIVE WASTE DISPOSAL
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

Quarterly Progress Report: Research and Development Activities, Waste Fixation Program, April Through June 1974,
W75-05393 5D

RADIOACTIVE WASTES
Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

RADIOACTIVITY
Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974,
W75-05361 5C

Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

Significance of Stable Iodine-127 in Milk,
W75-05373 5B

Radiation Data: Section II. Water.
W75-05374 5A

Environmental Levels of Radioactivity at Atomic Energy Commission Istallation,
W75-05375 5A

Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

Radiation Data. Section II. Water,
W75-05377 5A

Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

RADIOACTIVITY EFFECTS
Bibliography of Published Papers of the Atomic Bomb Casualty Commission,
W75-05366 5C

Bibliography on Published Papers of the Atomic Bomb Casualty Commission.
W75-05367 5C

RADIOCHEMICAL ANALYSIS
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

RADIOECOLOGY
Experimental Study of the Accumulation of Silver 110M in Various Marine Organisms, (Etude Experimentale De L'Accumulation de L'argent 110M Chez Divers Organismes Marins),
W75-05711 5A

RADIOISOTOPES
Significance of Stable Iodine-127 in Milk,
W75-05373 5B

Experimental Study of the Accumulation of Silver 110M in Various Marine Organisms, (Etude Experimentale De L'Accumulation de

L'argent 110M Chez Divers Organismes Marins),
W75-05711 5A

RADIOMETRY
Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

RAFT RIVER BASIN (IDA)
Techniques for Determining Amounts and Distribution of Precipitation in Mountain Valleys of Idaho,
W75-05783 2B

RAIN GAGES
Random and Systematic Errors in Precipitation at an Exposed Site,
W75-05845 2B

RAINFALL-RUNOFF RELATIONSHIPS
Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

RANDOM ERRORS
Random and Systematic Errors in Precipitation at an Exposed Site,
W75-05845 2B

RANGELEY LAKE (ME.)
Report on Rangeley Lake, Franklin County, Maine,
W75-05732 5C

RAPID SAND FILTER
Investigations on Filter Headloss,
W75-05809 5D

REACTORS
Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

REAERATION
Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

REAGENTS
Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

RECHARGE WELLS
Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

RECLAIMED WATER
Careful Renewal of a Campus Loch,
W75-05426 5G

Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

Automated Monitoring of Recovered Water Quality,
W75-05545 5A

Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

Physical-Chemical Treatment at Elevated Temperatures,
W75-05763 5D

RECREATION
Procedures for Developing a Model for Planning Waterbased Linear Parks along Stream Channels in Semiarid Urban Regions,
W75-05769 6B

Implementation of the Federal Water Project Recreation Act in Colorado,
W75-05772 6E

RECYCLING
Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

Protesting Pollution.
W75-05560 5D

REGIONAL ANALYSIS
Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

Regional Wastewater Management: A Water Quality Evaluation of System Centralization,
W75-05775 5D

New Priorities for Ground-Water Quality Protection,
W75-05827 5B

REGRESSION ANALYSIS
Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

REGULATION
Recommendations of the Galveston Bay Enforcement Conference.
W75-05801 5C

REMOTE SENSING
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

Summary of Multispectral Flood Inundation Mapping in Iowa,
W75-05639 7C

An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

REPELLENTS
Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

REPRODUCTION
Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

RESEARCH
Tenth Annual Report Water Resources Research Center,
W75-05439 9D

Information Concerning Water Resources Research Center Projects, 1964-1974,
W75-05467 9D

RESEARCH AND DEVELOPMENT
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

Electronic Identification and Temperature Monitoring,
W75-05381 7B

Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8F

Understanding the Water Resources Research Center, Graduate School, University of Minnesota,
W75-05443 6E

RESEARCH EQUIPMENT
A Procedure for Placing Large Undisturbed Monoliths in Lysimeters,
W75-05517 2C

RESEARCH NEEDS
An Evaluation of the Research Program for the State of Washington Water Research Center.
W75-05455 6E

RESEARCH PRIORITIES
Ground Water Activities in the USGS,
W75-05503 4E

RESEARCHERS
Tenth Annual Report Water Resources Research Center,
W75-05439 9E

RESERVIORS
Pressure Buildup and Drawdown Behavior in Undersaturated Reservoirs of Discontinuous Permeability,
W75-05617 4E

RESERVOIR OPERATION
A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

RESERVOIRS
Extensions to Hanningfield Works of Essex Water Company.
W75-05558 5F

Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

Plankton Development During the First Year of Inundation of the Van Blommestein (Brokopondo) Reservoir in Suriname, S. America,
W75-05754 5C

Oxygen Utilization, Dark Assimilation of Carbon Dioxide and the Rate of Photosynthesis i

Nautral and Filtered Water Samples. (In Russian),
W75-05846 5G

RESIDENTIAL REAL ESTATE
The Biological Impact of Residential Real Estate Developments in the South Florida Coastal Wetlands.
W75-05752 5C

RESISTIVITY
A Theoretical Study on the Interpretation of Resistivity Sounding Data Measured by the Wenner Electrode System,
W75-05618 8G

RESOURCE ALLOCATION
A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

RESPIROMETER
Description of a New Waste Water Analyzer for Laboratories (Respirometer) (In Hungarian),
W75-05398 5A

RETENTION
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

REVERSE OSMOSIS
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

Reverse Osmosis and Ultraviltration,
W75-05556 5D

4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

REVIEW
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

REVIEWS
Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

Microbiology of Water, (Literature Review),
W75-05400 5B

Biological Filters, (Literature Review),
W75-05537 5D

REYNOLDS NUMBER
Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

RHODE ISLAND
Combining Estimates of Low-Flow Characteristics of Streams in Massachusetts and Rhode Island,
W75-05629 2E

RICE
Analysis of the Yield-Determining Process and its Application to Yield Prediction and Culture Improvement of Lowland Rice: CXIV. On the Increase of Nitrate Nitrogen Utilization Ratio at the Tillering Stage of Rice Plants. (In Japanese),
W75-05849 2G

RIFFLES
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

RIO GRANDE BASIN (N MEX)
A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

RIO GRANDE BASIN (NMEX)
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

RIO GRANDE RIVER
The Relationship Between Waterfowl and Nitrogen Species in the Waters of the Bosque Del Apache,
W75-05469 5B

Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

RIVER FLOW
River Flow Increases in Central New England After the Hurricane of 1938,
W75-05720 2E

RIVER FORECASTING
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

RIVERS
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

ROADS
Erosion Control on Logging Roads in the Appalachians.
W75-05713 2J

ROCK CUTTING EQUIPMENT
Fundamental Studies in the Use of Sonic Power for Rock Cutting,
W75-05621 8C

RODENTS
Relative Toxicities of Selenite and Selenate in the Drinking Water of Rats,
W75-05490 5C

Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

Genetic Influence on Response to Dietary Manganese Deficiency in Mice,
W75-05692 5C

Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
W75-05696 5C

Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

Effect of Zinc Repletion Late in Gestation on Parturition in the Zinc-Deficient Rat,
W75-05708 5C

ROMANIA (TASAUL-GARGALIC LAKES)
Hydrobiological and Ichthyological Studies on the Coastal Lakes Tasaul and Gargalic in View of Their Use for Fish Management, (In Rumanian),
W75-05495 8I

RUNOFF
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

Vegetating Strip-Mine Spoils for Runoff and Erosion Control,
W75-05603 4D

RURAL AREAS
Socio-Economic Impacts of Rural Water Supplies,
W75-05407 6B

SACRAMENTO RIVER (CALIF)
Water-Quality Data of the Sacramento River, California, May 1972 to April 1973,
W75-05635 5A

SALINE AQUIFERS
Storage of Fresh Water in Saline Aquifers Using a Well Field,
W75-05465 4B

SALINE SOILS
Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

SALINE WATER
Salty Bark as a Soil Amendment,
W75-05718 2G

Nitrochromeazo Titrimetric Determination of Sulfate in Irrigation and Other Saline Waters,
W75-05848 5A

SALINITY
Influence of Salinity and Temperature on the Toxicity of Mercury to Marine and Brackish Water Isopods (Crustacea),
W75-05420 5C

Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

SALMON
Water-Quality Changes During a Salmon Run in an Interior Alaskan Stream,
W75-05628 5B

SALT MARSHES
Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

SAMPLERS
A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

SAMPLING
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

SAMPLING

Radiation Data: Section II. Water.
W75-05374 5A

Developing Water Sampling Standards.
W75-05555 5A

Problems with the use of Cascade Impactors,
W75-05574 5A

Industrial Source Sampling for Trace Metals,
W75-05575 5A

Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

Tar Pollution Survey at Golden Beach, Florida,
W75-05667 5B

Automatic Water Sampler,
W75-05822 5A

A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

Oxygen Utilization, Dark Assimilation of Carbon Dioxide and the Rate of Photosynthesis in Nautral and Filtered Water Samples. (In Russian),
W75-05846 5G

SAN FERNANDO (CALIF)
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

SAN FRANCISCO BAY (CALIF)
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

SAND FILTERS
The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

SAND MODELS
Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

SANDS
Experiments of Infiltration with Air Effects in a Vertical Rectangular Slab of Soil,
W75-05777 2G

SANITARY ENGINEERING
Sulfide Control in Sanitary Sewerage Systems.
W75-05808 5D

SANITARY LANDFILLS
Transpiration Drying of Sanitary Landfills,
W75-05523 5E

SANTA BARBARA COUNTY (CAL)
Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

SANTEE RIVER (S.C.)
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

SAVANNAH RIVER PLANT (SO CAR)
Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974,
W75-05361 5C

SAVANNAH RIVER (SO CAR)
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

SAWGRASS
The Effects of Prescribed Burning on Sawgrass, Cladium Jamaicense Crantz, In South Florida,
W75-05740 6G

Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

SCENERY
A Study of Aesthetic Preferences,
W75-05359 6B

Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

Indicators for Aesthetic Opportunity,
W75-05479 6A

SEA WATER
Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

SEASONAL
Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

SEAWATER
Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

SEBAGO LAKE (ME)
Report on Bay of Naples and Sebago Lake, Cumberland County, Maine,
W75-05731 5C

SEDIMENT TRANSPORT
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

Suspended-Sediment Transport Relationships for Four Alaskan Glacier Streams,
W75-05762 2J

Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

SEDIMENT-WATER INTERFACE
Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

SEDIMENT YIELD
Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

SEDIMENTATION
Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky,
W75-05598 5C

SEDIMENTS
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

Diatoms in Lakes and Lake Sediments as an Index to Environment. Part 1. Diatom Stratigraphy and Human Settlement in Minnesota,
W75-05805 5C

SEEDS
Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

SELECTIVE WITHDRAWAL
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

SELENIUM
Relative Toxicities of Selenite and Selenate in the Drinking Water of Rats,
W75-05490 5C

Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

SEPARATED SEWERS
Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

SEPARATION TECHNIQUES
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

SEPTIC TANKS
Comparison of Septic Tank and Aerobic Treatment Units: The Impact of Wastewater Variations on These Systems,
W75-05459 5D

SEWAGE
Multiplication of Algae in Sewage Water,
W75-05539 5G

Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

SEWAGE SLUDGE
Sewage Sludge Centrifuging Gets Scottish OK.
W75-05562 5D

Problem-Free Clarifier Sludge Treatment (Problemlose Klarschlammbehandlung),
W75-05727 5D

SEWAGE SLUDGE CENTRIFUGE
Sewage Sludge Centrifuging Gets Scottish OK.
W75-05562 5D

SEWAGE TREATMENT
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

Sewage Treatment Division Report, 1970-1971-1972, City of Eugene (Oregon).
W75-05429 5D

Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5D

The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

Sewage Treatment Plant Dependability with Special Reference to the Activated Sludge Process,
W75-05751 5D

Physical-Chemical Treatment at Elevated Temperatures,
W75-05763 5D

An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

First Installation in the World for the Sterilization of Sewage by Gamma Rays (Premier installation du monde pour l'hygienisation des boues d'epuration aux rayons gamma).
W75-05814 5D

Sewage Ozonizing Unit,
W75-05819 5D

SEWER OVERLOADS
Infiltration Smoked-Out,
W75-05541 8G

SEWERAGE
Davis County Comprehensive Study: Culinary Water, Pressure Irrigation Water, Sanitary Sewerage.
W75-05418 3F

Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

Infiltration Smoked-Out,
W75-05541 8G

Discharge Device for a Vacuum Sewage System,
W75-05553 8C

Sulfide Control in Sanitary Sewerage Systems.
W75-05808 5D

SEWERS
Infiltration Smoked-Out,
W75-05541 8G

Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

Discharge Device for a Vacuum Sewage System,
W75-05553 8C

SHAGAWA LAKE (MINN)
Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

SHALLOW WELLS
Aquifer Tests in Large Diameter Wells in India,
W75-05501 4B

SHEET EROSION
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

SHIPS
Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

SHORE PROTECTION
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

SHRUBS
Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

SILAGE
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

SILTING
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

SILVER
The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

Experimental Study of the Accumulation of Silver 110M in Various Marine Organisms, (Etude Experimentale De L'Accumulation de L'argent 110M Chez Divers Organismes Marins),
W75-05711 5A

SIMULATION ANALYSIS
An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

Groundwater Models for Texas,
W75-05508 2F

Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

SIOUX FALLS (SOUTH DAKOTA)
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

SITES
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

Environmental Levels of Radioactivity at Atomic Energy Commission Istallation,
W75-05375 5A

Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

Nuclear Power Facility Performance Characteristics for Making Environmental Impact Assessments.
W75-05395 6G

SLOW SAND FILTRATION
A Close Look at London's Waters,
W75-05550 5G

SLUDGE DISPOSAL
Sewage Sludge Centrifuging Gets Scottish OK.
W75-05562 5D

SLUDGE TREATMENT
Problem-Free Clarifier Sludge Treatment (Problemlose Klarschlammbehandlung),
W75-05727 5D

SLURRIES
Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

SMALL WATERSHEDS
Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

Procedures for Developing a Model for Planning Waterbased Linear Parks along Stream Channels in Semiarid Urban Regions,
W75-05769 6B

SMOKE
Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

SMOKE TESTING
Infiltration Smoked-Out,
W75-05541 8G

Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

SNAILS
Some Aspects of the Effects of Elevated Water Temperature on the Ramshorn Snail,
W75-05387 5C

SNAKE RIVER PLAIN (IDAHO)
Chemical and Physical Data for Disposal Wells, Eastern Snake River Plain, Idaho,
W75-05632 5B

SNOWFALL
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

SNOWMELT
Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

SNOWPACKS
A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

SOCIAL CHANGE
Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
W75-05461 5G

SOCIAL VALUES
A Study of Aesthetic Preferences,
W75-05359 6B

Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
W75-05461 5G

SOCIO-ECONOMIC MODELS
A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

SOCIOECONOMIC MODEL
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

SOIL AMENDMENTS
Salty Bark as a Soil Amendment,
W75-05718 2G

SOIL CHEMICAL PROPERTIES
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Factors Affecting the Establishment of Direct-Seeded Pine on Surface-Mine Spoils,
W75-05493 4D

Avoid Problem Spoils Through Overburden Analysis,
W75-05494 5A

Toxicity of Acid Coal-Mine Spoil to Plants,
W75-05591 5C

SOIL CHEMISTRY
Effect of CO2 on the Chemical Equillibrium of Soil Solution and Ground Water,
W75-05623 2G

SOIL CONTAMINATION
Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

SOIL DENSITY
Moisture and Density Relations on Graded Strip-Mine Spoils,
W75-05592 4C

SOIL DISPOSAL FIELDS
An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

SOIL EROSION
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

Erosion Effect on Soil Fauna Under Different Crops,
W75-05793 2J

SOIL MANAGEMENT
Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

SOIL MICROBIOLOGY
Influence of Endrin on Soil Microbial Populations and their Activity,
W75-05497 5B

SOIL MOISTURE
Thermal Conductivity of a Frozen Hubbard Loamy Sandy,
W75-05442 2G

Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

SOIL PROFILES
Micro-Topographic Profile Gage,
W75-05599 7B

Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

SOIL RECLAMATION WORK
Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

SOIL TEMPERATURE
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

SOIL TESTS
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

SOIL TEXTURE
Factors Affecting the Establishment of Direct-Seeded Pine on Surface-Mine Spoils,
W75-05493 4D

SOIL WARMING
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

SOIL WATER
Effect of CO2 on the Chemical Equillibrium of Soil Solution and Ground Water,
W75-05623 2G

Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

SOIL WATER MOVEMENT
Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

SOIL-WATER POTENTIAL
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

SOILDS
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

SOILS
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

SOLAR RADIATION
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

SOLIDS
Quarterly Progress Report: Research and Development Activities, Waste Fixation Program, April Through June 1974,
W75-05393 5D

SOLVENT EXTRACTION
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

SOLVENT EXTRACTIONS
Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

SOLVENTS
Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

SONIC DRILL EQUIPMENT
Fundamental Studies in the Use of Sonic Power for Rock Cutting,
W75-05621 8C

SORPTION
Measurements of Mercury Sorption by Algae,
W75-05415 5A

SOUTH AMERICA
Plankton Development During the First Years of Inundation of the Van Blommestein (Brokopondo) Reservoir in Suriname, S. America,
W75-05754 5C

SOUTH CAROLINA
Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974,
W75-05361 5C

Some Aspects of the Effects of Elevated Water Temperature on the Ramshorn Snail,
W75-05387 5C

Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

SOUTH DAKOTA
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

SOUTH FLORIDA
Water Management: The Key to Fish and Wildlife Values in South Florida,
W75-05742 6G

The Biological Impact of Residential Real Estate Developments in the South Florida Coastal Wetlands.
W75-05752 5C

The Freshwater Fishes and Fisheries of South Florida,
W75-05802 5C

Status of Colonies of Land Wading Birds in South Florida,
W75-05803 4C

SOUTH RIVER (VA)
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

SOUTHEAST U.S
Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

SOUTHERN HEMISPHERE (AUST)
Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

SOYBEANS
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

SPACE/TIME SCALE
On the Space/Time Scale Questions in Limnological Systems Analysis,
W75-05794 5C

SPECTROMETERS
Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

SPECTROPHOTOMETRY
Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

Flameless Atomic Absorption Determination of Cobalt Nickel, and Copper - A Comparison of Tantalum and Molybdenum Evaporation Surfaces,
W75-05487 5A

Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

Comparison of Continuous Wave and Pulsed Continuum Sources for Atomic Fluorescence Flame Spectrometry,
W75-05489 5A

SPECTROSCOPY
Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

SPILLWAYS
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

SPRINGS
Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

STABILITY
Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

Froude Criterion for Ice-Block Stability,
W75-05677 2C

STATISTICAL MODELS
Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

STATISTICS
Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error,
W75-05630 4A

STEEL
Characterizing Steel Mill Dust,
W75-05577 5A

STEELHEAD TROUT
Stress of Formalin Treatment in Juvenile Spring Chinook Salmon (Oncorhynchus Tshawytscha) and Steelhead Trout (Salmo Gairdneri),
W75-05506 5C

STOCHASTIC PROCESSES
Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

STOMATAL CLOSURE
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

STOMATAL OPENING
Effect of Potassium Chloride and Phenylmercuric Acetate on the Regulation of Stomatal Opening and Water Economy in Tephrosia Purpurea Pers,
W75-05538 2D

STORAGE
Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

STORAGE

Ponding Against the Storm,
W75-05425 8A

Smoother Waters for the Next 110,000,
W75-05427 8A

STORAGE TANKS
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

STORM RUNOFF
The Rise of Porous Paving.
W75-05423 8A

Ponding Against the Storm,
W75-05425 8A

Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

STRAIN MEASUREMENT
The Measurement of Vertical Strain in Glacier Bore Holes,
W75-05674 7B

STRATIFICATION
Modeling Inflows into Stratified Lakes with Vertical Scale Distortion,
W75-05448 2H

Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

STRATIGRAPHY
Sedimentary Facies of the Aquia Formation in the Subsurface of the Maryland Coastal Plain,
W75-05638 2F

Diatoms in Lakes and Lake Sediments as an Index to Environment. Part 1. Diatom Stratigraphy and Human Settlement in Minnesota,
W75-05805 5C

STRAW MAN MODEL
Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

STREAM ORDER
Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

STREAMBEDS
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

STREAMFLOW
The Analysis of Monthly Hydrologic Time Series,
W75-05436 2E

STREAMFLOW FORECASTING
Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

STREAMS
Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

STRIP MINES
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Factors Affecting the Establishment of Direct-Seeded Pine on Surface-Mine Spoils,
W75-05493 4D

Avoid Problem Spoils Through Overburden Analysis,
W75-05494 5A

Toxicity of Acid Coal-Mine Spoil to Plants,
W75-05591 5C

Moisture and Density Relations on Graded Strip-Mine Spoils,
W75-05592 4C

Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

Genetic Variability in Survival and Growth of Virginia Pine Planted on Acid Surface-Mine Spoil,
W75-05594 4D

Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

Fertilizer and Herbaceous Cover Influence Establishment of Direct-Seeded Black Locust on Coal-Mine Spoils,
W75-05596 4D

Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky,
W75-05598 5C

Micro-Topographic Profile Gage,
W75-05599 7B

Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

Vegetating Strip-Mine Spoils for Runoff and Erosion Control,
W75-05603 4D

SUBJECTIVE ANALYSIS
Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

SUBSIDENCE
Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

SUBSURFACE FLOW
Experiments of Infiltration with Air Effects in a Vertical Rectangular Slab of Soil,
W75-05777 2G

SUBSURFACE HYDROLOGY
Experiments of Infiltration with Air Effects i
a Vertical Rectangular Slab of Soil,
W75-05777 2

SUBTROPIC
Chemical Hydrogeology of the Carbona
Peninsulas of Florida and Yucatan,
W75-05614 2

SULFATES
Nitrochromeazo Titrimetric Determination
Sulfate in Irrigation and Other Saline Waters,
W75-05848 5

SULFIDES
Sulfide Control in Sanitary Sewerage Systems
W75-05808 5

SULFUR
Removing Oil from Waste Water with Sulfur,
W75-05820 5

SURFACE DRAINAGE
The Rise of Porous Paving.
W75-05423 8

SURFACE-GROUNDWATER RELATIONSHIPS
An Evaluation of the Theory of Ground-Wat
and River-Water Interchange, Winnemuc
Reach of the Humboldt River, Nevada,
W75-05529 2

Digital Simulation of a Stream-Aquifer Syste
W75-05620 2

Geological Survey, Tallahassee, Fla.
W75-05640 4

A Socio-Economic Evaluation of Alternati
Water Management Policies on the Rio Gran
in New Mexico,
W75-05790 6

Evaluation of Population Growth and P
Capita Consumption of Water on the Regio
Economic Growth in the Rio Grande Region
New Mexico,
W75-05791 6

SURFACE WATER
Stream Gaging by Continuous Injection
Tracer Elements,
W75-05619 2

SURINAME RIVER (SOUTH AMERICA)
Plankton Development During the First Yea
of Inundation of the Van Blommest
(Brokopondo) Reservoir in Suriname, S. Am
ica,
W75-05754 5

SURVEILLANCE PROGRAM
Radiation Data: Section II. Water.
W75-05374 5

Environmental Levels of Radioactivity
Atomic Energy Commission Istallation,
W75-05375 5

SURVEYS
Evaluation of Quality Parameters in Wa
Resource Planning (A State-of-the-Art Surv
of the Economics of Water Quality),
W75-05483 6

Use of Remote Sensing for Vegetation Inven
ries in a Desert Shrub Community,
W75-05721 2

SUSPENDED LOAD
Mineralogy of Suspended Sediment and C
centration of Fe, Mn, Ni, Zn, Cu, and Pb

Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

Suspended-Sediment Transport Relationships for Four Alaskan Glacier Streams,
W75-05762 2J

SUSPENDED SEDIMENTS
Suspended-Sediment Transport Relationships for Four Alaskan Glacier Streams,
W75-05762 2J

SUSPENDED SOLIDS
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

SWAMPS
The Effects of Drainage and Associated Development in the Big Cypress Swamp,
W75-05807 6G

SYNOPTIC ANALYSIS
Combined Use of Satellite, Radar, and Aerosynoptic Information for Forecasting Heavy Precipitation, Taking the Snowfall of October 14-16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

SYSTEM ANALYSIS
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

SYSTEMATIC ERRORS
Random and Systematic Errors in Precipitation at an Exposed Site,
W75-05845 2B

SYSTEMS ANALYSIS
A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

TAMPA BYPASS CANAL (FLA)
Geological Survey, Tallahassee, Fla.
W75-05640 4A

TAR
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

TAR POLLUTION
Tar Pollution Survey at Golden Beach, Florida,
W75-05667 5B

TASTE
Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organolepticheskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

TAXES
A Tax System for Groundwater Management,
W75-05654 6C

TELEMETRY
Telemetry in Water Pollution Control,
W75-05397 5D

TEMPERATURE
Electronic Identification and Temperature Monitoring,
W75-05381 7B

The Analysis of Monthly Hydrologic Time Series,
W75-05436 2E

A Climatic Model of Urban Energy Budgets,
W75-05683 4C

Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

TEMPERATURE DISTRIBUTION
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

TENNESSEE
Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

TEPHROSIA-PURPUREA
Effect of Potassium Chloride and Phenylmercuric Acetate on the Regulation of Stomatal Opening and Water Economy in Tephrosia Purpurea Pers,
W75-05538 2D

TERTIARY TREATMENT
Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

TESTING
Infiltration Smoked-Out,
W75-05541 8G

Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

Evaluation Test of a Small Harbor Oil Spill Retrieval System,
W75-05669 5B

TEXAS
Groundwater Models for Texas,
W75-05508 2F

Technological Limitations to Ground-Water Management,
W75-05510 6E

Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

Recommendations of the Galveston Bay Enforcement Conference.
W75-05801 5C

THEIS EQUATION
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

THERMAL CAPACITY
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

THERMAL CONDUCTIVITY
Thermal Conductivity of a Frozen Hubbard Loamy Sandy,
W75-05442 2G

THERMAL DISCHARGES
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

THERMAL INSTABILITY
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

THERMAL POLLUTION
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

Some Aspects of the Effects of Elevated Water Temperature on the Ramshorn Snail,
W75-05387 5C

The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

THERMAL POWERPLANTS
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

THERMAL RADIATION
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

THERMAL STRATIFICATION
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

THERMODYNAMIC BEHAVIOR
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

THERMODYNAMICS
Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

THESAURI
Glossary, Water and Wastewater Control Engineering.
W75-05670 10C

THRONTHWAITE METHOD
The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

THROUGHFALL
Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

THYROID
Significance of Stable Iodine-127 in Milk,
W75-05373 5B

TIDES
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

TIME-LAYSSE PHOTOGRAPHY
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

TIME SERIES ANALYSIS
The Analysis of Monthly Hydrologic Time Series,
W75-05436 2E

Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

TOCK ISLAND AREA (NJ)
Geology and Ground Water Resources of Sussex County and the Warren County Portion of the Tocks Island Impact Area,
W75-05513 4B

TOMATOS
Effects of Ammonium Nutrition on Water Stress, Water Uptake, and Root Pressure in Lycopersicon Esculentum Mill,
W75-05548 3F

TOPOGRAPHY
Micro-Topographic Profile Gage,
W75-05599 7B

TOTAL DISSOLVED SOLIDS (TDS)
4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

TOTAL KJELDAHL NITROGEN
Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

TOTAL PHOSPHORUS
Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

TOXICITY
Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

Influence of Salinity and Temperature on the Toxicity of Mercury to Marine and Brackish Water Isopods (Crustacea),
W75-05420 5C

Relative Toxicities of Selenite and Selenate in the Drinking Water of Rats,
W75-05490 5C

Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

Toxicity of Acid Coal-Mine Spoil to Plants,
W75-05591 5C

Workers' Deaths Point to Exposure to Arsenics,
W75-05705 5C

TOXINS
The Role of Microorganisms in Eco-Toxicology,
W75-05760 5C

TRACE ELEMENTS
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

Overview of a Unified Transport Model,
W75-05569 5B

A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

Problems with the use of Cascade Impactors,
W75-05574 5A

Industrial Source Sampling for Trace Metals,
W75-05575 5A

Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5B

Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

TRACERS
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

Stream Gaging by Continuous Injection of Tracer Elements,
W75-05619 2E

Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

TRANSFER
Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

TRANSMISSION LINE ROUTING
Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

TRANSPIRATION
Transpiration Drying of Sanitary Landfills,
W75-05523 5E

Effect of Potassium Chloride and Phenylmercuric Acetate on the Regulation of Stomatal Opening and Water Economy in Tephrosia Purpurea Pers,
W75-05538 2D

A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

Some Regularities of the Xerophilization of Plants. (In Russian),
W75-05800 2I

Amount of Water Lost by Transpiration by Plant Communities of the Eastern Pamir. (In Russian),
W75-05847 2D

TRANSPORTATION
Commercial Navigation on the Upper Mississippi River: An Economic Review of Its Development and Public Policy Issues Affecting Minnesota,
W75-05353 4A

Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

TREATMENT
Application of the Aleksandra Mineral Water from Wysowa and its Salt Tablets in the Treatment of Duodenal Ulcers, (In Polish),
W75-05712 6D

TREATMENT FACILITIES
Sewage Treatment Division Report, 1970-1971-1972, City of Eugene (Oregon).
W75-05429 5D

New Water Works for Sutton.
W75-05554 5F

The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applications en papeterie),
W75-05726 5D

TREES
Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

TRICKLING FILTERS
Sewage Treatment Division Report, 1970-1971-1972, City of Eugene (Oregon).
W75-05429 5D

Biological Filters, (Literature Review),
W75-05537 5D

Plastic Filter Trickling Bed Waste Water Treatment (In Japanese),
W75-05813 5D

TRITIATED WATER
Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

TRITIUM
Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974,
W75-05361 5C

Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

TROPHIC LEVEL
Report on Estes Lake, York County, Maine.
W75-05729 5C

Report on Bay of Naples and Sebago Lake, Cumberland County, Maine,
W75-05731 5C

Report on Rangeley Lake, Franklin County, Maine,
W75-05732 5C

Report on Long Lake, Aroostook County, Maine,
W75-05733 5C

Report on Mattawamkeag Lake, Aroostook County, Maine,
W75-05734 5C

TUCSON (ARIZ)
Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

TUNDRA
The Microclimates of the Arctic Tundra,
W75-05830 2C

TURBIDITY
Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

TURBULENT FLOW
Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

TURBULENT PENETRATION THEORY
A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

TWO-DIMENSIONAL JETS
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

TWO-PHASE FLOW
Experiments of Infiltration with Air Effects in a Vertical Rectangular Slab of Soil,
W75-05777 2G

ULCERS
Application of the Aleksandra Mineral Water from Wysowa and its Salt Tablets in the Treatment of Duodenal Ulcers, (In Polish),
W75-05712 6D

ULTRAFILTRATION
Reverse Osmosis and Ultraviltration,
W75-05556 5D

ULTRAVIOLET RADIATION
Method and Apparatus for Purifying Fluids,
W75-05551 5D

UNDERGROUND STORAGE
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

The Use of Bounding Wells to Control Flux in Underground Water Storage Projects,
W75-05464 4B

Storage of Fresh Water in Saline Aquifers Using a Well Field,
W75-05465 4B

Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

UNDERGROUND WASTE DISPOSAL
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

UNITED KINGDOM (ENGLISH LAKE DISTRICT)
The Life Cycle and Production of the Leach Eropobdella Octoculata (L.) (Hirudinea: Eropobdellidae) in Lake District Stream,
W75-05480 2H

The Diel Activity Pattern, Drifting and Food of the Leech Erpobdella Octoculata (L.) (Hirudinea: Erpobdellidae) in a Lake District Stream,
W75-05498 2H

UNIVERSITIES
Understanding the Water Resources Research Center, Graduate School, University of Minnesota,
W75-05443 6E

UNSATURATED FLOW
Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

URANIUM
Radiation Data. Section IV. Other data. Environmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

URANIUM RADIOISOTOPES
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

URBAN DRAINAGE
Procedure for Estimating Total Flood Damage in Urban Areas,
W75-05776 4A

Criteria for Evaluation of Urban Drainage and Flood Control,
W75-05778 4A

URBAN FLOOD PLAINS
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

URBAN LANDSCAPES
A Climatic Model of Urban Energy Budgets,
W75-05683 4C

URBAN RUNOFF
Chlorides in Lake Erie Basin,
W75-05355 5B

Drainage Plans with Environmental Benefits.
W75-05422 8A

Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

Smoother Waters for the Next 110,000,
W75-05427 8A

Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

URBAN WATER RESOURCES
A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

URBANIZATION
The Biological Impact of Residential Real Estate Developments in the South Florida Coastal Wetlands.
W75-05752 5C

Procedures for Developing a Model for Planning Waterbased Linear Parks along Stream Channels in Semiarid Urban Regions,
W75-05769 6B

Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

UREA
Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

USER PREFERENCES
Understanding Scenes: An Evaluation Technique,
W75-05478 6A

USSR (BALTIC STATES)
Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

USSR (LAKE BAIKAL)
Annual Dynamics of Vertical Distribution of the Number of Heterotrophic Bacteria in Southern Baikal, (In Russian),
W75-05636 5C

UTAH
Davis County Comprehensive Study: Culinary Water, Pressure Irrigation Water, Sanitary Sewerage.
W75-05418 3F

Study of Fluid Movements Through Causeway,
W75-05610 2F

Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

UTAH LAKE AREA (UTAH)
Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

UTILIZATION RATIO
Analysis of the Yield-Determining Process and its Application to Yield Prediction and Culture Improvement of Lowland Rice: CXIV. On the Increase of Nitrate Nitrogen Utilization Ratio at the Tillering Stage of Rice Plants. (In Japanese),
W75-05849 2G

VACUUM DISTILLATION
Liquid Purification Apparatus and Process,
W75-05552 5D

VACUUM SEWERS
Discharge Device for a Vacuum Sewage System,
W75-05553 8C

VAN BLOMMESTEIN RESERVOIR
Plankton Development During the First Years of Inundation of the Van Blommestein (Brokopondo) Reservoir in Suriname, S. America,
W75-05754 5C

VEGETATION
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

VEGETATION CONVERSION
Wamis Abstracts, No. 1,
W75-05767 10A

VEGETATION (DESERT)
Multivariate Analysis of Desert Vegetation III. the Relation of Vegetation Units to Habitat Classes,
W75-05698 2I

VEGETATION EFFECTS
Wamis Abstracts, No. 1,
W75-05767 10A

VEGETATION ESTABLISHMENT
Lime Retention in Anthracite Coal-Breaker Refuse,
W75-05496 4D

Vegetating Strip-Mine Spoils for Runoff and Erosion Control,
W75-05603 4D

VEHICLE PARKING AREAS
The Rise of Porous Paving.
W75-05423 8A

VELOCITY
Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

VERTICAL MIGRATION
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

Vertical Patterns of Primary Productivity in Castle Lake, California,
W75-05755 5C

VIRGINIA
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

VISTULA RIVER
Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

VITAMINS
Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

VOLUMETRIC ANALYSIS
Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

Nitrochromeazo Titrimetric Determination of Sulfate in Irrigation and Other Saline Waters,
W75-05848 5A

WABASH RIVER (IND)
A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

WADING BIRDS
Status of Colonies of Land Wading Birds in South Florida,
W75-05803 4C

WALLEYE
Effect of Fertilizers and Dense Stocking in Fattening Ponds on the Hydrochemical Regime and Natural Food Base, (In Russian),
W75-05601 2H

WASHINGTON
Radiation Data. Section II. Water,
W75-05377 5A

An Evaluation of the Research Program for the State of Washington Water Research Center.
W75-05455 6B

The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

WASTE DISPOSAL
Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

Disposal of Hazardous Wastes,
W75-05504 5G

Transpiration Drying of Sanitary Landfills,
W75-05523 5E

Protesting Pollution.
W75-05560 5D

WASTE DISPOSAL WELLS
Treated Effluent Goes 'Underground',
W75-05544 5D

Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

Chemical and Physical Data for Disposal Wells, Eastern Snake River Plain, Idaho,
W75-05632 5B

Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida,
W75-05633 2F

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

WASTE FIXATION

Quarterly Progress Report: Research and Development Activities, Waste Fixation Program, April Through June 1974,
W75-05393 5D

WASTE HEAT UTILIZATION

Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

WASTE IDENTIFICATION

Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

Characterizing Steel Mill Dust,
W75-05577 5A

WASTE TREATMENT

Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

Laboratory Studies on Feedlot Runoff,
W75-05607 5D

The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applications en papeterie),
W75-05726 5D

Literature Survey of Instrumental Measurements of Biochemical Oxygen Demand for Control Application 1960-1973,
W75-05753 5D

WASTE WATER CONTROL

Glossary, Water and Wastewater Control Engineering.
W75-05670 10C

WASTE WATER (POLLUTION)

An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

Multiplication of Algae in Sewage Water,
W75-05539 5G

Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

WASTE WATER TREATMENT

Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

Quarterly Progress Report: Research and Development Activities, Waste Fixation Program, April Through June 1974,
W75-05393 5D

Telemetry in Water Pollution Control,
W75-05397 5D

The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

Sewage Treatment Division Report, 1970-1971-1972, City of Eugene (Oregon).
W75-05429 5D

Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

Comparison of Septic Tank and Aerobic Treatment Units: The Impact of Wastewater Variations on These Systems,
W75-05459 5D

Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

Measures Taken Against Water Pollution in Basic Non-Ferrous Metal Industries,
W75-05484 5D

Aerobic Biostabilization of Sanitary Landfill Leachate,
W75-05507 5D

Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5D

Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

Asbestos Removal Systems Perfected,
W75-05543 5D

Method and Apparatus for Purifying Fluids,
W75-05551 5D

Liquid Purification Apparatus and Process,
W75-05552 5D

New Water Works for Sutton.
W75-05554 5F

Reverse Osmosis and Ultraviltration,
W75-05556 5D

Peat Moss: An Alternative Adsorption Medium.
W75-05557 5D

Design Criteria for Waste Stabilization Ponds,
W75-05559 5D

Flocculants Flourishing.
W75-05561 5D

Condensate Trapping Alleviates Pollution,
W75-05563 5D

Disinfection: The Last Line of Defense for Potable Water,
W75-05564 5F

The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

Nitrification Effects in Waste Treatment Processes,
W75-05661 5D

Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

Acid Mine Drainage Water Made Fit to Drink,
W75-05688 5D

Industrial Water Pretreatment,
W75-05695 5D

Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organoleptic heskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

Assessing the Capability of the Everglades Marsh Environment for Renovating Wastewater,
W75-05743 5D

Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

Physical-Chemical Treatment at Elevated Temperatures,
W75-05763 5D

Regional Wastewater Management: A Water Quality Evaluation of System Centralization,
W75-05775 5D

Plastic Filter Trickling Bed Waste Water Treatment (In Japanese),
W75-05813 5D

First Installation in the World for the Sterilization of Sewage by Gamma Rays (Premier installation du monde pour l'hygienisation des boues d'epuration aux rayons gamma).
W75-05814 5D

The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

Sewage Ozonizing Unit,
W75-05819 5D

Removing Oil from Waste Water with Sulfur,
W75-05820 5D

Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed,
W75-05821 5D

Liquid Treatment Apparatus,
W75-05826 5D

WASTEWATER DISPOSAL
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

WASTEWATER TREATMENT
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

WATER
Radiation Data. Section II. Water,
W75-05377 5A

WATER ANALYSIS
Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

Developing Water Sampling Standards.
W75-05555 5A

Oxygen Utilization, Dark Assimilation of Carbon Dioxide and the Rate of Photosynthesis in Nautral and Filtered Water Samples. (In Russian),
W75-05846 5G

WATER CHEMISTRY
Effect of CO2 on the Chemical Equillibrium of Soil Solution and Ground Water,
W75-05623 2G

The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

WATER CHESTNUT
Control of Water Chestnut with 2,4-D Amine.
W75-05806 4A

WATER CIRCULATION
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

WATER DELIVERY
Control Apparatus for a Water Supply System,
W75-05817 8C

WATER DEMAND
Commercial Navigation on the Upper Mississippi River: An Economic Review of Its Development and Public Policy Issues Affecting Minnesota,
W75-05353 4A

The Impact of Energy Development on Water Resources in Arid Lands, Literature Review and Annotated Bibliography,
W75-05471 3E

Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

WATER DISTRIBUTION (APPLIED)
A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

WATER ISAPODS
Influence of Salinity and Temperature on the Toxicity of Mercury to Marine and Brackish Water Isopods (Crustacea),
W75-05420 5C

WATER LAW
Connecticut Water Law: Summary and Index of Statutes,
W75-05437 6E

Technological Limitations to Ground-Water Management,
W75-05510 6E

WATER LEVEL FLUCTUATIONS
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

WATER LEVELS
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

WATER MANAGEMENT (APPLIED)
A Tax System for Groundwater Management,
W75-05654 6C

Water Management: The Key to Fish and Wildlife Values in South Florida,
W75-05742 6G

A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

WATER MEASUREMENT
Meter for Sewer Flow Measurement,
W75-05522 5G

WATER POLICY
Commercial Navigation on the Upper Mississippi River: An Economic Review of Its Development and Public Policy Issues Affecting Minnesota,
W75-05353 4A

WATER POLLUTION
Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

Radiation Data. Section II. Water,
W75-05377 5A

Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

Microbiology of Water, (Literature Review),
W75-05400 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

Measures Taken Against Water Pollution in Basic Non-Ferrous Metal Industries,
W75-05484 5D

A Close Look at London's Waters,
W75-05550 5G

Reverse Osmosis and Ultraviltration,
W75-05556 5D

Condensate Trapping Alleviates Pollution,
W75-05563 5D

Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5B

Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

Determination of Pollution Parameters (Concepto de polucion, Parametros a determinar),
W75-05725 5C

How to Read a Fish Kill,
W75-05812 5A

WATER POLLUTION CONTROL
Telemetry in Water Pollution Control,
W75-05397 5D

Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

Report on Long Lake, Cumberland County, Maine.
W75-05730 5C

Liquid Treatment Apparatus,
W75-05826 5D

New Priorities for Ground-Water Quality Protection,
W75-05827 5B

/ATER POLLUTION EFFECTS
Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning,
W75-05402 5C

The Effect of a Municipal Effluent on the Microbial Populations of the Williman-tic/Shetucket Rivers,
W75-05438 5C

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

Determination of Pollution Parameters (Concepto de polucion, Parametros a deter-minar),
W75-05725 5C

ATER POLLUTION SOIL CONTAMINATION
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

ATER POLLUTION SOURCES
Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 973,
W75-05376 5B

Radiation Data. Section IV. Other data. En-vironmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Ter-iary-Treated Sewage, Bay Park, New York,
W75-05626 5B

Chemical and Physical Data for Disposal Wells, Eastern Snake River Plain, Idaho,
W75-05632 5B

Origin of Metalliferous Sediments from the acific Ocean,
W75-05701 2J

stuarial and Coastal Pollution,
W75-05811 5B

lew Priorities for Ground-Water Quality Pro-ection,
W75-05827 5B

TER PURIFICATION
escription of a New Waste Water Analyzer or Laboratories (Respirometer) (In Hungari-n),
W75-05398 5A

valuation of Quality Parameters in Water esource Planning (A State-of-the-Art Survey f the Economics of Water Quality),
W75-05483 5G

xamples of Water and Air Purification by atalytic Reactions (Beispiele Fuer Die Rein-altung Von Wasser Und Luft Durch Kata-tische Reaktionen),
W75-05540 5D

ethod and Apparatus for Purifying Fluids,
W75-05551 5D

Liquid Purification Apparatus and Process,
W75-05552 5D

Disinfection: The Last Line of Defense for Potable Water,
W75-05564 5F

Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organolep-ticheskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applica-tions en papeterie),
W75-05726 5D

WATER QUALITY
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

Alternative Methods of Evaluating the Economic and Social Aspects of Water Quali-ty,
W75-05445 5G

Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

Evaluation of Quality Parameters in Water Resource Planning (A State-of-the-Art Survey of the Economics of Water Quality),
W75-05483 5G

Transport Mechanisms of Lead Industry Wastes,
W75-05486 5B

Biological Filters, (Literature Review),
W75-05537 5D

Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

Water-Quality Changes During a Salmon Run in an Interior Alaskan Stream,
W75-05628 5B

Chemical and Physical Data for Disposal Wells, Eastern Snake River Plain, Idaho,
W75-05632 5B

Water-Quality Data of the Sacramento River, California, May 1972 to April 1973,
W75-05635 5A

The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

Industrial Water Pretreatment,
W75-05695 5D

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

Determination of Pollution Parameters (Concepto de polucion, Parametros a deter-minar),
W75-05725 5C

Derivation of a Three Dimensional Numerical Water Quality Model for Estuary and Con-tinental Shelf Application,
W75-05738 5B

Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

Regional Wastewater Management: A Water Quality Evaluation of System Centralization,
W75-05775 5D

New Priorities for Ground-Water Quality Pro-tection,
W75-05827 5B

Oxygen Utilization, Dark Assimilation of Car-bon Dioxide and the Rate of Photosynthesis in Nautral and Filtered Water Samples. (In Rus-sian),
W75-05846 5G

WATER QUALITY CONTROL
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

A Close Look at London's Waters,
W75-05550 5G

Liquid Purification Apparatus and Process,
W75-05552 5D

Condensate Trapping Alleviates Pollution,
W75-05563 5D

Glossary, Water and Wastewater Control En-gineering.
W75-05670 10C

Water Quality in the Great Lakes: A New Timetable,
W75-05694 5G

Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

WATER QUALITY STANDARDS
Developing Water Sampling Standards.
W75-05555 5A

WATER RENOVATION
An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

WATER RESOURCES
Tenth Annual Report Water Resources Research Center,
W75-05439 9D

Information Concerning Water Resources Research Center Projects, 1964-1974,
W75-05467 9D

Evaluation of Quality Parameters in Water Resource Planning (A State-of-the-Art Survey of the Economics of Water Quality),
W75-05483 5G

WATER RESOURCES DEVELOPMENT
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Quantifying Aesthetic Opportunity,
W75-05476 6A

A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

Planning the Development of Water Resources,
W75-05832 6B

WATER RESOURCES INSTITUTE
Understanding the Water Resources Research Center, Graduate School, University of Minnesota,
W75-05443 6E

An Evaluation of the Research Program for the State of Washington Water Research Center.
W75-05455 6B

Information Concerning Water Resources Research Center Projects, 1964-1974,
W75-05467 9D

Delaware Water Resources Center, Annual Report/Fiscal Year 1974.
W75-05781 9D

WATER REUSE
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

Condensate Trapping Alleviates Pollution,
W75-05563 5D

Assessing the Capability of the Everglades Marsh Environment for Renovating Wastewater,
W75-05743 5D

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

First Installation in the World for the Sterilization of Sewage by Gamma Rays (Premier installation du monde pour l'hygienisation des boues d'epuration aux rayons gamma).
W75-05814 5D

WATER RIGHTS
Connecticut Water Law: Summary and Index of Statutes,
W75-05437 6E

Technological Limitations to Ground-Water Management,
W75-05510 6E

WATER SAMPLING
Automatic Water Sampler,
W75-05822 5A

WATER SHORTAGE
The Impact of Energy Development on Water Resources in Arid Lands, Literature Review and Annotated Bibliography,
W75-05471 3E

WATER STORAGE
The Use of Bounding Wells to Control Flux in Underground Water Storage Projects,
W75-05464 4B

Storage of Fresh Water in Saline Aquifers Using a Well Field,
W75-05465 4B

WATER SUPPLY
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

Valuation of a Ground-Water Supply for Management and Development,
W75-05613 4B

Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

Control Apparatus for a Water Supply System,
W75-05817 8C

WATER SUPPLY DEVELOPMENT
Davis County Comprehensive Study: Culinary Water, Pressure Irrigation Water, Sanitary Sewerage.
W75-05418 3F

Extensions to Hanningfield Works of Essex Water Company.
W75-05558 5F

WATER TABLE
Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

WATER TEMPERATURE
Influence of Salinity and Temperature on the Toxicity of Mercury to Marine and Brackish Water Isopods (Crustacea),
W75-05420 5C

Effect of Temperature on the Mineralization of Organic Phosphorus Compounds by Certain Aquatic Bacteria,
W75-05745 5C

WATER TRANSFER
An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

WATER TREATMENT
Filtration Analysis of Four Different Filter Fabrics,
W75-05460 4B

New Water Works for Sutton.
W75-05554 5F

Extensions to Hanningfield Works of Essex Water Company.
W75-05558 5F

Disinfection: The Last Line of Defense for Potable Water,
W75-05564 5F

4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

WATER USE
Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

WATER USERS
Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

WATER UTILIZATION
A Computerized Model for Determining the Optimal Water Utilization for Agriculture,
W75-05356 6A

Ground Water Activities in the USGS,
W75-05503 4B

Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

Optimal Allocation of Water Quality Control in Urbanizing River Basins,
W75-05774 5G

WATER VAPOR
Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5C

Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

WATER YIELD IMPROVEMENT
Wamis Abstracts, No. 1,
W75-05767 10A

WATERSHED MANAGEMENT
Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

Probabilistic Model of Rare Hydrologic Events
W75-05766 2A

A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

WATERSHED PROTECTION
Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

WATERSHEDS (BASINS)
Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

Report on Moosehead Lake, Piscataquis and Somerset Counties, Maine.
W75-05728 5C

WELL DATA
Analysis of Shallow Hard Rock Well Pumping and Recovery Test Data,
W75-05615 8G

WENNER ELECTRODE SYSTEM
A Theoretical Study on the Interpretation of Resistivity Sounding Data Measured by the Wenner Electrode System,
W75-05618 8G

WEST VIRGINIA
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

WESTERN US
Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

WET SEASONS
A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

WETLANDS
The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

WILDLIFE
Status of Colonies of Land Wading Birds in South Florida,
W75-05803 4C

WILDLIFE CONSERVATION
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

Water Management: The Key to Fish and Wildlife Values in South Florida,
W75-05742 6G

WILDLIFE HABITATS
Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

WILLAMETTE VALLEY (ORE)
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

WILLIMANTIC/SHETUCKET RIVERS (CONNECTICUT)
The Effect of a Municipal Effluent on the Microbial Populations of the Willimantic/Shetucket Rivers,
W75-05438 5C

WINDS
Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

WITHDRAWAL
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

WOODLANDS (TEXAS)
Hydrological Balancing Act on a Texas New Town Site.
W75-05424 8A

WYOMING
A Study of Aesthetic Preferences,
W75-05359 6B

Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

XEROPHYTES
Some Regularities of the Xerophilization of Plants. (In Russian),
W75-05800 2I

YANKEETOWN (FLA)
Mid-1971 Ground-Water Conditions at Yankeetown Well Field, Levy County, Florida,
W75-05649 2F

YEASTS
The Effect of a Municipal Effluent on the Microbial Populations of the Willimantic/Shetucket Rivers,
W75-05438 5C

YUCATAN (MEXICO)
Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

YUCATAN PENINSULA (MEX)
Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

ZINC
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

Cadmium and Zinc Binding in Mammalian Liver and Kidneys,
W75-05485 5A

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

Effect of Zinc Repletion Late in Gestation on Parturition in the Zinc-Deficient Rat,
W75-05708 5C

ZOOPLANKTON
Ecological and Physiological Characteristics of the Most Abundant Species of Zooplankton and Zoobenthos in Two Northern Lakes,
W75-05759 5C

Nearshore Zooplankton of Southeastern Lake Michigan, 1972,
W75-05761 5C

AUTHOR INDEX

ADAMS, B. J.
Regional Wastewater Management: A Water Quality Evaluation of System Centralization,
W75-05775 5D

ADRIAN, D. D.
Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

AGARWAL, H. C.
Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning,
W75-05402 5C

AHMAD, N.
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

AKUNE, M.
Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

ALBENESIUS, E. L.
Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

ALIMOV, A. P.
Ecological and Physiological Characteristics of the Most Abundant Species of Zooplankton and Zoobenthos in Two Northern Lakes,
W75-05759 5C

ALLAWAY, W. H.
Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

ALLRED, E. R.
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

AMEZAGA, E. DE
Vertical Patterns of Primary Productivity in Castle Lake, California,
W75-05755 5C

AMIARD, J-C.
Experimental Study of the Accumulation of Silver 110M in Various Marine Organisms, (Etude Experimentale De L'Accumulation de L'argent 110M Chez Divers Organismes Marins),
W75-05711 5A

ANDERSON, B. J.
The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

ANDERSON, J. A. D.
Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

ANDERSON, J. B.
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

ANDERSON, J. L.
Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

ANDERSON, R. G.
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

ANDERSON, V. L.
The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

ANDERSSON, J.
Discharge Device for a Vacuum Sewage System,
W75-05553 8C

ANDREWS, F. L.
Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

ANGINO, E. E.
Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

APGAR, J.
Effect of Zinc Repletion Late in Gestation on Parturition in the Zinc-Deficient Rat,
W75-05708 5C

APMANN, R. P.
Chlorides in Lake Erie Basin,
W75-05355 5B

ASHTON, G. D.
Froude Criterion for Ice-Block Stability,
W75-05677 2C

ATLAVINYTE, O.
Erosion Effect on Soil Fauna Under Different Crops,
W75-05793 2J

AVERETT, R. C.
Water-Quality Data of the Sacramento River, California, May 1972 to April 1973,
W75-05635 5A

AVERETTE, F. G.
A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

BACK, W.
Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

BAGGS, R. B.
Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
W75-05696 5C

BAHL, R. W.
Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

BAILEY, D. A.
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

BAKER, A. A.
Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

BAKER, E. T. JR.
Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

BAKER, F. G.
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

BALAOUSKUS, R. A.
Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

BALARAMAN, K.
Multiplication of Algae in Sewage Water,
W75-05539 5G

BALKE, J.
Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

BALLARD, J.
An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

BALLU, L.
Floating Anti-Pollution Device,
W75-05825 5G

BARKER, J. C.
Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

BARLOW, E. W. R.
Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

Physiological Effects of Water Stress on Young Corn Plants,
W75-05450 2I

BARLOW, J. P.
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

BARTLETT, E. T.
A Decision-Aiding Model for Planning Optimal Resource Allocation of Water Basins,
W75-05770 6A

BATCH, D. L.
Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky,
W75-05598 5C

BAUDOUIN, M. F.
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

BEARDEN, J. E.
Liquid Treatment Apparatus,
W75-05826 5D

BELL, D. T.
A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

BELL, L. T.
Genetic Influence on Response to Dietary Manganese Deficiency in Mice,
W75-05692 5C

BELLAR, T. A.
Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

BEN-DAVID, S.
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

BENEDICT, B. A.
Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

BENNETT, E. R.
Comparison of Septic Tank and Aerobic Treatment Units: The Impact of Wastewater Variations on These Systems,
W75-05459 5D

BERG, W. A.
Fertilizer and Herbaceous Cover Influence Establishment of Direct-Seeded Black Locust on Coal-Mine Spoils,
W75-05596 4D

Toxicity of Acid Coal-Mine Spoil to Plants,
W75-05591 5C

BERNAT, M.
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

BERNHARDT, J.
Ecological Effects of Heat in the River,
W75-05797 5C

BEXSON, J.
Infiltration Smoked-Out,
W75-05541 8G

BHATTACHARYYA, B.
Investigations on Filter Headloss,
W75-05809 5D

BJORK, S.
Joining Forces to Save Damaged Lakes in Sweden and Tunisia,
W75-05428 5G

BLACKWOOD, K. R.
Runoff Water Quality of Three Tucson Watersheds.
W75-05768 4C

BLANE, F. C.
Removal of Cations from Leachate by Interaction with Subsurface Soils,
W75-05589 5G

BLUHM, L. H.
Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
W75-05461 5G

BOERSMA, L.
Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

BOLLEN, W. B.
Influence of Endrin on Soil Microbial Populations and their Activity,
W75-05497 5B

Salty Bark as a Soil Amendment,
W75-05718 2G

BOND, K. J.
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

BOND, W. O.
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

BONDIETTI, E. H.
Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

BONNEAU, W. R.
Laboratory Studies on Feedlot Runoff,
W75-05607 5D

BONNET, C. W.
Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

BONNET, L.
Phytoplankton and Primary Production of a High Lake in the Pyrenees: A Fractorial Analysis of 'Correspondences' Applied to Data from Lake Port-Bielh. (In French),
W75-05622 2H

BOOKER, S. E.
Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

BOOTH, R. L.
Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

BORDELON, B. R.
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
W75-05787 5B

BORISOVSKIY, M. A.
Characteristics of the Winter Hydrometeorological Regime of Drained Mineral Soils,
W75-05833 2G

BOSTER, R. S.
On the Criteria for and the Possibility of Quantifying the Aesthetic Aspects of Water Resource Projects,
W75-05474 6A

BOTHNER, M. H.
The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

BOUGHTON, W. C.
Planning the Development of Water Resources,
W75-05832 6B

BOUMA, J.
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

BOUVENG, H. O.
Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

BOWDEN, C.
The Impact of Energy Development on Water Resources in Arid Lands, Literature Review and Annotated Bibliography,
W75-05471 3E

BRADBURY, J. P.
Diatoms in Lakes and Lake Sediments as an Index to Environment. Part 1. Diatom Stratigraphy and Human Settlement in Minnesota,
W75-05805 5C

BRADFORD, B. H.
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

BRANSKI, J.
Transport of Suspended Solids Along the Vistula River,
W75-05828 2

BRANSON, B. A.
Effects of Strip Mining on Small-Stream Fishes in East-Central Kentucky,
W75-05598 5C

BRETSCHKO, G.
Benthos Production of a High-Mountain Lake Nematoda,
W75-05746 5

BRETT, R. W. J.
Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5

BRIEL, L. I.
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2

BRIESE, F. W.
Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5

BRITTON, L. J.
Water-Quality Data of the Sacramento River, California, May 1972 to April 1973,
W75-05635 5

BROENKOW, W. W.
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2

BROOKS, A. A.
Overview of a Unified Transport Model,
W75-05569 5B

BROOKS, H. K.
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

BROOKSBANK, H. R.
The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

BROWN, J. M.
Tables and Conversions for Microclimatology,
W75-05717 7C

BROWN, K. W.
A Procedure for Placing Large Undistrubed Monoliths in Lysimeters,
W75-05517 2G

BROWN, P. J.
Understanding Scenes: An Evaluation Technique,
W75-05478 6A

BROWNING, V. D.
Transpiration Drying of Sanitary Landfills,
W75-05523 5E

BRUNS, W.
The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

BRUTSAERT, W.
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

BRUTSAERT, W. H.
Evaporative Water Loss from Large Land Areas in the Finger Lakes,
W75-05532 2D

BRYAN, J. B.
Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

BUCKLEY, A. D.
Estuarial and Coastal Pollution,
W75-05811 5B

BUNCH, R. L.
Biological Filters, (Literature Review),
W75-05537 5D

BURNET, A. M. R.
The Relation Between Primary Productivity, Nutrients, and the Trout Environment in Some New Zealand Lakes,
W75-05419 5C

BURRELL, D. C.
Determination of Heavy Metals in Seawater by Carbon Filament Atomic Spectrometry,
W75-05405 5A

Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

Trace Metal Associations in Sub-Arctic Fjord Environments, Progress Report May 1972-March 1974,
W75-05403 5B

BURTON, D. E.
Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8H

BUSH, W. R.
Assessing and Controlling the Hazard from Tritiated Water,
W75-05369 5G

BUT, V. P.
Effect of Fertilizers and Dense Stocking in Fattening Ponds on the Hydrochemical Regime and Natural Food Base, (In Russian),
W75-05601 2H

BUTTERFIELD, W. S.
A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

CAMPBELL, E. E.
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

CAMPBELL, K. W.
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

CANNON, J. N.
A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

CAPBLANCQ, J.
Phytobenthos and Primary Production of a High Mountain Lake in the Central Pyrenees. (In French),
W75-05672 2H

Phytoplankton and Primary Production of a High Lake in the Pyrenees: A Fractorial Analysis of 'Correspondences' Applied to Data from Lake Port-Bielh. (In French),
W75-05622 2H

CAPPER, C. B.
Fouling of Heat Exchangers from Cooling Water and Process Materials,
W75-05810 5B

CARPENTER, R.
The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

CARR, R. A.
Measurements of Mercury Sorption by Algae,
W75-05415 5A

CARROL, J. W.
Design of an Experimental system for Studying Physical-Chemical Treatment of Wastewater at Elevated Temperatures,
W75-05682 5D

CARTEE, C. P.
Socio-Economic Impacts of Rural Water Supplies,
W75-05407 6B

CARTER, H. H.
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

CASE, C. M.
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

CATALAN, J. G.
Determination of Pollution Parameters (Concepto de polucion, Parametros a determinar),
W75-05725 5C

CERMAK, J. E.
Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

CHAN, S. H.
A Theoretical Study on the Interpretation of Resistivity Sounding Data Measured by the Wenner Electrode System,
W75-05618 8G

CHAO, T. T.
The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

CHENG, R. T.
Study of Fluid Movements Through Causeway,
W75-05610 2F

CHEREM, G. J.
Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

CHIEN, C. C.
Chlorides in Lake Erie Basin,
W75-05355 5B

CHRISTENSON, L. R.
Laboratory Studies on Feedlot Runoff,
W75-05607 5D

CHRISTIAN, J. E.
The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

CHRISTIANSON, R.
Commercial Navigation on the Upper Mississippi: Economic and Environmental Choices,
W75-05788 6E

CHRISTIANSON, R. W.
Commercial Navigation on the Upper Mississippi River: An Economic Review of Its Development and Public Policy Issues Affecting Minnesota,
W75-05353 4A

CHURCH, T. M.
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

CLARK, G. R.
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

CLIKEMAN, F. M.
The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

CLINTON, J.
An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

COLE, W. D.
Micro-Topographic Profile Gage,
W75-05599 7B

CONOMOS, T. J.
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

CONRY, T.
Problems with the use of Cascade Impactors,
W75-05574 5A

CONTRACTOR, D. N.
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

COOK, E. N.
Aerobic Biostabilization of Sanitary Landfill Leachate,
W75-05507 5D

COOLEY, R. L.
An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

CORLISS, J. C.
Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

COSTEA, E.
Hydrobiological and Ichthyological Studies on the Coastal Lakes Tasaul and Gargalic in View of Their Use for Fish Management, (In Rumanian),
W75-05495 8I

COTTON, B. L.
Liquid Purification Apparatus and Process,
W75-05552 5D

COWART, J. B.
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

CREEL, B. J.
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

CRIPPEN, J. R.
Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error,
W75-05630 4A

CROUCH, L. W.
An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

CROWDER, J. P.
The Effects of Drainage and Associated Development in the Big Cypress Swamp,
W75-05807 6G

The Freshwater Fishes and Fisheries of South Florida,
W75-05802 5C

Water Management: The Key to Fish and Wildlife Values in South Florida,
W75-05742 6G

CUNNINGHAM, A. B.
Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

CURE, V.
Hydrobiological and Ichthyological Studies on the Coastal Lakes Tasaul and Gargalic in View of Their Use for Fish Management, (In Rumanian),
W75-05495 8I

CURTIS, M.
Tar Pollution Survey at Golden Beach, Florida,
W75-05667 5B

CURTIS, W. R.
Effects of Strip Mining on the Hydrology of Small Mountain Watersheds in Appalachia,
W75-05593 4C

Micro-Topographic Profile Gage,
W75-05599 7B

Moisture and Density Relations on Graded Strip-Mine Spoils,
W75-05592 4C

Strip-Mining, Erosion and Sedimentation,
W75-05600 5C

Vegetating Strip-Mine Spoils for Runoff and Erosion Control,
W75-05603 4D

CZAPOWSKYJ, M. M.
Lime Retention in Anthracite Coal-Breaker Refuse,
W75-05496 4D

Performance of Red Pine and Japanese Larch Planted on Anthracite Coal-Breaker Refuse,
W75-05597 4D

DASCH, E. J.
Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

DAUGARD, S. J.
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

DAVIES, D. W.
The Relationship Between Waterfowl and Nitrogen Species in the Waters of the Bosque Del Apache,
W75-05469 5B

DAVIS, D. R.
Optimum Design of Mountainous Raingage Networks Using Bayesian Decision Theory,
W75-05524 2B

DAVIS, G.
Comparison of Fall and Spring Planting in Strip-Mine Spoils in the Bituminous Region of Pennsylvania,
W75-05595 4D

DAVIS, L. G.
A Manual for Estimating the Magnitude and Frequency of Floods on Ungaged Streams in Indiana,
W75-05645 4A

DAVIS, W. J.
The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

Modeling of Particulates in Gary, Indiana Area
W75-05586 5E

DEBEIKO, E. V.
Direct Photometric Determination of Soluble Proteins in Natural Waters, (In Russian),
W75-05409 2K

DEHLINGER, P.
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report Part II,
W75-05411 5B

DEITCHMAN, R. W.
Connecticut Water Law: Summary and Index of Statutes,
W75-05437 6E

DEIVEEKASUNDARAM, M.
Multiplication of Algae in Sewage Water,
W75-05539 5C

DEL PICO, J.
Reverse Osmosis and Ultraviltration,
W75-05556 5D

DENNY, M. D.
Numerical Studies of Cratering in Bearpaw Shale: Two-Dimensional Results,
W75-05385 8G

DEPP, S.
Electronic Identification and Temperature Monitoring,
W75-05381 7B

DESPARD, T. L.
Avoid Problem Spoils Through Overburden Analysis,
W75-05494 5G

DETERS, E. M.
Control Apparatus for a Water Supply System
W75-05817 5F

DEY, A. K.
Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 2K

DI TORO, D.
Preliminary Model of Potomac Estuary Phytoplankton,
W75-05798 5C

DILLON, P. J.
The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 5C

DOBRYNIN, E. G.
Oxygen Utilization, Dark Assimilation of Carbon Dioxide and the Rate of Photosynthesis in Nautral and Filtered Water Samples. (In Russian),
W75-05846 2H

DOHERTY, P. C.
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

DOMENICO, P. A.
Valuation of a Ground-Water Supply for Management and Development,
W75-05613 4B

DORNBUSCH, D. M.
A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

DOUGLASS, J. E.
Flood Frequencies and Bridge and Culvert Sizes for Forested Mountains of North Carolina,
W75-05715 2E

Watershed Values Important in Land Use Planning on Southern Forests,
W75-05716 4D

DOW, B. L.
Characterizing Steel Mill Dust,
W75-05577 5A

DREAVER, K. R.
Random and Systematic Errors in Precipitation at an Exposed Site,
W75-05845 2B

DROWN, D. B.
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

DUCKSTEIN, L.
Optimum Design of Mountainous Raingage Networks Using Bayesian Decision Theory,
W75-05524 2B

Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

DUGUID, J. O.
A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

DUKE, C. M.
Bedrock Intensity Attenuation and Site Factors From San Fernando Earthquake Records,
W75-05684 8E

DUNN, B.
Flood-Flow Characteristics of the Chenango River at Proposed Interstate Highway in Towns of Fenton and Chenango, Broome County, New York,
W75-05655 4A

DURKALEC, J.
Application of the Aleksandra Mineral Water from Wysowa and its Salt Tablets in the Treatment of Duodenal Ulcers, (In Polish),
W75-05712 6D

DYER, K. L.
Effect of CO2 on the Chemical Equillibrium of Soil Solution and Ground Water,
W75-05623 2G

DYMOND, J.
Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

DYSON, J. M.
The Design and Construction of Aycliffe Sewage Works Extensions,
W75-05565 5D

EAGLES, J. D.
Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

ECCLES, L. A.
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

EDGAR, D. E.
Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

ELI, R. N. II
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

ELLIOT, J. M.
Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

ELLIOTT, J. M.
The Diel Activity Pattern, Drifting and Food of the Leech Erpobdella Octoculata (L.) (Hirudinea: Erpobdellidae) in a Lake District Stream,
W75-05498 2H

ELLISON, W. K.
Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

FALCKE, C. O.
A Generic Methodology to Forecast Benefits from Urban Water Resource Improvement Projects,
W75-05536 6B

FATTAH, Q. N
Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

FAULKNER, G. L.
Mid-1971 Ground-Water Conditions at Yankeetown Well Field, Levy County, Florida,
W75-05649 2F

FEKETE, A.
The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

FELTON, J.
Comparison of Septic Tank and Aerobic Treatment Units: The Impact of Wastewater Variations on These Systems,
W75-05459 5D

FENG, S. Y.
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

FENSKE, P. R.
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

FFOLLIOTT, P. F.
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

Wamis Abstracts, No. 1,
W75-05767 10A

FIELD, C. W.
Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

FISCHER, J. A.
Condensate Trapping Alleviates Pollution,
W75-05563 5D

FISH, E. B.
Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

FITZGERALD, P. D.
The Estimation of Soil Moisture Deficits by Penman's and Thornthwaite's Method in Mid Canterbury,
W75-05831 2D

FITZGERALD, W. F.
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

FLEPS, W.
Description of a New Waste Water Analyzer for Laboratories (Respirometer) (In Hungarian),
W75-05398 5A

FOGEL, M. M.
Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

FOLLETT, C. R.
Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

FOREE, E. G.
Aerobic Biostabilization of Sanitary Landfill Leachate,
W75-05507 5D

FORTHMAN, C. A.
The Effects of Prescribed Burning on Sawgrass, Cladium Jamaicense Crantz, In South Florida,
W75-05740 6G

FOSSBERG, R. A.
Flexible Oil Boom,
W75-05824 5G

FOSTER, K. E.
Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

FOX, M. R. S.
Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

FRANCO, N. B.
Electrochemical Removal of Heavy Metals from Acid Mine Drainage,
W75-05433 5D

FRANK, D.
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

FRANKLIN, T. C.
The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

FREYMAN, R.
Electronic Identification and Temperature Monitoring,
W75-05381 7B

FRIED, S. M.
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

FRIEDMAN, A. M.
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

FRIEDMAN, J. D.
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

FRY, B. E. JR.
Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

FUHRIMAN, J. W.
An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

FURLONG, W. K.
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

GABRYSCH, R. K.
Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

GADDIS, B. L.
Suspended-Sediment Transport Relationships for Four Alaskan Glacier Streams,
W75-05762 2J

GALES, M. E.
Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

GALLOWAY, F. M.
On the Space/Time Scale Questions in Limnological Systems Analysis,
W75-05794 5C

GANN, E. E.
Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

GARVINE, R. W.
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

GEBHARD, T. G. JR.
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

GELDREICH, E. E.
Microbiology of Water, (Literature Review),
W75-05400 5B

GERARD, C. J.
A Procedure for Placing Large Undistrubed Monoliths in Lysimeters,
W75-05517 2G

GHOSE, A. K.
Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

GIBBONS, D. R.
An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada,
W75-05500 5C

GIBSON, T. A.
Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

GILLEY, J. E. JR.
Thermal Conductivity of a Frozen Hubbard Loamy Sandy,
W75-05442 2G

GILLEY, J. R.
Use of Thermally Enriched Water for Growing Field Crops in Minnesota,
W75-05440 3C

Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

GLADNEY, E. S.
Problems with the use of Cascade Impactors,
W75-05574 5A

GLUSHKOVA, N. I.
Combined Use of Satellite, Radar, and Aerosynoptic Information for Forecasting Heavy Precipitation, Taking the Snowfall of October 14-16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

GOLDMAN, C. R.
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W75-05689 2H

Vertical Patterns of Primary Productivity in Castle Lake, California,
W75-05755 5C

GONZALEZ DE DE LA FUENTE, MARCIA A.
Inventory Theory Application to the Optimum Control of Irrigation Water,
W75-05771 6A

GOODRICH, R. D.
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

GOPEN, S. R.
A Time-Space Technique to Analyze Snowpacks in and Adjacent to Openings in the Forest,
W75-05764 4A

GORDON, G. E.
Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

Problems with the use of Cascade Impactors,
W75-05574 5A

GORONOVSKII, I. T.
Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organoleptic heskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

GRAHAM, D. J.
Evaluation Test of a Small Harbor Oil Spill Retrieval System,
W75-05669 5B

GRAM, H. R.
Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

GRAY, B. A.
Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

GRIGG, N. S.
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

Criteria for Evaluation of Urban Drainage and Flood Control,
W75-05778 4A

Procedure for Estimating Total Flood Damage in Urban Areas,
W75-05776 4A

GRIGGS, B.
Feasibility Studies for Decontamination and Densification of Chop-Leach Cladding Residues,
W75-05371 5D

GROMOVA, G. G.
Combined Use of Satellite, Radar, and Aerosynoptic Information for Forecasting

Heavy Precipitation, Taking the Snowfall of October 14e16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

GROSS, G. W.
Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

GUARINO, A. M.
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

GUM, R.
Quantifying Aesthetic Opportunity,
W75-05476 6A

GUPTA, B.
Distribution and Metabolism of DDT in the Catfish Heteropneustes Fossilis in Relation to the Signs of Poisoning,
W75-05402 5C

GUYTON, W. F.
Technological Limitations to Ground-Water Management,
W75-05510 6E

HAAS, M.
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

HAFEMAN, D. G.
Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

HAGENBUEL, W. W.
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

HAIMES, Y. Y.
A Tax System for Groundwater Management,
W75-05654 6C

HALL, J. D.
Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

HALLBERG, G. R.
Summary of Multispectral Flood Inundation Mapping in Iowa,
W75-05639 7C

HAMMOND, A. L.
Manganese Nodules (II): Prospects for Deep Sea Mining,
W75-05690 5B

HANNAN, P. J.
Measurements of Mercury Sorption by Algae,
W75-05415 5A

HANSEN, H. J.
Sedimentary Facies of the Aquia Formation in the Subsurface of the Maryland Coastal Plain,
W75-05638 2F

HANSHAW, B. B.
Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

HARMS, R. H.
Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

HARRISON, W. G.
Nitrogen Budget of a North Carolina Estuary,
W75-05357 5B

HART, G. E.
Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

HARVEY, E. J.
Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

HARVEY, T. F.
A Proposed Rainout Hazard Model for Systems Analysis Studies,
W75-05388 5B

HASHIMI, N. H.
Glacial History of Kolahoi Glacier, Kashmir, India,
W75-05678 2C

HAWKINS, R. H.
Mineralogy and Ion Exchange Characteristics of Savannah River Plant Streambed Sediments,
W75-05389 5B

HAYNES, R. C.
Some Ecological Effects of Artificial Circulation on a Small Eutrophic Lake with Particular Emphasis on Phytoplankton. 1. Kezar Lake Experiment, 1968,
W75-05609 5C

HEALY, J. W.
Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

HEATH, G. R.
Origin of Metalliferous Sediments from the Pacific Ocean,
W75-05701 2J

HEDRICH, M. F.
Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

HEIDE, J. VAN DER
Plankton Development During the First Years of Inundation of the Van Blommestein (Brokopondo) Reservoir in Suriname, S. America,
W75-05754 5C

HEINITZ, A. J.
Flood of August 2, 1972, in the Littel Maquoketa River Basin, Dubuque County, Iowa,
W75-05648 2E

HENDRICKSON, P. L.
Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

HILLS, R. G.
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

HINES, W. W.
Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

HIPP, B. W.
A Procedure for Placing Large Undistrubed Monoliths in Lysimeters,
W75-05517 2G

HOEKSTRA, W. G.
Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

HOEPPNER, S.
Water or Air, Which Do You Pump,
W75-05542 8C

HOLM, D.
Electronic Identification and Temperature Monitoring,
W75-05381 7B

HOLMES, J. R.
Telemetry in Water Pollution Control,
W75-05397 5D

HOLMGREN, B.
The Microclimates of the Arctic Tundra,
W75-05830 2C

HORNOR, S. G.
The Effect of a Municipal Effluent on the Microbial Populations of the Williamantic/Shetucket Rivers,
W75-05438 5C

HORVATH, G. J.
The Influence of Big Cypress Land Development in the Distribution of Heavy Metals in Everglades Estuaries,
W75-05434 5B

HORVATH, R.
Method and Apparatus for Monitoring Pollution of Natural Waters,
W75-05823 5A

HOUSE, W. A.
Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

HOUSER, E. A.
Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

HOWARD, N. M.
Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

HOYER, B. E.
Summary of Multispectral Flood Inundation Mapping in Iowa,
W75-05639 7C

HU, M-H.
Study of Fluid Movements Through Causeway,
W75-05610 2F

HUCKABEE, J. W.
Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

HUFF, C. E.
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

HUG, W. L.
Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

HUGHES, J. L.
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

HULETT, L. D.
Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

HUMISTON, G. F.
Liquid Purification Apparatus and Process,
W75-05552 5D

HUNTER, J. V.
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

HUNTZINGER, T. L.
Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

HURLEY, L. S.
Genetic Influence on Response to Dietary Manganese Deficiency in Mice,
W75-05692 5C

HUTCHINSON, G. E.
Eutrophication,
W75-05749 5C

HUTCHINSON, P.
Random and Systematic Errors in Precipitation at an Exposed Site,
W75-05845 2B

HYSON, P.
Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

IVANOVA, M. B.
Ecological and Physiological Characteristics of the Most Abundant Species of Zooplankton and Zoobenthos in Two Northern Lakes,
W75-05759 5C

IYER, K. M.
Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

IZMAILOVA, N. N.
Amount of Water Lost by Transpiration by Plant Communities of the Eastern Pamir. (In Russian),
W75-05847 2D

JACKO, R. B.
The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

Industrial Source Sampling for Trace Metals,
W75-05575 5A

JACOBS, S. A.
Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

JAVORNICKY, P.
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W75-05689 2H

JEFFCOAT, H. H.
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

JEFFREY, L. M.
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

JENNINGS, M. E.
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

JERNELOV, A.
The Role of Microorganisms in Eco-Toxicology,
W75-05760 5C

JOHNSON, A. I.
A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

JOHNSON, G. B.
Some Aspects of the Effects of Elevated Water Temperature on the Ramshorn Snail,
W75-05387 5C

JOHNSON, H. B.
Drought Adaptation in Opuntia Basilaris: Significance of Recycling Carbon Through Crassulacean Acid Metabolism,
W75-05547 2I

JOHNSON, J. D.
Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

JOHNSON, R. C.
Procedures for Developing a Model for Planning Waterbased Linear Parks along Stream Channels in Semiarid Urban Regions,
W75-05769 6B

JONES, E. E.
The Vital Role of Protozoa in Mobile Bay,
W75-05525 2L

JONES, K.
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

JONES, L. W.
Removing Oil from Waste Water with Sulfur,
W75-05820 5D

JONES, M. B.
Influence of Salinity and Temperature on the Toxicity of Mercury to Marine and Brackish Water Isopods (Crustacea),
W75-05420 5C

JORDEN, R. M.
Analysis of Trace Metal Mass Balance for Aqueous Systems,
W75-05582 5B

Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

JORGENSEN, D. G.
Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas,
W75-05642 4B

JOYNER, B. F.
Chemical and Biological Conditions of Lake Okeechobee, Florida, 1969-72,
W75-05634 5C

JUBBOORI, S. A.
Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

JUDD, J. B.
Ohio Biological Survey Biological Notes No. 6. Effects of Ecological Changes on Buckeye Lake, Ohio, with Emphasis on Largemouth Bass and Aquatic Vascular Plants,
W75-05505 5C

JUDGE, R.
Quantifying Aesthetic Opportunity,
W75-05476 6A

KAAKINAN, J. W.
Determination of a Trace Element Mass Balance for a Coal-Fired Power Plant,
W75-05576 5A

KALFF, J.
Phytoplankton Production in Char Lake, A Natural Polar Lake, and in Meretta Lake, A Polluted Polar Lake, Cornwallis Island Northwest Territories,
W75-05396 5C

KASTNER, W. M.
Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

KATEN, P. C.
Modeling Atmospheric Dispersion of Lead from Automotive Sources,
W75-05584 5B

KAUFMAN, M. I.
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

KELLEHER, W. J.
Significance of Stable Iodine-127 in Milk,
W75-05373 5B

KELLER, E. A.
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

KERFOOT, W. B.
Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

KERMODE, R. I.
Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5D

KERNODLE, D. R.
Water-Quality Changes During a Salmon Run in an Interior Alaskan Stream,
W75-05628 5B

KESSLER, W. V.
The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

KEUP, L. E.
How to Read a Fish Kill,
W75-05812 5A

KHASANOV, V. K.
Protection of the Environment from Contamination with Pesticides Used in Cotton Growing, (In Russian),
W75-05408 5G

KIMBALL, D.
Quantifying Aesthetic Opportunity,
W75-05476 6A

KING, C. J.
Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

KING, L. D.
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

KISIEL, C. C.
Optimum Design of Mountainous Raingage Networks Using Bayesian Decision Theory,
W75-05524 2B

KLEMT, W. B.
Groundwater Models for Texas,
W75-05508 2F

KLOCK, B. V.
Sewage Ozonizing Unit,
W75-05819 5D

KNOPMAN, D. S.
Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

KNOWLES, T. R.
Groundwater Models for Texas,
W75-05508 2F

KO, K. S.
Responses of Penaeus Japonicus Bate to Fishing Net and Electrical Stimulation for the Improvement of Fishing Efficacy, (In Korean),
W75-05394 8I

KOCHENDERFER, J. N.
Erosion Control on Logging Roads in the Appalachians,
W75-05713 2J

KOELLE, A.
Electronic Identification and Temperature Monitoring,
W75-05381 7B

KOMAROV, V. D.
Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

KOSKELA, P.
Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

KOUBA, G. E.
Modeling Inflows into Stratified Lakes with Vertical Scale Distortion,
W75-05448 2H

KOWNACKA, M.
The Distribution of the Bottom Fauna in Several Streams of the Middle Balkan in the Summer Period,
W75-05666 2E

KOWNACKI, A.
The Distribution of the Bottom Fauna in Several Streams of the Middle Balkan in the Summer Period,
W75-05666 2E

KREITH, F.
A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

KU, H. F. H.
Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

KUGINYTE, Z.
Erosion Effect on Soil Fauna Under Different Crops,
W75-05793 2J

KUL'SKIY, L. A.
The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

LABADIE, J. W.
Automatic Control of Large-Scale Combined Sewer Systems,
W75-05608 5D

LACHAPELLE, E. R.
The Measurement of Vertical Strain in Glacier Bore Holes,
W75-05674 7B

LAND, C. C.
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

LANGHETTE, E. J. III.
The Use of Bounding Wells to Control Flux in Underground Water Storage Projects,
W75-05464 4B

LANSFORD, R. R.
Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

A Socio-Economic Evaluation of Alternative Water Management Policies on the Rio Grande in New Mexico,
W75-05790 6B

LAPCHEVA, V. F.
Combined Use of Satellite, Radar, and Aerosynoptic Information for Forecasting Heavy Precipitation, Taking the Snowfall of October 14-16, 1971, in the Central Region of the European USSR as an Example,
W75-05841 2B

LAUZANNE, L.
Qualitative Study of the Nutrition of Alestes Baremoze (Pisces, Characidae),
W75-05512 2I

LAYRISSE, M.
Iron Absorption by Humans from Veal Liver,
W75-05706 5C

LEAVESLEY, G. H.
Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

LEE, M. L.
Extraction of Cobalt, Iron, Indium and Zinc from Seawater by Means of the Trifluoroacetylacetone Toluene System,
W75-05404 5A

LEETS, I.
Iron Absorption by Humans from Veal Liver,
W75-05706 5C

LEFEVRE, B.
Experiments of Infiltration with Air Effects in a Vertical Rectangular Slab of Soil,
W75-05777 2G

LEGOVICH, N. A.
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

LEIGHTON, I. W.
Removal of Cations from Leachate by Interaction with Subsurface Soils,
W75-05589 5G

LEJEUNE, P.
The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applications en papeterie),
W75-05726 5D

LEUZE, R. E.
Feasibility Studies of the Partitioning of Commercial High-Level Wastes Generated in Spent Nuclear Fuel Reprocessing: annual Progress Report for FY-1974,
W75-05368 5D

LEVITZ, N. M.
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W75-05383 5D

LICHTENBERG, J. J.
Determining Volatile Organics at Microgram-Per-Liter Levels by Gas Chromatography,
W75-05838 5A

LIN, C.
Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

LIND, O. T.
The Relationship of Electric Power Station Thermal Circulation to Biological Productivity: Phase II - Control of Thermal Pollution by Biological Systems,
W75-05533 5C

LINN, J. G.
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

LINSTEDT, K. D.
Comparison of Septic Tank and Aerobic Treatment Units: The Impact of Wastewater Variations on These Systems,
W75-05459 5D

LISSAUER, I. M.
A Technique for Predicting the Movement of Oil Spills in New York Harbor,
W75-05668 5B

LO, T.
Fundamental Studies in the Use of Sonic Power for Rock Cutting,
W75-05621 8C

LOMBARDI, D. J.
Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

LOUIE, S. S-F,
A Climatic Model of Urban Energy Budgets,
W75-05683 4C

LOWE, J. E.
Response in Vitamin B-12 Production and Absorption to Increasing Cobalt Intake in the Sheep,
W75-05700 5C

LYUBEZNOV, YU. E.
Pond Phytoplankton of the Tedzhen Fish-Breeding Farm. (In Russian),
W75-05850 2H

MACK, H. J.
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

MADDOCK, T. III
A Tax System for Groundwater Management,
W75-05654 6C

MADEWELL, C. E.
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

MAESSEN, F. J. M. J.
Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

MAGNUSON, L. M.
Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

MAHAN, A.
Cation Exchange Characteristics of Some Metal Ions in Nitric Acid-Ammonium Acetate Medium,
W75-05686 5A

MAKAROVA, T. T.
Effect of the Ice Content, Temperature, Cementation, and Freezing Depth of the Soil on Meltwater Infiltration in a Basin,
W75-05836 2G

MAKSIMOVA, E. A.
Annual Dynamics of Vertical Distribution of the Number of Heterotrophic Bacteria in Southern Baikal, (In Russian),
W75-05636 5C

MALCOLM, R. L.
Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

MALYKHINA, T. YU.
Effect of Fertilizers and Dense Stocking in Fattening Ponds on the Hydrochemical Regime and Natural Food Base, (In Russian),
W75-05601 2H

MANIGOLD, D. B.
Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

MANKIN, J. B.
Overview of a Unified Transport Model,
W75-05569 5B

MARKOSIAN, A. G.
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

MARTER, W. L.
Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974,
W75-05361 5C

MARTIN, J. B.
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

MARTINEZ-TORRES, C.
Iron Absorption by Humans from Veal Liver,
W75-05706 5C

MARYUTINA, G. N.
Effect of Fertilizers and Dense Stocking in Fattening Ponds on the Hydrochemical Regime and Natural Food Base, (In Russian),
W75-05601 2H

MATHUR, T.
Effect of Potassium Chloride and Phenylmercuric Acetate on the Regulation of Stomatal Opening and Water Economy in Tephrosia Purpurea Pers,
W75-05538 2D

MATSUSHIMA, S.
Analysis of the Yield-Determining Process and its Application to Yield Prediction and Culture Improvement of Lowland Rice: CXIV. On the Increase of Nitrate Nitrogen Utilization Ratio at the Tillering Stage of Rice Plants. (In Japanese),
W75-05849 2G

MATSUZAKI, A.
Analysis of the Yield-Determining Process and its Application to Yield Prediction and Culture Improvement of Lowland Rice: CXIV. On the Increase of Nitrate Nitrogen Utilization Ratio at the Tillering Stage of Rice Plants. (In Japanese),
W75-05849 2G

MATULEWICH, V. A.
Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

MAYNARD, W. S.
Measuring the Social Attitudes and Aesthetic and Economic Considerations which Influence Transmission Line Routing,
W75-05391 6G

MCADOO, G. D.
Ground-Water Resources of Grimes County, Texas.
W75-05641 4B

MCCANTS, C. B.
A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

MCCAULEY, C. A.
Management of Subsiding Lands: An Economic Evaluation,
W75-05765 4B

MCGHEE, T. J.
Laboratory Studies on Feedlot Runoff,
W75-05607 5D

MCJUNKIN, A. R.
Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

MCKINNEY, M.
Investigation of Some Factors in the Biochemical Conversion of Mercury Pollutants to Toxic Methylmercury Effected by Micro-Organisms in a Marine Sediment,
W75-05417 5B

MEGAHAN, W. F.
Erosion Over Time on Severely Disturbed Granitic Soils: A Model,
W75-05499 4D

MEHTA, A. J.
Mosquito Lagoon Barrier Beach Study,
W75-05829 2L

MEL'NICHENKO, L. A.
Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organoleptic heskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

MELHORN, W. N.
Drainage Basin Response: Documented Historical Change and Theoretical Considerations Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

MENSHUTKIN, V. V.
A Mathematical Modelling of Lake Ecological Systems,
W75-05744 5C

MERCER, L. J.
Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

MEREDITH, D. D.
Chlorides in Lake Erie Basin,
W75-05355 5B

MESHKOVA, T. M.
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

MEYER, F. W.
Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida,
W75-05633 2F

MEYER, G.
Ground Water Activities in the USGS,
W75-05503 4B

MICHARD, G.
The Pore Water Chemistry of Recent Sediments in the Western Mediterranean Basin,
W75-05587 5B

MILES, M. E.
Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

MILLER, D. J.
Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

MILLER, D. W.
New Priorities for Ground-Water Quality Protection,
W75-05827 5B

MILLER, J. W. JR.
Geology and Ground Water Resources of Sussex County and the Warren County Portion of the Tocks Island Impact Area,
W75-05513 4B

MILLER, S. A.
Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
W75-05696 5C

MILLETTE, E. D.
Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

MILLS, M. T.
Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

MINER, J. R.
Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

MIRTI, P.
Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

MITCHELL, C.
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

MITCHELL, J. P.
A Study of Aesthetic Preferences,
W75-05359 6B

MITCHENER, M.
Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

MOLZ, F. J.
Transpiration Drying of Sanitary Landfills,
W75-05523 5E

MOORE, D. G.
Endrin in Forest Streams After Aerial Seeding with Endrin-Coated Douglas-Fir Seed,
W75-05602 5B

MORGAN, W. D.
Estimation of Commercial, Industrial and Governmental Water Use for Local Areas,
W75-05604 6D

MOTZ, L. H.
Geological Survey, Tallahassee, Fla.
W75-05640 4A

MOWER, R. D.
An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

MUSICK, B.
Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

NABIVANETS, B. I.
Direct Photometric Determination of Soluble Proteins in Natural Waters, (In Russian),
W75-05409 2K

NAFF, R. L.
Environmental Controls on Groundwater Chemistry in New Mexico. I. The Effect of Phreatophytes,
W75-05531 2D

NAKAYAMA, F. S.
Nitrochromeazo Titrimetric Determination of Sulfate in Irrigation and Other Saline Waters,
W75-05848 5A

NAKORCHEVSKAYA, V. F.
The Effect of Chemical Water Treatment Technology on the Efficiency of Filters (Vliyaniye tekhnologii reagentnoy obrabotki vody na effektivnost' raboty fil'trov),
W75-05815 5D

NAOT, D.
A Model Study of Transpiration from Plant Leaves,
W75-05779 2D

NARCHI, W.
Ecologic and Adaptive Aspects of Some Bivalves of The Sao Paulo Seacoast, (In Portuguese),
W75-05714 2L

NASON, A. P.
Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

NAUMAN, J. W.
Water-Quality Changes During a Salmon Run in an Interior Alaskan Stream,
W75-05628 5B

NERI, R. P.
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

NEWBY, F. L.
Indicators for Aesthetic Opportunity,
W75-05479 6A

NIGHTINGALE, H. I.
Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

NOY-MEIR, I.
Multivariate Analysis of Desert Vegetation III. the Relation of Vegetation Units to Habitat Classes,
W75-05698 2I

NOYES, H. E.
Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

O'CONNOR, D. J.
Preliminary Model of Potomac Estuary Phytoplankton,
W75-05798 5C

O'HERRON, R. J.
Literature Survey of Instrumental Measurements of Biochemical Oxygen Demand for Control Application 1960-1973,
W75-05753 5D

OBRIST, A.
Ponding Against the Storm,
W75-05425 8A

ODLAUG, T. O.
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

OGDEN, P. R.
Remote Sensing as a Vegetation Mapping Tool in the Proposed Charleston Dam Site Area,
W75-05722 7B

OJA, R. K.
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

OLAH, J.
Number, Biomass and Production of Planktonic Bacteria in the Shallow Lake Balaton,
W75-05719 2H

OLENIK, T. J.
Nitrification Effects in Waste Treatment Processes,
W75-05661 5D

OLSON, T. A.
The Response of Nearshore Periphyton in Western Lake Superior to Thermal Additions,
W75-05354 5C

ONDOV, J. M.
Problems with the use of Cascade Impactors,
W75-05574 5A

ORNES, W. H.
Assessing the Capability of the Everglades Marsh Environment for Renovating Wastewater,
W75-05743 5D

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

ORNES, W. H.

Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

ORSHAN, G.
Multivariate Analysis of Desert Vegetation III. the Relation of Vegetation Units to Habitat Classes,
W75-05698 2I

OSMOND, J. K.
Analysis of ground-water regimes by use of natural uranium isotope variations,
W75-05535 2F

OTSUKA, Y.
Plastic Filter Trickling Bed Waste Water Treatment (In Japanese),
W75-05813 5D

OZBUN, J. L.
Effects of Ammonium Nutrition on Water Stress, Water Uptake, and Root Pressure in Lycopersicon Esculentum Mill,
W75-05548 3F

PALLARDY, S. G.
A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

PARENT, D. R.
Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

PASANEN, S.
Seasonal Changes in Calcium, Magnesium, Copper and Zinc Content in the Liver of the Common Frog, Rana Temporaria L.,
W75-05693 5C

PASKAUSKY, D. F.
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part I,
W75-05410 5B

PASKAUSKY, F.
Determination of Budgets of Heavy Metal Wastes in Long Island Sound, Annual Report, Part II,
W75-05411 5B

PATOUILLET, C.
Measurements of Mercury Sorption by Algae,
W75-05415 5A

PATRIC, J. H.
River Flow Increases in Central New England After the Hurricane of 1938,
W75-05720 2E

PATTERSON, M. R.
Overview of a Unified Transport Model,
W75-05569 5B

PAULT, J. D. JR.
Process Control of Activated Sludge Treatment, Phase II,
W75-05528 5D

PAUW, N. DE.
On the Distribution of Eurytermora Affinis (Poppe) (Copepoda) in the Western Scheldt Estuary,
W75-05748 5C

PEARL, R.
Disposal of Hazardous Wastes,
W75-05504 5G

PEARSON, F. H.
Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

PECAN, E. V.
An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

PERHAC, R. M.
Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

PERTERSON, D. H.
Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

PETERSON, B. J.
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

PETERSON, D. E.
Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

PETERSON, J. B.
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

PETTYJOHN, W. A.
Artificial Recharge - A Potential Solution for Many Water Problems,
W75-05511 4B

PHINNEY, H. K.
Animal Waste Conversion Systems Based on Thermal Discharge,
W75-05453 5D

PIDCOE, W. W.
Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

PILESKIS, S.
Erosion Effect on Soil Fauna Under Different Crops,
W75-05793 2J

PINCKNEY, D. J.
Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

PINDER, G. F.
A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

PLASS, W. T.
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Factors Affecting the Establishment of Direct-Seeded Pine on Surface-Mine Spoils,
W75-05493 4D

Genetic Variability in Survival and Growth of Virginia Pine Planted on Acid Surface-Mine Spoil,
W75-05594 4D

PLATT, C. M. R.
Radiometric Measurements of Stratospheric Water Vapor in the Southern Hemisphere,
W75-05844 2B

POERTNER, H. G.
Drainage Plans with Environmental Benefits.
W75-05422 8A

POLHEMUS, V. D.
Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

POLISHCHUK, V. S.
Effect of Fertilizers and Dense Stocking in Fattening Ponds on the Hydrochemical Regime and Natural Food Base, (In Russian),
W75-05601 2H

POOVAIAH, B. W.
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

POSMA, F. D.
Direct Determination of Gold, Cobalt, and Lithium in Blood Plasma Using the Mini-Massmann Carbon Rod Atomizer,
W75-05702 5A

POST, A.
Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
W75-05624 2J

POUVREAU, B.
Experimental Study of the Accumulation of Silver 110M in Various Marine Organisms, (Etude Experimentale De L'Accumulation de L'argent 110M Chez Divers Organismes Marins),
W75-05711 5A

POZOS, R. S.
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

PRESLEY, B. J.
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

PRINS, H. R.
Significance of Stable Iodine-127 in Milk,
W75-05373 5B

PRITCHARD, J. B.
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

PRITSKER, A. A. B.
Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

PYETRUCHUK, N. I.
Floodplain Meadows of the Lower Course of the Pripyat' River, (In Byelorussian),
W75-05723 2G

QUARTERMAN, L. A.
Annual Report on Project ANO115A, Fiscal Year 1974,
W75-05382 5B

QUEBEDEAUX, B. JR.
Effects of Ammonium Nutrition on Water Stress, Water Uptake, and Root Pressure in Lycopersicon Esculentum Mill,
W75-05548 3F

RAGONE, S. E.
Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

RALL, D. P.
Tissue Distribution of (14C)DDT in the Lobster After Administration Via Intravascular or Oral Routes or After Exposure from Ambient Sea Water,
W75-05401 5C

RANGASWAMI, G.
Multiplication of Algae in Sewage Water,
W75-05539 5G

RANTZ, S. E.
Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error,
W75-05630 4A

RAO, P. V.
Investigations on Filter Headloss,
W75-05809 5D

RARIDON, R. J.
Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

RASNICK, B. A.
Nitrochromeazo Titrimetric Determination of Sulfate in Irrigation and Other Saline Waters,
W75-05848 5A

RAY, S. M.
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

READ, P. E.
Use of Waste Heat for Soil Warming and Irrigation in Northern Climates,
W75-05444 3F

REEVES, M.
A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

REGIER, R.
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

REIHARDT, W.
Effect of Temperature on the Mineralization of Organic Phosphorus Compounds by Certain Aquatic Bacteria,
W75-05745 5C

REINERS, W. A.
Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

REITER, E. R.
Problems with Modeling Transport and Biological Translocation,
W75-05568 5B

REJIC, M.
Biological Pollution Indicators in Underground Waters. (In Slovenian),
W75-05616 5A

RENZI, M.
Iron Absorption by Humans from Veal Liver,
W75-05706 5C

RICHARDSON, M. E.
Pathological Changes Produced in Japanese Quail by Ingestion of Cadmium,
W75-05491 5C

RIGLER, F. H.
The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

RIHA, J.
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

RITCHIE, J. T.
A Procedure for Placing Large Undistrubed Monoliths in Lysimeters,
W75-05517 2G

RODGERS, D. P.
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

ROGERS, J. C.
The Measurement of Vertical Strain in Glacier Bore Holes,
W75-05674 7B

ROLAND, D. A. SR.
Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

ROMANENKO, V. I.
Oxygen Utilization, Dark Assimilation of Carbon Dioxide and the Rate of Photosynthesis in Nautral and Filtered Water Samples. (In Russian),
W75-05846 5G

ROMNEY, E. M.
Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

ROSE, J. D.
Filtration Analysis of Four Different Filter Fabrics,
W75-05460 4B

ROSENSHEIN, J. S.
Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

ROSSON, H. F.
Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

ROTH, J. C.
Nearshore Zooplankton of Southeastern Lake Michigan, 1972,
W75-05761 5C

ROWLAND, D. A.
Pressure Buildup and Drawdown Behavior in Undersaturated Reservoirs of Discontinuous Permeability,
W75-05617 4B

RUMER, R. R.
Chlorides in Lake Erie Basin,
W75-05355 5B

RUSHTON, K. R.
Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

RUSSELL, E. R.
Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

RYABOV, A. K.
Direct Photometric Determination of Soluble Proteins in Natural Waters, (In Russian),
W75-05409 2K

RYKBOST, K. A.
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

Soil and Air Temperature Changes Induced by Subsurface Line Heat Sources,
W75-05452 3C

SAKEVISH, A. I.
Methods for the Analysis and Identification of Organoleptic Substances in the Technological Process of Water Treatment (Razrabotka metodov analiza i identifikatsii organoleptcheskikh veshchest' v tekhnologicheskom protsesse podgotovkivody),
W75-05724 5A

SALO, E. O.
An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada,
W75-05500 5C

SAMMEL, E. A.
Aquifer Tests in Large Diameter Wells in India,
W75-05501 4B

SANER, W.
Tar Pollution Survey at Golden Beach, Florida,
W75-05667 5B

SANTOYO, H.
Hydrology and Phytoplankton of a Continental Shelf Transect of Campeche Bay, Mexico (August, 1972). (In Spanish),
W75-05673 2L

SAULNIER, G. J. JR.
Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

SAVAGE, A. E.
The Physiological State With Respect to Phosphorus of Cayuga Lake Phytoplankton,
W75-05406 5C

SCALF, M. R.
New Priorities for Ground-Water Quality Protection,
W75-05827 5B

SCHAUFELBERGER, J. E.
A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

SCHINDLER, D. W.
Eutrophication in the High Arctic--Meretta Lake, Cornwallis Island (75 Degree N Lat.),
W75-05799 5C

SCHLESINGER, W. H.
Heavy Metal Concentrations and Deposition in Bulk Precipitation in Montane Ecosystems of New Hampshire,
W75-05509 5B

SCHMISSEUR, W. E.
Crop Response to Warming Soils above their Natural Temperatures,
W75-05451 3C

SCHOFFSTOLL, C. B.
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

SCHROEDER, H. A.
Life-Term Effects of Nickel in Rats: Survival, Tumors, Interactions with Trace Elements and Tissue Levels,
W75-05691 5C

SCHULZE, J. A.
Pesticides in Selected Western Streams--1968-71,
W75-05653 5A

SCHWINDT, B. W.
Water Quality Analysis System with Multicircuit Single Shell Heat Exchanger,
W75-05549 5A

SCOPPA, P.
Calculated Distribution of the Chemical Species of Copper, Zinc, Cadmium and Lead in 16 Lakes of Northern Italy,
W75-05413 5B

SEEFELDT, W. J.
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

SEELS, F. H.
Industrial Water Pretreatment,
W75-05695 5D

SEN, D. N.
Effect of Potassium Chloride and Phenylmercuric Acetate on the Regulation of Stomatal Opening and Water Economy in Tephrosia Purpurea Pers,
W75-05538 2D

SEN, R. N.
Investigations on Filter Headloss,
W75-05809 5D

SEPHTON, H. H.
Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

SERPAUD, J.
The Seclar Process and its Applications in Papermaking (Le procede Seclar at ses applications en papeterie),
W75-05726 5D

SEWARD, L. B.
Groundwater Models for Texas,
W75-05508 2F

SEWELL, J.
Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

SHACKLETTE, H. T.
Cadmium in Plants,
W75-05709 2I

SHEARMAN, J. O.
Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

SIEGEL, S. M.
Mercury: Aspects of its Ecology and Environmental Toxicity,
W75-05414 5B

SIGAL, C. E.
Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

SIGNORET, M
Hydrology and Phytoplankton of a Continental Shelf Transect of Campeche Bay, Mexico (August, 1972). (In Spanish),
W75-05673 2L

SIMON, D. E.
The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
W75-05611 8F

SJOBLOM, G. L.
Environmental Monitoring and Disposal of Radioactive Wastes From U.S. Naval Nuclear-Powered Ships and Their Support Facilities, 1973,
W75-05376 5B

SKOGERBOE, G. V.
Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

SKRESLET, S.
The Ecosystem of the Arctic Lake Nordlaguna, Jan Mayen Island: III. Ecology of Arctic Char, Salvelinus Alpinus (L.),
W75-05676 2H

SLOAN, D. R.
Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

SMALL, M.
An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

SMITH, B. J. W.
Smoother Waters for the Next 110,000,
W75-05427 8A

SMITH, E. L.
Use of Remote Sensing for Vegetation Inventories in a Desert Shrub Community,
W75-05721 7B

SMITH, W. J.
Contamination Limits for Real and Personal Property, Progress Report, July-December 1973,
W75-05379 5A

SMOLEI, A. I.
Physico-Chemical Regime and Bioproductive Processes in Lake Sevan (Armenia) in Transition from Oligotrophy to Eutrophy,
W75-05747 5C

SODERQUIST, M. R.
Characterization of Fruit and Vegetable Processing Wastewaters,
W75-05534 5B

SOLONKO, G. N.
Some Regularities of the Xerophilization of Plants. (In Russian),
W75-05800 2I

SOMERS, L.
Evaluation Test of a Small Harbor Oil Spill Retrieval System,
W75-05669 5D

SOUTHERLAND, E. V.
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

SOWA, E. A.
Lime Retention in Anthracite Coal-Breaker Refuse,
W75-05496 4D

SPAULDING, M.
Derivation of a Three Dimensional Numerical Water Quality Model for Estuary and Continental Shelf Application,
W75-05738 5B

SPENCE, J. A.
Implementation of the Federal Water Project Recreation Act in Colorado,
W75-05772 6E

SPITZER, R. H.
Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

STABA, E. J.
Aquatic Plants from Minnesota, Part 5 - Digestibility and Fermentation of Aquatic Plants,
W75-05466 3F

STEARNS, R. G.
Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

STEINDLER, M. J.
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

STENHOUSE, M. H.
Combined Buoyancy and Boundary Effects on the Trajectory of a Two-Dimensional Jet,
W75-05780 5B

STEWARD, K. K.
Assessing the Capability of the Everglades Marsh Environment for Renovating Wastewater,
W75-05743 5D

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

STEWART, G. L.
Aquifer Clogging in Combined Wastewater Recharge,
W75-05520 5D

STEWART, J. A.
Nearshore Zooplankton of Southeastern Lake Michigan, 1972,
W75-05761 5C

STORMS, S. E.
Ingestion and Assimilation Rates of Chesapeake Bay Zooplankton: Preliminary Report,
W75-05735 5C

STRAND, R. H.
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

STULL, E. A.
Vertical Patterns of Primary Productivity in Castle Lake, California,
W75-05755 5C

SUNDARAM, T. R.
Review of the Engineering Aspects of Power Plant Discharges,
W75-05386 5B

SUNDE, R. A.
Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

SURKAN, A. J.
Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

SUTHERLAND, W.
Automatic Water Sampler,
W75-05822 5A

SWAIN, W. R.
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

SWEETON, F. H.
Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

SWIFT, W.
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

SWISSHELM, R. V. JR.
Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

SZAREK, S. B.
Drought Adaptation in Opuntia Basilaris: Significance of Recycling Carbon Through Crassulacean Acid Metabolism,
W75-05547 2I

TADMOR, N. H.
Multivariate Analysis of Desert Vegetation III. the Relation of Vegetation Units to Habitat Classes,
W75-05698 2I

TAFT, J. L.
Phosphorus Cycling in the Plankton of Chesapeake Bay,
W75-05736 5C

TAMURA, T.
Characterization of Cadmium and Nickel Contaminated Sediments from Foundry Cove, New York,
W75-05579 5A

TARANIK, J. V.
Summary of Multispectral Flood Inundation Mapping in Iowa,
W75-05639 7C

TASKER, G. D.
Combining Estimates of Low-Flow Characteristics of Streams in Massachusetts and Rhode Island,
W75-05629 2E

TAUB, S. H.
Ohio Biological Survey Biological Notes No. 6. Effects of Ecological Changes on Buckeye Lake, Ohio, with Emphasis on Largemouth Bass and Aquatic Vascular Plants,
W75-05505 5C

TAYLOR, D. G.
Nutis: Numerical and Textual Information System, Version 1.0, - A Users Manual,
W75-05390 7C

TAYLOR, W. R.
The Ecology of the Plankton of the Chesapeake Bay Estuary,
W75-05792 5C

Ingestion and Assimilation Rates of Chesapeake Bay Zooplankton: Preliminary Report,
W75-05735 5C

Phosphorus Cycling in the Plankton of Chesapeake Bay,
W75-05736 5C

TENNYSON, L. C.
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

TERJUNG, W. H.
A Climatic Model of Urban Energy Budgets,
W75-05683 4C

TERRY, D. L.
A Sampler for Taking Soil Samples from Specific Soil Zones,
W75-05839 7B

TERRY, R. E.
Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

THAMES, J. L.
Probabilistic Model of Rare Hydrologic Events,
W75-05766 2A

THARIN, D. W.
Removal of Heavy Metal Contaminants from Fluid Streams,
W75-05412 5D

THIRUMURTHI, D.
Design Criteria for Waste Stabilization Ponds,
W75-05559 5D

THOMANN, R. V.
Preliminary Model of Potomac Estuary Phytoplankton,
W75-05798 5C

THOMAS, T. J.
Modeling of Particulates in Gary, Indiana Area,
W75-05586 5B

THOMPSON, R.
A Preliminary Investigation of the Effects of Water Levels on Vegetative Communities of Loxahatchee National Wildlife Refuge, Florida,
W75-05737 6G

THOMPSON, R. S.
Physical Modeling of Atmospheric Diffusion,
W75-05571 5B

THORUD, D. B.
Use of Time-Lapse Photography to Assess Potential Interception in Arizona Ponderosa Pine,
W75-05834 2C

Wamis Abstracts, No. 1,
W75-05767 10A

THURLOW, E. H.
The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

TING, I. P.
Drought Adaptation in Opuntia Basilaris: Significance of Recycling Carbon Through Crassulacean Acid Metabolism,
W75-05547 2I

TOETZ, D. W.
Diel Periodicity in Uptake of Nitrate and Nitrite by Reservoir Plankton,
W75-05739 5C

TOMITA, T.
Analysis of the Yield-Determining Process and its Application to Yield Prediction and Culture Improvement of Lowland Rice: CXIV. On the Increase of Nitrate Nitrogen Utilization Ratio at the Tillering Stage of Rice Plants. (In Japanese),
W75-05849 2G

TORELLI, L.
The Analysis of Monthly Hydrologic Time Series,
W75-05436 2E

TREVORROW, L. E.
Chemical Engineering Division, Waste Management Programs, Quarterly Report, April-June 1974,
W75-05383 5D

TRIHEY, E. W.
Techniques for Determining Amounts and Distribution of Precipitation in Mountain Valleys of Idaho,
W75-05783 2B

TRIPLETT, M. B.
Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

TROEGER, J.
Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

TU, C. M.
Influence of Endrin on Soil Microbial Populations and their Activity,
W75-05497 5B

TUFFEY, T. J.
The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

TURNER, A.
Numerical Analysis of Pumping from Confined-Unconfined Aquifers,
W75-05835 4B

TUSA, I.
Mayfly Larvae in Current Habitats of Bela Creek (The Northwestern Part of Moravia, Czechoslovakia).
W75-05687 2E

TYMOSZCZUK, J.
Process and Apparatus for Treating Wastes by a Combined Activated Sludge and Biological Filter Bed,
W75-05821 5D

VALDES-KRIEG, E.
Foam and Bubble Fractionation for Removal of Trace Metal Ions from Water,
W75-05590 5D

VAN DEMAN, J. M.
A Computerized Model for Determining the Optimal Water Utilization for Agriculture,
W75-05356 6A

VAN FLEET, S. R.
Transpiration Drying of Sanitary Landfills,
W75-05523 5E

VAN LOOCK, H. J. III.
Land-Use Changes and the Economic Evaluation of Natural Virginia Pine Stands on the Dial Creek Watershed, Durham County, North Carolina,
W75-05446 4D

VECCHIOLI, J.
Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

VENEMAN, P. L. M.
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

VIDHYASEKARAN, P.
Multiplication of Algae in Sewage Water,
W75-05539 5G

VOGEL, G. J.
Reduction of Atmospheric Pollution by the Application of Fluidized-Bed Combustion: Annual Report, July, 1972-June, 1973,
W75-05392 5D

VOGEL, W. G.
Chemical Properties and Particle-Size Distribution of 39 Surface-Mine Spoils in Southern West Virginia,
W75-05492 5A

Fertilizer and Herbaceous Cover Influence Establishment of Direct-Seeded Black Locust on Coal-Mine Spoils,
W75-05596 4D

Toxicity of Acid Coal-Mine Spoil to Plants,
W75-05591 5C

VOGENO, W.
Problem-Free Clarifier Sludge Treatment (Problemlose Klarschlammbehandlung),
W75-05727 5D

VOLLHEIM, G.
Examples of Water and Air Purification by Catalytic Reactions (Beispiele Fuer Die Reinhaltung Von Wasser Und Luft Durch Katalytische Reaktionen),
W75-05540 5D

VOLTOLINA, D.
A Phytoplankton Bloom in the Lagoon of Venice,
W75-05699 2L

WALKER, W. R.
Optimal Allocation of Water Quality Controls in Urbanizing River Basins,
W75-05774 5G

Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

WALLACE, A.
Feasibility and Alternate Procedures for Decontamination and Post Treatment Management of Pu-Contaminated areas in Nevada,
W75-05384 5G

WALLACE, DENISE A.
The Relation Between Primary Productivity, Nutrients, and the Trout Environment in Some New Zealand Lakes,
W75-05419 5C

WALLBANK, T. E.
Solvents in Sewage and Industrial Waste Waters: Identification and Determination,
W75-05840 5A

WALTER, M. F.
Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

WALTON, W. C.
Digest of Energy Facts for Water Resources Studies in Minnesota,
W75-05352 3E

Information Concerning Water Resources Research Center Projects, 1964-1974,
W75-05467 9D

Understanding the Water Resources Research Center, Graduate School, University of Minnesota,
W75-05443 6E

WARD, P. S.
Water Quality in the Great Lakes: A New Timetable,
W75-05694 5G

WARD, R. C.
Water Supply, Treatment, Distribution, and Reuse Optimization in Arid Urban Areas,
W75-05773 6A

WATTS, F. J.
Design of Culvert Fishways,
W75-05782 8I

WAUGH, T. C.
Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

WEATHERFORD, D. J.
Boat for Collecting Oil Slicks and Other Contaminants from the Surface of Water,
W75-05816 5G

WEDDLE, A. E.
Careful Renewal of a Campus Loch,
W75-05426 5G

WEDEMEYER, G.
Stress of Formalin Treatment in Juvenile Spring Chinook Salmon (Oncorhynchus Tshawytscha) and Steelhead Trout (Salmo Gairdneri),
W75-05506 5C

WEEKS, J. B.
Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

WELCH, H. E.
Phytoplankton Production in Char Lake, A Natural Polar Lake, and in Meretta Lake, A Polluted Polar Lake, Cornwallis Island, Northwest Territories,
W75-05396 5C

WELCH, R. M.
Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

WELDER, F. A
Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
W75-05637 4C

WELKER, F. S.
Smoke Tests Detect Sources of Illegal Inflow,
W75-05546 8G

WELLER, G.
The Microclimates of the Arctic Tundra,
W75-05830 2C

WENZEL, H. G. JR.
Meter for Sewer Flow Measurement,
W75-05522 5G

WERRELL, W. L.
Stream Gaging by Continuous Injection of Tracer Elements,
W75-05619 2E

WERSHAW, R. L.
Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

WEST, A. W.
Sewage Treatment Plant Dependability with Special Reference to the Activated Sludge Process,
W75-05751 5D

WESTPHAL, J. A.
An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

WHIPPLE, W.
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

WHITE, G. C.
Disinfection: The Last Line of Defense for Potable Water,
W75-05564 5F

WHITE, J. G. H.
Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

WHITE, L. M.
Wamis Abstracts, No. 1,
W75-05767 10A

WHITE, P. W.
Reverse Osmosis and Ultraviltration,
W75-05556 5D

WHITE, R. C.
Sewage Ozonizing Unit,
W75-05819 5D

WHITEHEAD, R. L.
Chemical and Physical Data for Disposal Wells, Eastern Snake River Plain, Idaho,
W75-05632 5B

WHITEHEAD, W. R.
Storage of Fresh Water in Saline Aquifers Using a Well Field,
W75-05465 4B

WIEBE, H. H.
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

WIENTJENS, W. H. J. M.
Mercury, Cadmium, and Chromium in the Netherlands, (Le Mercure, Le Cadmium Et Le Chrome Aux Pays-Bas),
W75-05710 5B

WIGGERT, J. M.
Reverse Flow Routing by the Implicit Method,
W75-05675 2E

WILCOX, R. L.
Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

WILKNISS, P. E.
Measurements of Mercury Sorption by Algae,
W75-05415 5A

WILLEKE, G. E.
Public Perceptions of Water Quality in a Metropolitan Area,
W75-05605 5G

WILLIAMS, D. C. JR.
Socio-Economic Impacts of Rural Water Supplies,
W75-05407 6B

WILSON, H. R.
Relationship of Calcium to Reproductive Abnormalities in the Laying Hen (Gallus domesticus),
W75-05703 5C

WILSON, R. M.
A New Technique for Remote Monitoring of Freshwater Invertebrate Populations,
W75-05441 5A

WILSON, W.
Quantifying Aesthetic Opportunity,
W75-05476 6A

WIXSON, B. G.
Tri-University Report on the Status of Environmental Contamination by Lead,
W75-05567 5B

WOLD, P. B.
4632 TDS Reduced to 322 by Reverse Osmosis,
W75-05566 5D

WOOD, G. O.
Development of Air-Sampling Techniques, Progress Report, October 1, 1973, Through March 31, 1974,
W75-05365 5A

WOODS, M. D.
Method and Apparatus for Purifying Fluids,
W75-05551 5D

WOODWELL, G. M.
An Experiment in the Eutrophication of Terrestrial Ecosystems with Sewage: Evidence of Nitrification in a Late Successional Forest,
W75-05804 5D

WRIGHT, N. W.
Physical-Chemical Treatment at Elevated Temperatures,
W75-05763 5D

YAMAUCHI, T.
Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

YANDELL, E. L. JR.
Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

YANG, J. T. T.
A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

YASUTAKE, W. T.
Stress of Formalin Treatment in Juvenile Spring Chinook Salmon (Oncorhynchus Tshawytscha) and Steelhead Trout (Salmo Gairdneri),
W75-05506 5C

YEH, T-P.
Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

YEO, K. O.
Thermodynamic Studies of the Effects of Solvents on Molecular Complex Formation Equilibria; Orientation of Water Around Nonpolar Solutes in Aqueous Solutions,
W75-05447 1B

YOSHII, K.
Method and Apparatus for Treatment of Liquid Wastes,
W75-05818 5D

YOST, K. J.
Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Characterizing Steel Mill Dust,
W75-05577 5A

The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

YU, S. L.
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

ZDANKUS, N. T.
Analysis of Shallow Hard Rock Well Pumping and Recovery Test Data,
W75-05615 8G

ZOLLER, W. H.
Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

Problems with the use of Cascade Impactors,
W75-05574 5A

ORGANIZATIONAL INDEX

ABCOR, INC., CAMBRIDGE, MASS.
Reverse Osmosis and Ultraviltration,
W75-05556 5D

AGRICULTURAL RESEARCH COUNCIL, TRUMPINGTON (ENGLAND). PLANT BREEDING INST.
Yield of Green Peas: II. Effects of Water and Plant Density,
W75-05758 3F

AGRICULTURAL RESEARCH SERVICE, FOR LAUDERDALE, FLA.
Effect of Phosphorus and Potassium on Phytoplankton Populations in Field Enclosures,
W75-05741 5C

AGRICULTURAL RESEARCH SERVICE, FORT LAUDERDALE, FLA.
Assessing the Capability of the Everglades Marsh Environment for Renovating Wastewater,
W75-05743 5D

Investigations into the Mineral Nutrition of Sawgrass Using Experimental Cultural Techniques,
W75-05750 5D

The Autecology of Sawgrass (Mariscus Jamaicensis) in the Florida Everglades,
W75-05757 5C

AGRICULTURAL RESEARCH SERVICE, FRESNO, CALIF. GROUND WATER RECHARGE FIELD STATION.
Soil and Ground-Water Salinization Beneath Diversified Irrigated Agriculture,
W75-05842 3C

AGRICULTURAL RESEARCH SERVICE, ITHACA, N.Y. PLANT, SOIL AND NUTRITION LAB.
Availability of Zinc From Pea Seeds to Rats,
W75-05707 5C

Effect of Zinc Repletion Late in Gestation on Parturition in the Zinc-Deficient Rat,
W75-05708 5C

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Nitrochromeazo Titrimetric Determination of Sulfate in Irrigation and Other Saline Waters,
W75-05848 5A

AIR FORCE AVIONICS LAB., WRIGHT-PATTERSON, (AFB), OHIO.
An Application of Infrared Remote Sensing Techniques to Ecological Problems,
W75-05679 7B

AKADEMIYA NAUK LITOVSKOI SSR, VILNIUS. INSTITUT ZOOLOGII I PARAZITOLOGII.
Erosion Effect on Soil Fauna Under Different Crops,
W75-05793 2J

AKADEMIYA NAUK SSSR, LENINGRAD. BOTANICHESKII INSTITUT.
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W75-05769 6B

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W75-05632 5B

GEOLOGICAL SURVEY, BOSTON, MASS.
Combining Estimates of Low-Flow Characteristics of Streams in Massachusetts and Rhode Island,
W75-05629 2E

GEOLOGICAL SURVEY, COLUMBIA, S.C.
Lakes Marion-Moultrie Stream System Investigation: Part I--Model Selection, Calibration, and Error Analysis,
W75-05646 2E

GEOLOGICAL SURVEY, DENVER, COLO.
Disposal of Hazardous Wastes,
W75-05504 5G

Pyrrolidone-A New Solvent for the Methylation of Humic Acid,
W75-05631 5A

The Scavenging of Silver by Manganese and Iron Oxides in Stream Sediments Collected from Two Drainage Areas of Colorado,
W75-05652 2J

Cadmium in Plants,
W75-05709 2I

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Dissolved Organic Carbon (DOC), An Index of Organic Contamination in Ground Water Near Barstow, California,
W75-05502 5A

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Land-Surface Subsidence in the Houston-Galveston Region, Texas,
W75-05643 4B

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A Manual for Estimating the Magnitude and Frequency of Floods on Ungaged Streams in Indiana,
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Flood of August 2, 1972, in the Littel Maquoketa River Basin, Dubuque County, Iowa,
W75-05648 2E

GEOLOGICAL SURVEY, LAWRENCE, KANS.
Application of Statistical Techniques to the Estimation of Ground-Water Withdrawals in Northwestern Kansas,
W75-05651 4B

GEOLOGICAL SURVEY, LOUISVILLE, KY.
Derivation of Homogeneous Streamflow Records in the Upper Kentucky River Basin, Southeastern Kentucky,
W75-05644 2E

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Aquifer Tests in Large Diameter Wells in India,
W75-05501 4B

Adjustment of Logarithmic Flood-Frequency Statistics for Gaged California Streams to Minimize the Time Sampling Error,
W75-05630 4A

Water-Quality Data of the Sacramento River, California, May 1972 to April 1973,
W75-05635 5A

Location of the Non-Tidal Current Null Zone in Northern San Francisco Bay,
W75-05650 2L

GEOLOGICAL SURVEY, MENLO PARK, CALIF. WATER RESOURCES DIV.
Study of Fluid Movements Through Causeway,
W75-05610 2F

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Changes in Concentration of Certain Constituents of Treated Waste Water During Movement Through the Magothy Aquifer, Bay Park, New York,
W75-05625 5B

Mobilization of Iron in Water in the Magothy Aquifer During Long-Term Recharge with Tertiary-Treated Sewage, Bay Park, New York,
W75-05626 5B

GEOLOGICAL SURVEY, MINEOLA, N.Y. WATER RESOURCES DIV.
Chemical Interaction During Deep Well Recharge, Bay Park, New York,
W75-05656 5B

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Simulated Effects of Oil-Shale Development on the Hydrology Piceance Basin, Colorado,
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Hydrogeochemistry of the Northern Yucatan Peninsula, Mexico, With a Section on Mayan Water Practices,
W75-05647 2F

A Tax System for Groundwater Management,
W75-05654 6C

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Norman Creek, a Source of Recharge to Maramec Spring, Phelps County, Missouri,
W75-05627 2F

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Recurrent Geothermally Induced Debris Avalanches on Boulder Glacier, Mount Baker, Washington,
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Chemical and Biological Conditions of Lake Okeechobee, Florida, 1969-72,
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Mid-1971 Ground-Water Conditions at Yankeetown Well Field, Levy County, Florida,
W75-05649 2F

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Ground Water Activities in the USGS,
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New Priorities for Ground-Water Quality Protection,
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GOODYEAR ATOMIC CORP., PIKETON, OHIO.
Radiation Data. Section IV. Other data. Environmental Levels of Radioactivity at Atomic Energy Commission Installations,
W75-05378 5A

GRAVER WATER CONDITIONING CO., UNION, N.J.
Removing in Excess of 99% Phosphorus at Ely, Minnesota,
W75-05796 5C

GUYTON (WILLIAM F.) AND ASSOCIATES, HOUSTON, TEX.
Technological Limitations to Ground-Water Management,
W75-05510 6E

HARDING POLLUTION CONTROL CORP., WEST HEMPSTEAD, N.Y.
Evaluation Test of a Small Harbor Oil Spill Retrieval System,
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HARVARD MEDICAL SCHOOL, SOUTHBORO, MASS. NEW ENGLAND REGIONAL PRIMATE RESEARCH CENTER.
Nutritional Iron Deficiency as a Determinant of Host Resistance in the Rat,
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W75-05386 5B

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Looking Through the Eyes of the Public or Public Images as Social Indicators of Aesthetic Opportunity,
W75-05477 6A

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Design of Culvert Fishways,
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Techniques for Determining Amounts and Distribution of Precipitation in Mountain Valleys of Idaho,
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The Analysis of Monthly Hydrologic Time Series,
W75-05436 2E

Meter for Sewer Flow Measurement,
W75-05522 5G

A Systems Approach to the Operation of Flood Control Reservoirs,
W75-05784 4A

ILLINOIS UNIV., URBANA. DEPT. OF FORESTRY.
A Fortran IV Computer Program to Tabulate and Graph Micro-Climatic Data,
W75-05671 7C

ILLINOIS UNIV., URBANA. DEPT. OF GEOLOGY.
Geohydrology of Pleistocene Deposits and Sustained Yield of Principal Pleistocene Aquifer, Lake County, Indiana,
W75-05514 2F

A Numerical Technique for Aquifer Evaluation,
W75-05612 2F

Digital Simulation of a Stream-Aquifer System,
W75-05620 2F

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Experimental Measurements of Particle Motion in a Turbulent Pipe Flow,
W75-05462 8B

ILLINOIS UNIV., URBANA, DEPT. OF SOCIOLOGY.
Some Pollution-Related Attitudes of High School Youth in the United States and Brazil,
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INDIAN INST. OF TECH., KHARAGPUR. DEPT. OF CIVIL ENGINEERING.
Investigations on Filter Headloss,
W75-05809 5D

INSTITUT DE PHYSIQUE DE GLOBE, PARIS (FRANCE).
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W75-05760 5C

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IOWA STATE GEOLOGICAL SURVEY, IOWA CITY.
Summary of Multispectral Flood Inundation Mapping in Iowa,
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The Partition of Calcium Among Cementing Compounds in Aging Highway Concretes,
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A Phytoplankton Bloom in the Lagoon of Venice,
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JODHPUR UNIV., (INDIA). DEPT. OF BOTANY.
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W75-05538 2D

JOHNS HOPKINS UNIV., BALTIMORE. CHESAPEAKE BAY INST.
The Three Dimensional Heated Surface Jet in a Cross Flow,
W75-05360 5B

JOHNS HOPKINS UNIV., BALTIMORE, MD.
The Ecology of the Plankton of the Chesapeake Bay Estuary,
W75-05792 5C

JOHNS HOPKINS UNIV., BALTIMORE, MD. CHESAPEAKE BAY INST.
Ingestion and Assimilation Rates of Chesapeake Bay Zooplankton: Preliminary Report,
W75-05735 5C

Phosphorus Cycling in the Plankton of Chesapeake Bay,
W75-05736 5C

KANSAS STATE UNIV., MANHATTAN. DEPT. OF AGRICULTURAL ENGINEERING.
Filtration Analysis of Four Different Filter Fabrics,
W75-05460 4B

KANSAS UNIV., LAWRENCE. DEPT. OF GEOLOGY; AND KANSAS UNIV., LAWRENCE. DEPT. OF CIVIL ENGINEERING.
Mineralogy of Suspended Sediment and Concentration of Fe, Mn, Ni, Zn, Cu, and Pb in Water and Fe, Mn, and Pb in Suspended Load of Selected Kansas Streams,
W75-05521 5B

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Livestock Manure Disposal Via Hydrogasification,
W75-05351 5D

KAUNASSKII POLITEKHNICHESKII INSTITUT (USSR). HYDRAULIC DIV.
Analysis of Shallow Hard Rock Well Pumping and Recovery Test Data,
W75-05615 8G

KEMIJSKI INSTITUT BORIS KIDRIC, LJUBLJANA (YUGOSLAVIA).
Biological Pollution Indicators in Underground Waters. (In Slovenian),
W75-05616 5A

KENTUCKY WATER RESOURCES INST., LEXINGTON.
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W75-05528 5D

KLEBER-COLOMBESSA, PARIS (FRANCE). (ASSIGNEE)
Floating Anti-Pollution Device,
W75-05825 5G

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W75-05420 5C

LOS ALAMOS SCIENTIFIC LAB., N.M.
Environmental Surveillance at Los Alamos During 1973,
W75-05362 5A

Compatibility of Hafnalloys 105 and 150 with 238PuO2,
W75-05363 5A

Shipping Container for Plutonium-238 as Fissile Material Class 1,
W75-05364 5G

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W75-05379 5A

Electronic Identification and Temperature Monitoring,
W75-05381 7B

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W75-05465 4B

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF PETROLEUM ENGINEERING.
The Use of Bounding Wells to Control Flux in Underground Water Storage Projects,
W75-05464 4B

LOUISIANA STATE UNIV., NEW ORLEANS. DEPT. OF BIOLOGICAL SCIENCES.
Environmental Factors Affecting the Properties and Precipitation of Coloring Colloids in Aquatic Habitats,
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LUND UNIV. (SWEDEN).
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W75-05428 5G

MANHATTAN COLL., BRONX, N.Y. ENVIRONMENTAL ENGINEERING AND SCIENCE PROGRAM.
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W75-05798 5C

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W75-05638 2F

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W75-05574 5A

Normalization and Interpretation of Atmospheric Trace Element Concentration Patterns,
W75-05585 5B

MASSACHUSETTS UNIV., AMHERST. DEPT. OF PLANT AND SOIL SCIENCES.
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W75-05520 5D

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W75-05396 5C

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W75-05740 6G

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W75-05352 3E

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W75-05443 6E

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W75-05440 3C

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W75-05442 2G

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W75-05444 3F

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W75-05467 9D

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W75-05618 8G

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W75-05738 5B

NATIONAL AUDUBON SOCIETY, NEW YORK.
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W75-05803 4C

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W75-05401 5C

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO.
Simultaneous and Automated Determination of Total Phosphorus and Total Kjeldahl Nitrogen,
W75-05756 5A

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Simulation of Storm Velocity Effects on Flow from Distributed Channel Networks,
W75-05518 2E

NEVADA UNIV., RENO.
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W75-05613 4B

Chemical Hydrogeology of the Carbonate Peninsulas of Florida and Yucatan,
W75-05614 2F

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Evaluation of Flood Peak Prediction Methods in Northern Nevada in Relation to Dam Safety,
W75-05468 8B

Theis Equation Analysis of Residual Drawdown Data,
W75-05519 2F

An Evaluation of the Theory of Ground-Water and River-Water Interchange, Winnemucca Reach of the Humboldt River, Nevada,
W75-05529 2A

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Evaluation of Population Growth and Per Capita Consumption of Water on the Regional Economic Growth in the Rio Grande Region in New Mexico,
W75-05791 6B

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W75-05818 5D

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W75-05356 6A

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF SOIL SCIENCE.
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W75-05579 5A

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W75-05425 8A

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W75-05448 2H

Investigation of Artificial Lake Destratification -- A Hydraulic Model Study,
W75-05449 2H

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W75-05447 1B

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W75-05534 5B

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W75-05453 5D

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W75-05450 2I

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W75-05451 3C

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W75-05452 3C

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Report on Long Lake, Cumberland County, Maine.
W75-05730 5C

Report on Bay of Naples and Sebago Lake, Cumberland County, Maine,
W75-05731 5C

Report on Rangeley Lake, Franklin County, Maine,
W75-05732 5C

Report on Long Lake, Aroostook County, Maine,
W75-05733 5C

Report on Mattawamkeag Lake, Aroostook County, Maine,
W75-05734 5C

PANSTWOWY INSTYTUT HYDROLOGICZNO-METEOROLOGICZNY, WARSAW (POLAND).
Transport of Suspended Solids Along the Vistula River,
W75-05828 2J

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
Neutralization of Acidic Wastes by Crushed Limestone: Evaluation of Prototype Crushed Limestone Barriers for the Neutralization of Acidic Streams,
W75-05454 5G

POERTNER (HERBERT G.), BOLINGBROOK, ILL.
Drainage Plans with Environmental Benefits.
W75-05422 8A

POLISH ACADEMY OF SCIENCES, KRAKOW. ZAKLAD BIOLOGII WOD.
The Distribution of the Bottom Fauna in Several Streams of the Middle Balkan in the Summer Period,
W75-05666 2E

POLLUTION CONTROL INC., SOUTH BARRE, VT. (ASSIGNEE)
Liquid Purification Apparatus and Process,
W75-05552 5D

PURDUE UNIV., LAFAYETTE, IND.
The Environmental Flow of Cadmium and Other Trace Metals: Volume I,
W75-05431 5B

The Environmental Flow of Cadmium and Other Trace Metals: Volume II,
W75-05432 7C

Analysis of Cadmium Paths in Zinc Smelter Operations,
W75-05572 5B

Industrial Source Sampling for Trace Metals,
W75-05575 5A

Characterizing Steel Mill Dust,
W75-05577 5A

Denitrification in Indiana Lake, Reservoir, and Pond Sediments,
W75-05785 5B

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRICULTURAL ENGINEERING.
Adsorption of Phosphorus by Unsaturated Synthetic Soil,
W75-05463 5B

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF GEOSCIENCES.
Form and Fluvial Processes in Alluvial Stream Channels. Studies in Fluvial Geomorphology No. 2,
W75-05526 2E

Drainage Basin Response: Documented Historical Change and Theoretical Considerations. Studies in Fluvial Geomorphology. No. 3,
W75-05527 2E

PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF INDUSTRIAL ENGINEERING.
Modeling Cadmium Discharge from an Electroplating Line with the GASP IV Simulation Language,
W75-05573 5B

PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF MECHANICAL ENGINEERING.
Transient Three Dimensional Modeling of Temperature Distributions in Rivers with and without Thermal Discharges,
W75-05786 5B

PUSAN FISHERIES COLL. (REPUBLIC OF KOREA). DEPT. OF FISHERIES TECHNOLOGY.
Responses of Penaeus Japonicus Bate to Fishing Net and Electrical Stimulation for the Improvement of Fishing Efficacy, (In Korean),
W75-05394 8I

QUEENSLAND IRRIGATION AND WATER SUPPLY COMMISSION, BRISBANE (AUSTRALIA). SYSTEMS BRANCH.
Planning the Development of Water Resources,
W75-05832 6B

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF CHEMICAL ENGINEERING; AND RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF BIOCHEMICAL ENGINEERING.
Stochastic Modeling of the Passaic River Flow,
W75-05660 2E

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Nitrification Effects in Waste Treatment Processes,
W75-05661 5D

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ECONOMICS.
Alternative Methods of Evaluating the Economic and Social Aspects of Water Quality,
W75-05445 5G

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ENVIRONMENTAL SCIENCE.
Instream Aeration and Parameters of Stream and Estuarine Nitrification,
W75-05530 5A

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ENVIRONMENTAL SCIENCES.
Photosynthetic Reaeration in the Upper Passaic River,
W75-05662 5B

Distribution of Autotrophic Nitrifying Bacteria in the Passaic River,
W75-05663 5B

RUTGERS-THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ENVIRONMENTAL SERVICES.
The Detection and Study of Nitrification in Streams and Estuaries,
W75-05659 5A

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF SOILS AND CROPS.
The Water Quality and Bottom Sediment Characteristics of New Jersey Lagoon Developments,
W75-05658 5B

The Release of Phosphorus from Pond Sediments and Its Availability to Lemna minor L.,
W75-05789 5C

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ZOOLOGY.
A Study of Benthic Invertebrates in Lagoon Systems in the Salt Marshes of New Jersey,
W75-05664 2L

SANDERS (B.G.) AND ASSOCIATES, INC., ATLANTA, GA.
Comprehensive Water and Sewer Plan, Bradley County, Tennessee.
W75-05430 6B

SAO PAULO UNIV. (BRAZIL). DEPT. OF ZOOLOGY.
Ecologic and Adaptive Aspects of Some Bivalves of The Sao Paulo Seacoast, (In Portuguese),
W75-05714 2L

SHEFFIELD UNIV. (ENGLAND).
Careful Renewal of a Campus Loch,
W75-05426 5G

SKIDAWAY INST. OF OCEANOGRAPHY, SAVANNAH, GA.
Transport Fate and Geochemical Interactions of Mercury, Cadmium and Other Inorganic Pollutants in the Coastal Littoral-Salt Marsh Environment of the Southeastern United States.
W75-05416 5B

SOUTH DAKOTA STATE UNIV., BROOKINGS. DEPT. OF BIOCHEMISTRY.
Relative Toxicities of Selenite and Selenate in the Drinking Water of Rats,
W75-05490 5C

SOUTH EASTERN COUNCIL OF GOVERNMENTS, SIOUX FALLS, S. DAK.
Interim Water Quality Plan for the Minnehaha County Standard Metropolitan Statistical Area and District II.
W75-05421 6B

SOUTH YORKSHIRE METROPOLITAN COUNTRY COUNCIL (ENGLAND).
Telemetry in Water Pollution Control,
W75-05397 5D

SOUTHERN ILLINOIS UNIV., CARBONDALE.
An Evaluation of Water Reuse for Municipal Supply,
W75-05482 5D

SPECTROGRAM CORP., NORTH HAVEN, CONN.
Discrimination of Waste Oils by Micro Emission Spectrochemical analysis,
W75-05680 5A

STANFORD UNIV., CALIF. DEPT. OF PETROLEUM ENGINEERING.
Pressure Buildup and Drawdown Behavior in Undersaturated Reservoirs of Discontinuous Permeability,
W75-05617 4B

STATE UNIV. OF IOWA, IOWA CITY. DEPT. OF MECHANICS AND HYDRAULICS.
Transverse Mixing of Heated Effluents in Open-Channel Flow,
W75-05657 5B

Reverse Flow Routing by the Implicit Method,
W75-05675 2E

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF CIVIL ENGINEERING.
Chlorides in Lake Erie Basin,
W75-05355 5B

SWEDISH WATER AND AIR POLLUTION RESEARCH LAB., STOCKHOLM.
Control of Mercury in Effluents from Chlorine Plants,
W75-05435 5D

TAMIL NADU AGRICULTURAL UNIV., COIMBATORE, (INDIA).
Multiplication of Algae in Sewage Water,
W75-05539 5G

TENNESSEE UNIV., KNOXVILLE. DEPT. OF AGRICULTURAL ENGINEERING.
Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W75-05606 5B

TENNESSEE VALLEY AUTHORITY, MUSCLE SHOALS, ALA. DIV. OF AGRICULTURAL DEVELOPMENT.
Uses of Power Plant Discharge Water in Greenhouse Production,
W75-05380 3C

TEXACO, INC., NEW YORK. (ASSIGNEE)
Sewage Ozonizing Unit,
W75-05819 5D

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF SOIL AND CROP SCIENCES.
A Procedure for Placing Large Undistrubed Monoliths in Lysimeters,
W75-05517 2G

TEXAS A AND M UNIV., GALVESTON. CENTER FOR MARINE RESOURCES.
A Quantitative and Qualitative Survey of Oils and Tars Stranded on Galveston Island Beaches,
W75-05681 5A

TEXAS WATER DEVELOPMENT BOARD, AUSTIN.
Groundwater Models for Texas,
W75-05508 2F

TEXAS WATER QUALITY BOARD, AUSTIN; AND ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.
Recommendations of the Galveston Bay Enforcement Conference.
W75-05801 5C

TORONTO UNIV., (ONTARIO). DEPT. OF GEOLOGY.
Solvent Extraction for Use with Flame Atomic Absorption Spectrometry,
W75-05488 5A

TORONTO UNIV. (ONTARIO). DEPT. OF ZOOLOGY.
The Phosphorus-Chlorophyll Relationship in Lakes,
W75-05837 2H

TOULOUSE-3 UNIV. (FRANCE). LABORATOIRE DE BIOLOGIE QUANTITATIVE.
Phytoplankton and Primary Production of a High Lake in the Pyrenees: A Fractorial Analysis of 'Correspondences' Applied to Data from Lake Port-Bielh. (In French),
W75-05622 2H

TOULOUSE-3 UNIV. (FRANCE). LABORATORIE D'HYDROBIOLOGIE.
Phytobenthos and Primary Production of a High Mountain Lake in the Central Pyrenees. (In French),
W75-05672 2H

TROMSOE UNIV. (NORWAY). INST. OF BIOLOGY AND GEOLOGY.
The Ecosystem of the Arctic Lake Nordlaguna, Jan Mayen Island: III. Ecology of Arctic Char, Salvelinus Alpinus (L.),
W75-05676 2H

TURIN UNIV. (ITALY). ISTITUTO DI CHIMICA ANALITICA.
Spectropolarimetric Determination of Copper (II), Nickel (II) and Iron (III) Ions with N-Carboxymethylpyrrolidine-2-Carboxylic Acid,
W75-05704 2K

UNION CARBIDE CORP., OAK RIDGE, TENN. COMPUTER SCIENCE DIV.
A Multi-Source Atmospheric Transport Model for Deposition of Trace Contaminants,
W75-05570 5B

UNION CARBIDE CORP., OAK RIDGE, TENN. COMPUTER SCIENCES DIV.
Overview of a Unified Transport Model,
W75-05569 5B

A Soil and Ground-Water Pollutant Transport Model,
W75-05581 5B

Computer Model for Chemical Exchange in the Stream System,
W75-05583 5B

UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, MEXICO CITY. INSTITUTO DE BIOLOGIA.
Hydrology and Phytoplankton of a Continental Shelf Transect of Campeche Bay, Mexico (August, 1972). (In Spanish),
W75-05673 2L

UNIVERSITY OF SOUTHERN MISSISSIPPI, HATTIESBURG. DEPT. OF ECONOMICS.
Socio-Economic Impacts of Rural Water Supplies,
W75-05407 6B

UNIVERSITY OF WESTERN ONTARIO, LONDON. FACULTY OF ENGINEERING SCIENCE.
A Mathematical Simulation of Lake Ecology and Control of its Balance,
W75-05795 5C

UTAH STATE UNIV., LOGAN.
Toward a Technique for Quantifying Aesthetic Quality of Water Resources,
W75-05473 6A

An Overview: The Development of Aesthetic Opportunity Criteria as it Relates to the Planning Process,
W75-05475 6A

Understanding Scenes: An Evaluation Technique,
W75-05478 6A

TAH STATE UNIV., LOGAN. DEPT. OF OTANY.
Influence of Moisture, Heat and Light Stress on Hydrogen Fluoride Fumigation Injury to Soybeans,
W75-05588 3F

TAH STATE UNIV., LOGAN. DEPT. OF OREST SCIENCE.
Chemistry of Throughfall Under Douglas Fir and Rocky Mountain Juniper,
W75-05685 2I

ANDERBILT UNIV., NASHVILLE, TENN.
Analytical Modeling of Thermal Discharges: A Review of the State of the Art,
W75-05370 5B

ANDERBILT UNIV., NASHVILLE, TENN. EPT. OF GEOLOGY.
Porosity and Hydrology of Jointed Middle Ordovician Limestones in the J. Percy Priest Dam Area of Central Tennessee,
W75-05470 2F

RGINIA POLYTECHNIC INST. AND STATE NIV., BLACKSBURG. DEPT. OF NVIRONMENTAL SCIENCES AND NGINEERING.
Agricultural and Forest Land Runoff in Upper South River Near Waynesboro, Virginia,
W75-05358 5B

ASTIVEDNY USTAV SUMPERKU, ZECHOSLOVAKIA).
Mayfly Larvae in Current Habitats of Bela Creek (The Northwestern Part of Moravia, Czechoslovakia).
W75-05687 2E

AIKATO VALLEY AUTHORITY, HAMILTON EW ZEALAND).
Random and Systematic Errors in Precipitation at an Exposed Site,
W75-05845 2B

ASHINGTON STATE WATER RESEARCH NTER, PULLMAN.
An Evaluation of the Research Program for the State of Washington Water Research Center.
W75-05455 6B

ASHINGTON UNIV., SEATTLE. COLL. OF SHERIES.
An Annotated Bibliography of the Effects of Logging on Fish of the Western United States and Canada,
W75-05500 5C

ASHINGTON UNIV., SEATTLE. DEPT. OF EANOGRAPHY.
The Rate of Mercury Loss from Contaminated Estuarine Sediments in Bellingham Bay, Washington,
W75-05578 5B

ASHINGTON UNIV., ST. LOUIS, MO. INST. R URBAN AND REGIONAL STUDIES.
Analysis of Theories and Methods for Estimating, Benefits of Protecting Urban Floodplains,
W75-05481 4A

WATER POLLUTION RESEARCH LAB., STEVENAGE (ENGLAND).
The Reclamation of Water from Sewage Effluents by Reverse Osmosis,
W75-05399 5D

WEIL-MCLAIN CO., INC., DALLAS, TEX. (ASSIGNEE)
Control Apparatus for a Water Supply System,
W75-05817 8C

WISCONSIN UNIV., MADISON. DEPT. OF AGRICULTURAL ENGINEERING.
Nitrate Movement in Soil Under Early Spring Conditions,
W75-05457 5B

WISCONSIN UNIV., MADISON. DEPT. OF BIOCHEMISTRY.
Effect of Dietary Selenium on Erythrocyte and Liver Glutathione Peroxidase in the Rat,
W75-05697 5C

WISCONSIN UNIV., MADISON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Selective Withdrawal at an Intermediate Depth from a Density Stratified Impoundment,
W75-05456 5G

Investigation and Verification of a Model for the Dispersion Coefficient Tensor in Flow Through Anisotropic, Homogeneous, Porous Media With Application to Flow from a Recharge Well Through a Confined Aquifer,
W75-05458 2F

WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.
Limitations of the Instantaneous Profile Method for Field Measurement of Unsaturated Hydraulic Conductivity,
W75-05843 2G

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Cadmium Accural in a Combined Wastewater Treatment-Aquaculture System,
W75-05580 5C

WYOMING UNIV., LARAMIE. DEPT. OF SOCIOLOGY.
A Study of Aesthetic Preferences,
W75-05359 6B

WYOMING UNIV., LARAMIE. DIV. OF AGRICULTURAL ECONOMICS.
Municipal and Industrial Reimbursement for a Water Resource Project in Wyoming's Platte River Basin,
W75-05472 6C

YALE UNIV., NEW HAVEN, CONN.
Eutrophication,
W75-05749 5C

ACCESSION NUMBER INDEX

W75-05351 5D
W75-05352 3E
W75-05353 4A
W75-05354 5C
W75-05355 5B
W75-05356 6A
W75-05357 5B
W75-05358 5B
W75-05359 6B
W75-05360 5B
W75-05361 5C
W75-05362 5A
W75-05363 5A
W75-05364 5G
W75-05365 5A
W75-05366 5C
W75-05367 5C
W75-05368 5D
W75-05369 5G
W75-05370 5B
W75-05371 5D
W75-05372 8I
W75-05373 5B
W75-05374 5A
W75-05375 5A
W75-05376 5B
W75-05377 5A
W75-05378 5A
W75-05379 5A
W75-05380 3C
W75-05381 7B
W75-05382 5B
W75-05383 5D
W75-05384 5G
W75-05385 8H
W75-05386 5B
W75-05387 5C
W75-05388 5B
W75-05389 5B
W75-05390 7C
W75-05391 6G
W75-05392 5D
W75-05393 5D
W75-05394 8I
W75-05395 6G
W75-05396 5C
W75-05397 5D
W75-05398 5A
W75-05399 5D
W75-05400 5B
W75-05401 5C
W75-05402 5C
W75-05403 5B
W75-05404 5A
W75-05405 5A
W75-05406 5C
W75-05407 6B
W75-05408 5G
W75-05409 2K
W75-05410 5B
W75-05411 5B
W75-05412 5D
W75-05413 5B
W75-05414 5B
W75-05415 5A
W75-05416 5B
W75-05417 5B
W75-05418 3F
W75-05419 5C
W75-05420 5C
W75-05421 6B
W75-05422 8A
W75-05423 8A
W75-05424 8A
W75-05425 8A
W75-05426 5G
W75-05427 8A
W75-05428 5G
W75-05429 5D
W75-05430 6B
W75-05431 5B
W75-05432 7C
W75-05433 5D
W75-05434 5B
W75-05435 5D
W75-05436 2E
W75-05437 6E
W75-05438 5C
W75-05439 9D
W75-05440 3C
W75-05441 5A
W75-05442 2G
W75-05443 6E
W75-05444 3F
W75-05445 5G
W75-05446 4D
W75-05447 1B
W75-05448 2H
W75-05449 2H
W75-05450 2I
W75-05451 3C
W75-05452 3C
W75-05453 5D
W75-05454 5G
W75-05455 6B
W75-05456 5G
W75-05457 5B
W75-05458 2F
W75-05459 5D
W75-05460 4B
W75-05461 5G
W75-05462 8B
W75-05463 5B
W75-05464 4B
W75-05465 4B
W75-05466 3F
W75-05467 9D
W75-05468 8B
W75-05469 5B
W75-05470 2F
W75-05471 3E
W75-05472 6C
W75-05473 6A
W75-05474 6A
W75-05475 6A
W75-05476 6A
W75-05477 6A
W75-05478 6A
W75-05479 6A
W75-05480 2H
W75-05481 4A
W75-05482 5D
W75-05483 5G
W75-05484 5D
W75-05485 5A
W75-05486 5B
W75-05487 5A
W75-05488 5A
W75-05489 5A
W75-05490 5C
W75-05491 5C
W75-05492 5A
W75-05493 4D
W75-05494 5A
W75-05495 8I
W75-05496 4D
W75-05497 5B
W75-05498 2H
W75-05499 4D
W75-05500 5C
W75-05501 4B
W75-05502 5A
W75-05503 4B
W75-05504 5G
W75-05505 5C
W75-05506 5C
W75-05507 5D
W75-05508 2F
W75-05509 5B
W75-05510 6E
W75-05511 4B
W75-05512 2I
W75-05513 4B
W75-05514 2F
W75-05515 8G
W75-05516 8A
W75-05517 2G
W75-05518 2E
W75-05519 2F
W75-05520 5D
W75-05521 5B
W75-05522 5G
W75-05523 5E
W75-05524 2B
W75-05525 2L
W75-05526 2E
W75-05527 2E
W75-05528 5D
W75-05529 2A
W75-05530 5A
W75-05531 2D
W75-05532 2D
W75-05533 5C
W75-05534 5B
W75-05535 2F
W75-05536 6B
W75-05537 5D
W75-05538 2D
W75-05539 5G
W75-05540 5D
W75-05541 8G
W75-05542 8C
W75-05543 5D
W75-05544 5D
W75-05545 5A
W75-05546 8G
W75-05547 2I
W75-05548 3F
W75-05549 5A
W75-05550 5G
W75-05551 5D
W75-05552 5D
W75-05553 8C
W75-05554 5F
W75-05555 5A
W75-05556 5D
W75-05557 5D
W75-05558 5F
W75-05559 5D
W75-05560 5D
W75-05561 5D
W75-05562 5D
W75-05563 5D
W75-05564 5F
W75-05565 5D
W75-05566 5D
W75-05567 5B
W75-05568 5B
W75-05569 5B
W75-05570 5B
W75-05571 5B
W75-05572 5B
W75-05573 5B
W75-05574 5A
W75-05575 5A
W75-05576 5A
W75-05577 5A
W75-05578 5B
W75-05579 5A
W75-05580 5C
W75-05581 5B
W75-05582 5B
W75-05583 5B
W75-05584 5B
W75-05585 5B
W75-05586 5B
W75-05587 5B
W75-05588 3F
W75-05589 5G
W75-05590 5D
W75-05591 5C
W75-05592 4C
W75-05593 4C
W75-05594 4D
W75-05595 4D
W75-05596 4D
W75-05597 4D
W75-05598 5C
W75-05599 7B
W75-05600 5C
W75-05601 2H
W75-05602 5B
W75-05603 4D
W75-05604 6D
W75-05605 5G
W75-05606 5B
W75-05607 5D
W75-05608 5D
W75-05609 5C
W75-05610 2F
W75-05611 8F
W75-05612 2F
W75-05613 4B
W75-05614 2F
W75-05615 8G
W75-05616 5A
W75-05617 4B
W75-05618 8G
W75-05619 2E
W75-05620 2F
W75-05621 8C
W75-05622 2H
W75-05623 2G
W75-05624 2J
W75-05625 5B
W75-05626 5B
W75-05627 2F
W75-05628 5B
W75-05629 2E
W75-05630 4A
W75-05631 5A
W75-05632 5B
W75-05633 2F
W75-05634 5C
W75-05635 5A
W75-05636 5C
W75-05637 4C
W75-05638 2F
W75-05639 7C
W75-05640 4A
W75-05641 4B
W75-05642 4B
W75-05643 4B
W75-05644 2E
W75-05645 4A
W75-05646 2E
W75-05647 2F
W75-05648 2E
W75-05649 2F
W75-05650 2L
W75-05651 4B
W75-05652 2J
W75-05653 5A
W75-05654 6C
W75-05655 4A
W75-05656 5B
W75-05657 5B
W75-05658 5B
W75-05659 5A
W75-05660 2E
W75-05661 5D
W75-05662 5B

W75-05663 5B
W75-05664 2L
W75-05665 7C
W75-05666 2E
W75-05667 5B
W75-05668 5B
W75-05669 5B
W75-05670 10C
W75-05671 7C
W75-05672 2H
W75-05673 2L
W75-05674 7B
W75-05675 2E
W75-05676 2H
W75-05677 2C
W75-05678 2C
W75-05679 7B
W75-05680 5A
W75-05681 5A
W75-05682 5D
W75-05683 4C
W75-05684 8E
W75-05685 2I
W75-05686 5A
W75-05687 2E
W75-05688 5D
W75-05689 2H
W75-05690 5B
W75-05691 5C
W75-05692 5C
W75-05693 5C
W75-05694 5G
W75-05695 5D
W75-05696 5C
W75-05697 5C
W75-05698 2I
W75-05699 2L
W75-05700 5C
W75-05701 2J
W75-05702 5A
W75-05703 5C
W75-05704 2K
W75-05705 5C
W75-05706 5C
W75-05707 5C
W75-05708 5C
W75-05709 2I
W75-05710 5B
W75-05711 5A
W75-05712 6D
W75-05713 2J
W75-05714 2L
W75-05715 2E
W75-05716 4D
W75-05717 7C
W75-05718 2G
W75-05719 2H
W75-05720 2E
W75-05721 7B
W75-05722 7B
W75-05723 2G
W75-05724 5A
W75-05725 5C
W75-05726 5D
W75-05727 5D
W75-05728 5C
W75-05729 5C
W75-05730 5C
W75-05731 5C
W75-05732 5C
W75-05733 5C
W75-05734 5C
W75-05735 5C
W75-05736 5C
W75-05737 6G
W75-05738 5B
W75-05739 5C
W75-05740 6G
W75-05741 5C
W75-05742 6G
W75-05743 5D
W75-05744 5C
W75-05745 5C
W75-05746 5C
W75-05747 5C
W75-05748 5C
W75-05749 5C
W75-05750 5D
W75-05751 5D
W75-05752 5C
W75-05753 5D
W75-05754 5C
W75-05755 5C
W75-05756 5A
W75-05757 5C
W75-05758 3F
W75-05759 5C
W75-05760 5C
W75-05761 5C
W75-05762 2J
W75-05763 5D
W75-05764 4A
W75-05765 4B
W75-05766 2A
W75-05767 10A
W75-05768 4C
W75-05769 6B
W75-05770 6A
W75-05771 6A
W75-05772 6E
W75-05773 6A
W75-05774 5G
W75-05775 5D
W75-05776 4A
W75-05777 2G
W75-05778 4A
W75-05779 2D
W75-05780 5B
W75-05781 9D
W75-05782 8I
W75-05783 2B
W75-05784 4A
W75-05785 5B
W75-05786 5B
W75-05787 5B
W75-05788 6E
W75-05789 5C
W75-05790 6B
W75-05791 6B
W75-05792 5C
W75-05793 2J
W75-05794 5C
W75-05795 5C
W75-05796 5C
W75-05797 5C
W75-05798 5C
W75-05799 5C
W75-05800 2I
W75-05801 5C
W75-05802 5C
W75-05803 4C
W75-05804 5D
W75-05805 5C
W75-05806 4A
W75-05807 6G
W75-05808 5D
W75-05809 5D
W75-05810 5B
W75-05811 5B
W75-05812 5A
W75-05813 5D
W75-05814 5D
W75-05815 5D
W75-05816 5G
W75-05817 8C
W75-05818 5D
W75-05819 5D
W75-05820 5D
W75-05821 5D
W75-05822 5A
W75-05823 5A
W75-05824 5G
W75-05825 5G
W75-05826 5D
W75-05827 5B
W75-05828 2J
W75-05829 2L
W75-05830 2C
W75-05831 2D
W75-05832 6B
W75-05833 2G
W75-05834 2C
W75-05835 4B
W75-05836 2G
W75-05837 2H
W75-05838 5A
W75-05839 7B
W75-05840 5A
W75-05841 2B
W75-05842 3C
W75-05843 2G
W75-05844 2B
W75-05845 2B
W75-05846 5G
W75-05847 2D
W75-05848 5A
W75-05849 2G
W75-05850 2H

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-05360 -- 05393 05395	35
Cornell University, Policy Models for Water Resources Systems	W75-05473 -- 05479 05481 -- 05483 05608	11
East Central State College, Agricultural Livestock Wastes	W75-05606 -- 05607	2
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-05396 -- 05402 05537 05539 -- 05546 05549 -- 05566 05809 -- 05815	41
Illinois State Water Survey, Hydrology	W75-05517 -- 05524 05657, 05665 05667 -- 05671 05674 -- 05675 05677 -- 05681 05827 -- 05845	41
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-05724 -- 05727	4
National Water Well Association, Water Well Construction Technology	W75-05501 -- 05504 05508 05510 -- 05511 05513 -- 05516 05611 -- 05615 05617 -- 05621 05623	22
University of Arizona, Arid Land Water Resources	W75-05721 -- 05722	2
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-05604 -- 05605	2
University of Wisconsin, Eutrophication	W75-05406 -- 05407 05609 05728 -- 05757 05759 -- 05761 05792 05794 -- 05799 05801 -- 05808	51
B. State Water Resources Research Institutes		
Alabama Water Resources Research Institute	W75-05525	1
Alaska Institute of Water Resources	W75-05762	1
Arizona Water Resources Research Center	W75-05682 05763 -- 05771	10
California Water Resources Center	W75-05683 -- 05684	2
Colorado Environmental Resources Center	W75-05459 05772 -- 05774 05776 -- 05779	8

Source	Accession Number	Total
B. State Water Resources Research Institutes (Cont'd)		
Connecticut Institute of Water Resources	W75-05437 -- 05438 05780	3
Delaware Water Resources Center	W75-05781	1
Idaho Water Resources Research Institute	W75-05782 -- 05783	2
Illinois Water Resources Center	W75-05461 -- 05462 05775, 05784	4
Indiana Water Resources Research Center	W75-05463 05526 -- 05527 05785 -- 05786	5
Kansas Water Resources Research Institute	W75-05351, 05460	2
Kentucky Water Resources Research Institute	W75-05528	1
Louisiana Water Resources Research Institute	W75-05464 -- 05465 05787	3
Minnesota Water Resources Research Center	W75-05352 -- 05354 05439 -- 05444 05466 -- 05467 05788	12
Nevada Center for Water Resources Research	W75-05468, 05529	2
New Jersey Water Resources Research Institute	W75-05445, 05530 05658 -- 05664 05789	10
New Mexico Water Resources Research Institute	W75-05469, 05531 05790 -- 05791	4
New York Water Resources and Marine Sciences Center	W75-05355, 05532	2
North Carolina Water Resources Research Institute	W75-05356 -- 05357 05446	3
Oklahoma Water Resources Research Institute	W75-05447 -- 05449	3
Oregon Water Resources Research Institute	W75-05450 -- 05453 05534	5
Pennsylvania Institute for Research on Land and Water Resources	W75-05454	1
Tennessee Water Resources Research Center	W75-05470	1
Texas Water Resources Institute	W75-05533	1
Utah Center for Water Resources Research	W75-05685	1
Virginia Water Resources Research Center	W75-05358	1
Washington Water Research Center	W75-05455	1
Wisconsin Water Resources Center	W75-05456 -- 05458	3
Wyoming Water Resources Research Institute	W75-05359	1

ABSTRACT SOURCES

Source	Accession Number	Total
C. Other		
BioSciences Information Service	W75-05394 05408 -- 05409 05419 -- 05420 05480, 05495 05498 05505 -- 05507 05509, 05512 05538 05547 -- 05548 05588, 05601 05616, 05622 05636, 05666 05672 -- 05673 05676, 05687 05689 05698 -- 05699 05712, 05714 05719, 05723 05758, 05793 05800 05846 -- 05850	41
Engineering Aspects of Urban Water Resources (Poertner)	W75-05418 05421 -- 05430	11
Forest Service (USDA)	W75-05492 -- 05494 05496 -- 05497 05499 -- 05500 05591 -- 05600 05602 -- 05603 05713 05715 -- 05718 05720	25
Ocean Engineering Information Service (Patents)	W75-05816 -- 05826	11
Office of Water Research and Technology	W75-05471 -- 05472 05535 -- 05536	4
U.S. Geological Survey	W75-05436, 05610 05624 -- 05635 05637 -- 05656	34
Vanderbilt University, Metals Pollution	W75-05403 -- 05405 05410 -- 05417 05431 -- 05435 05484 -- 05491 05567 -- 05587 05589 -- 05590 05686, 05688 05690 -- 05697 05700 -- 05711	69

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
- WATER QUALITY MANAGEMENT AND PROTECTION
- WATER RESOURCES PLANNING
- RESOURCES DATA
- ENGINEERING WORKS
- MANPOWER, GRANTS, AND FACILITIES
- SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

- SUBJECT INDEX
- AUTHOR INDEX
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- ABSTRACT SOURCES

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 12
JUNE 15, 1975

W75-05851 -- W75-06350
CODEN: SWRABW

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

PROCEEDINGS OF THE JOINT FAO/U.S.S.R. INTERNATIONAL SYMPOSIUM IN FOREST INFLUENCES AND WATERSHED MANAGEMENT, MOSCOW, U.S.S.R. 17 AUGUST-6 SEPTEMBER 1970.
For primary bibliographic entry see Field 4D.
W75-05912

TRANSITION IN RESEARCH ON SMALL FORESTED WATERSHEDS IN WEST VIRGINIA,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. H. Patric, and G. R. Trimble, Jr.
In: National Symposium on Watersheds in Transition, Proceedings Series No. 14, p 272-275, 1972. 21 ref.

Descriptors: *Forest watersheds, Natural resources, *Small watersheds, Water quality, *West Virginia, *Research priorities, Streamflow, Forest management, Water supply, *Watershed management.
Identifiers: *Fernow watersheds(W Va).

The Fernow Watersheds are described, the research on them is summarized, and the hydrologic concepts and other factors that determined research priority are reviewed. (Forest Service)
W75-05919

THE HYDROLOGIC CHARACTERISTICS OF UNDRAINED ORGANIC SOILS IN THE LAKE STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 2G.
W75-05924

INTERNATIONAL SYMPOSIUM ON MATHEMATICAL MODELS IN HYDROLOGY, WARSAW, POLAND, JULY 26-31, 1971,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
EOS, Transactions, American Geophysical Union, Vol. 53, No. 1, p 26-28, January 1972.

Descriptors: *Conferences, *Mathematical models, *Reviews, *Analytical techniques, *Simulation analysis, *River basin development, *Water resources, *Watershed management, *Systems analysis, Data acquisition, Network design.
Identifiers: Symposia, Stochastic hydrology, Deterministic hydrology, Lumped systems, Distributed systems, Interdisciplinary research.

A summary is presented of the symposium which was organized under the auspices of the International Association of Scientific Hydrology, an arm of the International Union of Geodesy and Geophysics, with the sponsorship of Unesco and WMO. It was held at the Polish Academy of Sciences in Warsaw. The five-day symposium was divided into 17 sections. A reporter summarized 4 to 7 papers and the authors, if present, were given an opportunity to amplify or correct the reporters' summary. The audience then was able to discuss the papers in each group (all interventions were simultaneously translated into English, Polish, French and Russian). Repeatedly the discussions made it clear that the better models were unique in that they were designed to solve a particular problem--in a particular context of present knowledge, data available, physical and economic constraints, and hydrologic and social goals. From this complex context, several basic patterns of analysis became evident as well as detailed procedures for using each pattern. And in the process the terminology of mathematical models in hydrology was clarified. (Forest Service)
W75-05934

THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAMME,
Commonwealth Scientific and Industrial Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 7A.
W75-05953

A NONLINEAR TIME VARIANT RAINFALL-RUNOFF MODEL FOR AUGMENTING MONTHLY DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
S. Tuffuor, and J. W. Labadie.
Water Resources Research, Vol 10, No 6, p 1161-1166, December 1974. 5 fig, 2 tab, 16 ref. AID/csd-2460.

Descriptors: *Mathematical models, *Rainfall-runoff relationships, *River basins, Data collections, Model studies, Evapotranspiration, *Hydrologic data, Flooding, Data processing.
Identifiers: *Ghana(Todzie River basin), Developing countries.

Deficiency of data is a serious obstacle to river basin management in developing countries. A lumped, nonlinear, seasonally time variant rainfall-runoff model was applied to the problem of augmenting limited monthly runoff data for the Todzie River basin, Ghana. When the trade-off between model realism (and therefore complexity) and its practical usability for a developing nation is considered, a proper balance may be achieved in the model presented. Though the model is nonlinear, it is simple and easily calibrated or identified by gradient search procedures. The model produced estimates of seasonal evapotranspiration (assuming four distinct seasons per year) that were extremely close to available historical data. It also gave a good fit to available runoff records for the more important wet seasonal flows. (Jess-ISWS)
W75-05957

THE PULVINATE MOSS VEGETATION IN THE KARADJ-VALLEY (ELBURS MOUNTAINS, IRAN), (IN GERMAN),
Tuebingen Univ. (West Germany). Lehrbereich fuer Spezielle Botanik.
W. Frey, and W. Probst.
Bot Jahr Syst Pflanzengesch Pflanzengeogr. Vol 93, No 3, p 404-423, 1973, Illus, English summary.

Descriptors: *Vegetation, *Mosses, Iran.
Identifiers: Karadj Valley(Iran), Elburs Mountains.

The composition and variation in total surface cover of the pulvinate moss vegetation in the Karadj-Valley (Elburs Mountains, Iran) and the surface cover values in N, E, S and W directions from the edge of the mountain range in the south (Karadj) to the high mountain chain (Kandavan Pass) are described. Microclimatic conditions explain the high surface cover measurements. The surface cover values were ascertained at 14 points along the 73 km valley. The total surface cover at the edge of the mountain range is only 0.01%. At the entrance to the valley it rises immediately to about 25% and remains at this value until point 7. However, from points 8-10 the surface cover values rise to over 60% and then decline steadily from point 11 to 3% at point 14. These high values coincide with a short east-west tract in the normally north-south valley. A similar figure is obtained by the fractional surface cover values for the individual exposure zones. The surface cover of the pulvinate mosses is on average higher in the northerly exposed zone and lower in the southerly exposed zone. Maximal peaks of over 50% are reached in the latter zone (point 10, 65%). The pulvinate moss community comprises only a few species. Although the southern part of the Elburs Mountains is influenced by a steppe climate characterized by winter rainfall and summer drought, microclimatic registration during summer 1970 revealed that humid air masses from the north flow over the mountain ridge into the south facing valleys. The daily periodical changes between north and south winds thus result in high humidity in the Karadj-Valley even during summer drought. These climatic peculiarities could be responsible for the growth of the pulvinate mosses.--Copyright 1974, Biological Abstracts, Inc.
W75-05966

A SUB-ALPINE SNOWMELT RUNOFF MODEL,
Wyoming Univ., Laramie. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W75-05971

RECENT RESEARCH IN RUNOFF ESTIMATES FROM SAMLL RURAL WATERSHEDS,
Federal Highway Administration, Washington, D.C.
D.-C. Woo.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 109-120. (1973) 7 ref.

Descriptors: *Runoff forecasting, *Rainfall-runoff relationships, *Small watersheds, Watersheds(Basins), Runoff, Rural areas, Storm runoff, Peak discharge, Flood flow.

Research results of five studies (one national, two feasibility, and two local) which aimed at the development of better practical methods for estimating flood peaks from small rural watersheds (less than 65 sq km) in the continental United States in the last five years were summarized. General descriptions of the approaches employed in the research, the rationale of their selections, and the research results were presented. The present precipitation and small streamflow data are not adequate: they are too few and too short, and not evenly distributed geographically. This situation hampers progress toward the development of accurate general methods of flood prediction for nationwide use. For detailed local studies, some kind of scheme of stratification will be required, and watersheds slightly larger than 65 sq km in size may be included in order to increase the very limited sample size. The research approach should be selected to best suit local conditions and the nature of the available data; although the multiple-regression technique with some variations is the most popular tool used in the analyses. For future research, the need of great expansion of the current national rainfall and runoff data collection program for small rural watersheds, the method of generation of more adequate local rainfall data, the study of the best stratification scheme for regional analysis, and the development of accurate regional or local models should be the immediate major concerns. (See also W75-05973) (Humphreys-ISWS)
W75-05980

A TYPHOON FLOOD COMPUTATION MODEL IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
C. M. Wu.

In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 171-182. (1973) 5 fig, 7 ref, 1 append.

Descriptors: *Flood discharge, *Mathematical models, *Typhoons, *Watersheds(Basins), Model studies, Peak discharge, Rainfall, Orography, Rainfall intensity, Rainfall-runoff relationships, Storm runoff, Circulation, Air circulation, Analytical techniques.
Identifiers: *Taiwan.

A typhoon flood computation model, based on moisture input by a moving typhoon to a watershed and on the response of the river system that is considered analogous to a nonlinear reservoir system, was presented. Typhoon rainfall was divided into two components, circulation and orographic rainfall. A general semi-emperical nonlinear hydrologic system response model was proposed. Use of the model depends upon methods of curve fitting and optimization technique, however, several simpler models are possible based on the general model. (See also W75-05973) (Humphreys-ISWS)
W75-05985

DESIGN PEAK FLOOD COMPUTATION FOR MAJOR AND MULTIPURPOSE RESERVOIRS ON NARMADA RIVER,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 4A.
W75-05986

STOCHASTIC APPROACH TO LINEAR AND NONLINEAR RUNOFF ANALYSIS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
M. Hino.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 211-219. (1973) 8 ref, 1 append.

Descriptors: *Hydrologic systems, *Mathematical studies, *Theoretical analysis, *Runoff, Analytical techniques, Equations, Continuity equation, Hydraulics, Hydrology, Peak runoff, Fourier analysis, Stochastic processes, Hydrographs, Rainfall, Hydrologic aspects, Systems analysis, Analysis.
Identifiers: *Kernel functions, Runoff kernel, Linear runoff kernel, Nonlinear runoff kernel.

Recently, stochastic investigations of runoff processes as a lumped hydrological system have been advanced considerably because of the progress in stochastic methods of data analysis. On the other hand, researchers following the dynamic hydrology cirticize the results obtained stochastically, such as linear and nonlinear runoff kernels, are empirical. An analysis was presented to theoretically bridge the stochastic analysis of a lumped water system and the dynamic analysis of hydrological processes and to deepen understanding of the fundamental hydrologic and river flow processes. The theory was developed by applying the Cameron-Martin-Wiener functional expansion method to the equation of motion (in this study, resistance formula) and the continuity of water flow in an open channel. The linear and nonlinear response kernels for an idealized hydrologic basin were derived. (See also W75-05973) (Humphreys-ISWS)
W75-05988

FLOOD ESTIMATION METHODS FOR UNGAGED CATCHMENTS-A REVIEW,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05992

FLOOD COMPUTATIONS FOR NONUNIFORM RAINFALL DISTRIBUTION,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
M. C. Chaturvedi, S. Chander, and B. S. Mathur.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 265-275 (1973). 3 fig, 1 tab, 6 ref.

Descriptors: *Flood discharge, *Hydrograph analysis, *Hydrologic systems, Watersheds(Basins), Rainfall-runoff relationships, Storm runoff, Rainfall, Distribution patterns, Hydrographs, Spatial distribution, Large watersheds, Model studies, Mathematical models.

A catchment response model to take into account nonuniform rainfall distribution was developed and satisfactorily tested. The proposed model is different from others as the input rainfall is treated as distributed and not lumped. The phenomenon was conceptually explained through linear channels which are tools of translation only. Linear channel is a conceptual approach and may not be compared with a hydraulic channel which has its own storage. Instead, the adopted linear channel translates the input which it receives from a prefixed area, termed as subwatershed, which accounts for the storage effect. Each subwatershed was treated as an assembly of 'subareas' which may have different amounts of precipitation, thereby taking into account the nonuniformity of rainfall as well as the catchment. This model was tested and verified on medium sized natural catchments in different meteorological zones in India. The model can be applied to large catchments and is being verified for these conditions. (See also W75-05973) (Humphreys-ISWS)
W75-05993

FLOOD WARNING THROUGH A HYDROLOGICAL-CUM-MATHEMATICAL MODEL AND VHF TELEMETRY,
Irrigation and Power Research Station, Poondi (India).
For primary bibliographic entry see Field 4A.
W75-06004

FLOOD PREDICTION METHOD OF RIVER WITH RESERVOIR AND CONFLUENCE OF TRIBUTARIES,
Kinki Univ., Osaka (Japan). Dept. of Civil Engineering.
T. Ito.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4. Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 409-417. (1973) 7 fig.

Descriptors: *Flood forecasting, *Mathematical models, *River forecasting, Equations, Flood discharge, Water levels, Rivers, Tributaries, Junctions, Reservoirs, Runoff, Floods, Precipitation(Atmospheric), Rainfall-runoff relationships, Roughness(Hydraulic).
Identifiers: *Japan.

A flood prediction method by digital computer was described. Factors considered in the mathematical model included precipitation when river length is short, runoff, channel roughness coefficient, tributary junction, and reservoir. After taking these factors into consideration, the variation of unsteady flow was calculated stepwise. For the prediction of precipitation, a prepared regression formula that combines the local precipitation with meteorological data at high altitude was used. In Japan, these data are broadcasted twice a day. Owing to the prediction of precipitation, runoff in a river at a definite point was also predicted and then propagation of flood downstream was calculated by digital computer. In a test run computer time was 500 seconds for a flood duration of 40 hours. It was concluded that the mathematical flood prediction model can be applied to every type of river. (See also W75-05973) (Humphreys-ISWS)
W75-06005

REVERSED LONGITUDINAL SALINITY PROFILE OF A MAJOR RIVER IN THE SOUTH-WEST OF WESTERN AUSTRALIA,
Western Australian Dept. of Fisheries and Fauna, Perth. Marine Research Labs.
For primary bibliographic entry see Field 5B.
W75-06112

AN IMPLICIT METHOD TO SOLVE SAINT VENANT EQUATIONS,
Centro di Ricerca IBM di Pisa (Italy).
For primary bibliographic entry see Field 2E.
W75-06119

A SIMPLE PROCEDURE FOR SYNTHESIZING DIRECT RUNOFF HYDROGRAPHS,
University of the Witwatersrand, Johannesburg (South Africa).
S. W. Bauer, and D. C. Midgley.
Report No. 1/74, March 1974. 55 p, 10 fig, 5 tab, 12 ref, 3 append.

Descriptors: *Hydrograph analysis, *Unit hydrographs, *Flood routing, *Rainfall-runoff relationships, Floods, Hydrographs, Hydrology, *Synthetic hydrology, Surplus water, *Watersheds(Basins), Reservoir storage, Vegetation, Estimating, Precipitation excess, Hydraulics, Rainfall, Runoff.
Identifiers: South Africa.

Recent attempts to synthesize unitgraphs by routing procedures have revealed that, provided the catchment area does not exceed 10,000 sq km and is not of unusual shape, the direct runoff hydrograph resulting from uniformly distributed rain can be reproduced with reasonable accuracy by Nash-Muskingum routing of excess rain through a single reservoir-type storage, thus dispensing with conventional intermediary unitgraph steps. To test the validity of the method, direct runoff hydrographs were synthesized for uniformly distributed unit excess rain on 92 South African catchments. When these were compared with the corresponding unitgraphs derived from observed river flows, agreement was in general highly satisfactory. The storage through which excess rain is to be routed, the Muskingum routing K, was dependent primarily upon area of catchment and vegetal cover and it was therefore possible to provide a generalized basis for estimating appropriate K values. The suggested procedure was explained, the validity tests were demonstrated, and a comparison between the proposed method and the conventional unitgraph technique was illustrated. A guide in the form of a diagram and regional map for estimating Muskingum routing K values appropriate to South African catchments was included. (Dawes-ISWS)
W75-06123

DETERMINATIONS OF AN OPTIMAL IUH FOR LINEAR, TIME INVARIANT SYSTEMS FROM MULTI-STORM RECORDS,
Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
M. H. Diskin, and A. Boneh.
Journal of Hydrology, Vol 24, No 1/2, p 57-76, January 1975. 7 fig, 4 tab, 22 ref, append.

Descriptors: *Unit hydrographs, *Storms, *Runoff, *Optimization, *Analytical techniques, Hydrologic data, Systems analysis, Statistical methods, Rainfall, Surface runoff, Numerical analysis, Hydrograph analysis, Watersheds(Basins).
Identifiers: *Instantaneous unit hydrograph, Kernel function, Objective function.

Rainfall excess and direct surface runoff records from a number of independent storms in a given watershed were used to derive an optimal instantaneous unit hydrograph (IUH) for that watershed. The watershed was represented by a linear, time invariant, lumped system. The IUH is the kernel function of the surface runoff thus defined. Discrete representation of the input, output, and kernel functions led to a set of linear equations in which the ordinates of the IUH were the unknowns. Time bases of the output curves of the various storms were so adjusted as to produce a constant difference between the time bases of output and input curves for all storms. The total depth of output was made equal to the total depth of input. The solution method adopted was an optimization procedure that minimizes the sum of squared deviations between observed values of the output function and those predicted by the IUH ordinates. The IUH considered was subject to two constraints: all of its ordinates must be nonnegative and the area enclosed by the IUH must be unity. Minimization of squared deviations over all storms eliminated the need for averaging individual IUHs. A numerical example based on field data was presented. (Singh-ISWS)
W75-06127

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06138

SURFACE RUNOFF HYDROGRAPH EQUATION,
Nevada Univ., Reno. Center for Water Resources Research.
V. L. Gupta, and S. A. Moin.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY10, Proceedings Paper 10880, p 1353-1368, October 1974. 11 fig, 2 tab, 17 ref, 3 append. OWRT A-057-NEV(2).

Descriptors: *Hydrograph analysis, *Hydrology, *Great Basin, *Peak discharge, *Recession curves, *Runoff, California, Hydraulics, Reservoirs, Mathematical models, Drainage area, Surface waters, Withdrawal, Hydrographs, Surface runoff, Watersheds(Basins).
Identifiers: Bloomberg's equation, Reservoir performance, Peak runoff.

Bloomberg's equation (based on Edson's equation) for the description of surface runoff hydrographs was modified and a methodology was developed to express the shape and profile of rising limb, crest segment, and recession limb of a hydrograph in algebraic terms. Variables of concern for such a description included time to peak, peak rate of runoff, point of recession, recession constant, and the percentage ratio of flow volumes in recession to the total volume of surface runoff. A computerized procedure, based on the derived formulations and working rules, would facilitate tracing of the surface runoff hydrograph free of reliance on graphical procedures. The method was applied to nine arbitrarily chosen drainage areas in the Great Basin region in order to investigate the reproducibility of observed unimodal flood hydrograph events. (Singh-ISWS)
W75-06139

WATERSHED BEHAVIOR UNDER CONTROLLED SIMULATED RAINFALL,
Pennsylvania State Univ., University Park. School of Forest Resources.
J. A. Lynch, W. E. Sopper, and E. S. Corbett.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 921, $4.75 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Completion Report, December 1974. 71 p, 26 fig, 14 tab, 68 ref. OWRT B-028-PA(2). 14-31-0001-3124.

Descriptors: *Forestry, *Drainage water, *Watersheds(Basins), *Irrigation system, *Simulated rainfall, Storm runoff, Subsurface runoff, Small watersheds, *Soil moisture, Slopes, Forest watersheds, Peak discharge storms.
Identifiers: Hydrologic behavior, Antecedent soil moisture, *Storm size, Channel area, Total runoff, Storm hydrograph characteristics, Peakflow rate, Quickflow volume, Lower slope, Upper slope, Ridge top.

For hydrologic behavior and response of a small, natural forested drainage basin, as irrigation system was designed and installed to apply uniformly simulated rainfall on any/all parts of a 20-acre watershed. Effects of antecedent soil moisture and storm size on simulated rainfall disposition and storm hydrograph characteristics were analyzed. Hydrologic behavior and response of the watershed to controlled area applications of simulated rainfall were evaluated. High antecedent soil moisture content increased quickflow volume and peakflow rate, decreased time to peak, time of recession and storm duration. Increased storm runoff from increased storm size occurred as quickflow. Subsurface stormflow accounted for the majority of the quickflow volume regardless of storm size. Time to peakflow was delayed as storm size increased. Importance of the channel area in contributing to peak discharge decreased as storm size increased. Quickflow accounted for most of the total runoff regardless of the area of application; the channel and lower slope produced somewhat more than the upper slope and ridge top. (Sink-Penn State)
W75-06192

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
B-H. Lee.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 901, $7.25 in paper copy, $2.25 in microfiche. PhD Thesis, December 1973. 201 p, 36 fig, 26 tab, 3 append. OWRR B-041-PA(3). 14-31-0001-3635.

Descriptors: *Storm runoff, *Unit hydrographs, *Rainfall-runoff relationships, *Pennsylvania, Equations, Precipitation excess, Forecasting, *Runoff forecasting, Temporal distribution, Small watersheds, Model studies, Floods.
Identifiers: Storm flood records, Time-distribution, Antecedent wetness conditions, Watershed soil information, Soil-cover complex matrix, Antecedent dryness indices, Watershed dryness, Double triangle models.

An attempt was made to present a practical device for predicting sequential storm runoff volumes in such a manner that can be applied to unit hydrograph techniques. The data used were abstracted from the storm flood records of Pennsylvania watersheds. A new rainfall-runoff equation is derived with emphasis on its capability to describe the time-distribution of a rainfall excess during an entire rainstorm. A functional parameter introduced into the equation is determined according to antecedent wetness conditions and watershed soil information. Soil characteristic values are optimized for each component of the newly organized soil-cover complex matrix using an established relationship between antecedent dryness indices and watershed dryness. The unit hydrograph prediction methods based on a double triangle model are applied to formulating a procedure of design flood hydrograph synthesis, together with the new rainfall-runoff equation. The techniques developed are applicable to small watersheds, ranging in size between 3 and 200 square miles, in the humid northeastern regions of the United States.
W75-06194

THE EFFECTS OF PHYSIOGRAPHY AND CLIMATE ON UNIT HYDROGRAPHS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
R. G. Heerdegan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 891, $5.25 in paper copy, $2.25 in microfiche. MSc Thesis, August 1973. 104 p, 12 fig, 16 tab, 12 ref. OWRT B-041-PA(1). 14-31-0001-3635.

Descriptors: *Unit hydrographs, *Watersheds(Basins), *Physical properties, Physiographic provinces, Seasonal, Geomorphology, Climates, *Pennsylvania, Rainfall-runoff relationships.
Identifiers: Climatic contrasts.

It has been recognized by many authors that unit hydrographs vary from watershed since each represents a unique combination of physical characteristics which affect the volume and timing of the water outflow. It also has been concluded that variations in unit hydrographs should not occur within a watershed if all of the assumptions of the unit hydrograph theory are met. The validity of these arguments was tested by introducing both a wide range of physical differences in a sample of 17 watersheds in Pennsylvania, and within the 96 flood events that constitute the sample, an equally wide range of climatic and storm differences. An inspection of the data shows that real differences in unit hydrographs occur both among and within watersheds. This led to the formulation of hypotheses that state that differences among watersheds are the results of physiographic differences while the differences within watersheds are the results of climatic contrasts. There are differences enough in the physiographic parameters and climatic variables by watershed, physiographic province and season, to enable these differneces to be reflected in the unit hydrograph if such response takes place.
W75-06196

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
D. A. Telleck.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 902, $5.25 in paper copy, $2.25 in microfiche. MSc Thesis, August 1973. 91 p, 15 fig, 9 tab, 19 ref, 5 append. OWRR B-041-PA(2). 14-31-0001-3635.

Descriptors: *Flood forecasting, *Antecedent precipitation, *Peak discharge, *Watershed management, Soil environment, Retention, Temperature, Rainfall, *Pennsylvania, *Small watersheds, Optimization, Rainfall-runoff relationships, *Precipitation(Atmospheric).
Identifiers: Watershed parameters, Mean annual flood, Flood runoff, Flood response, Precipitation duration.

The study used 98 flood events on 12 watersheds located throughout Pennsylvania. Watershed areas ranged from 4 to 175 square miles. Search for an optimal antecedent precipitation index led to using the classical API, (total rainfall in a period of days prior to the flood event), and two other relatively new forms, DRI and APIDRI. Some 21 antecedent precipitation indices were examined to determine the optimal index or indices. After stratifying the data by physiographic provinces and season, multiple regression methods were used to determine the optimal antecedent precipitation index to use with climatic factors, storm variables and watershed parameters to predict PKRATIO (ratio of instantaneous peak discharge to mean annual flood) or VOL (volume of flood runoff). Results showed that AP indices account for 20% of the variation of PKRATIO and about 7% of the VOL variation. Except for the Valley and Ridge subsample, antecedent precipitation was not a strong flood response predictor. Future study recommen-

dations include using temperature, precipitation, and precipitation duration antecedent conditions with soil cover characteristics to quantify the relationship between antecedent soil moisture conditions and the potential retention capacity of a soil cover complex. (Sink-Penn State)
W75-06201

HYDROLOGIC VARIATIONS AND THE EXTENT OF THE HOLOCENE LAKES IN THE DANAKIL DESERT, (IN FRENCH),
Centre National de la Recherche Scientifique, Bellevue (France), Laboratoire de Geologie du Quaternaire.
For primary bibliographic entry see Field 2H.
W75-06243

ANALYTICAL MODELLING OF SURFACE RUNOFF HYDROGRAPHS FOR MAJOR STREAMS IN NORTHEAST THAILAND,
Desert Research Inst. Nevada Univ., Reno.
V. L. Gupta, V. Thongchareon, and S. M. A. Moin.
Hydrological Sciences Bulletin, Vol 19, No 4, p 523-540, December 1974. 5 fig, 5 tab, 23 ref, 3 append.

Descriptors: *Hydrographs, *Hydrologic data, *Analytical techniques, *Hydrograph analysis, *Watersheds(Basins), Graphical methods, Data processing, Streamflow, Regional analysis, Surface runoff, Modeling.
Identifiers: *Thailand, *Dimensionless hydrographs, Mune and Chee Rivers.

Observed streamflow hydrographs for 9 basins in northeast Thailand were analyzed to obtain characteristic dimensionless hydrographs. Separation of the flood hydrograph into components of baseflow, interflow, and direct surface runoff was accomplished via graphical procedures. The parameters of the resulting surface runoff hydrographs were evaluated by using Edson's hydrograph equation. These parameters were used in developing dimensionless hydrograph equations. Comparison of observed and developed dimensionless hydrographs indicated that the rising limbs of these hydrographs as well as the recession limbs do not match. The deviations were attributed to baseflow separation, physical characteristics of basins, and data errors. (Singh-ISWS)
W75-06269

A COMPACT WATERSHED MODEL SYSTEM,
Aston Univ., Birmingham (England).
T. R. E. Chidley, and I. M. Goodwill.
Journal of Hydrology, Vol 24, No 1/2, p 155-169, January 1975. 6 fig, 2 tab, 10 ref.

Descriptors: *Computer models, *Simulation analysis, Systems analysis, Synthetic hydrology, Operations research, Computers, Watersheds(Basins), Drainage programs, Computer programs, *Model studies.
Identifiers: *Mahalapshwe Watershed(Botswana), Developing countries.

A general procedure for watershed simulation and drainage network studies was described for use with a small-size computer (i.e., 8K x 16 bit word plus one disc transport). A system framework can be created to make a wide variety of watershed model and river routing techniques available. Separation of input/output functions and generalization of parameters were methods used in rendering simple modification and extension of the system. An example of an actual watershed model was included. (Jess-ISWS)
W75-06286

RELATIONSHIPS BETWEEN RAINFALL PARAMETERS AND INTERCEPTION BY TROPICAL FOREST,
New England Univ., Armidale (Australia).
For primary bibliographic entry see Field 2B.
W75-06291

THE WATER BALANCE OF AN EXCEPTIONALLY WET CATCHMENT AREA IN WEST AFRICA,
Edinburgh Univ. (Scotland). Dept. of Forestry and Natural Resources.
D. C. Ledger.
Journal of Hydrology, Vol 24, No 3/4, p 207-214, February 1975. 1 fig, 5 tab, 7 ref.

Descriptors: *Water balance, *Precipitation(Atmospheric), *Watersheds(Basins), Evaporation, Runoff, Flood discharge, Hydrology, Evapotranspiration, Dry seasons, Wet seasons, Hydrologic data, Africa.
Identifiers: *West Africa(Sierra Leone), Guma Reservoir.

Precipitation, evaporation, and runoff data for a small catchment in the exceptionally wet Freetown peninsula region of Sierra Leone, West Africa, were described and analyzed. In most respects, the water balance characteristics of this catchment (Guma) were similar to those encountered in many parts of West Africa. There is a wet season characterized by high precipitation and low evapotranspiration during July, August, and September. The evidence suggests that both long and short term precipitation and runoff rates were 300% more than those generally associated with West Africa; a flood discharge of 23,000 cu m/sec/sq km is a particularly notable event. Few other catchments in the world can experience conditions as wet as these. (Roberts-ISWS)
W75-06292

2B. Precipitation

AGROMETEOROLOGICAL FORECASTING, AN IMPORTANT MEANS FOR DECISION MAKING IN AGRICULTURE (IN FRENCH),
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
O. Berbecel, M. Eftimescu, N. Ciovica, and L. Rahau.
Bull Acad Sci Agric For. 2. p 99-111, 1973, Illus.

Descriptors: Meteorology, *Weather forecasting, Climatic data, *Agriculture, *Precipitation(Atmospheric), Rainfall, Droughts, *Agroclimatology.
Identifiers: Agrometeorological forecasting.

The question of whether some kind of order exists in the succession and duration of climatic anomalies and whether such anomalies can be predicted is discussed. The time span for which objective meteorological data are available for different zones of the planet is too short to derive from them laws governing variations in climatic conditions over decades and centuries, but in spite of this certain indicators (y tree rings, river beds, littoral of enclosed seas) permit certain conclusions to be reached about the climate of the past. These data together with certain indicators of purely meteorological character permit the elaboration of agrometeorological forecasting for from 2-3 wk up to 6 mo. into the future. Of special importance is pluviometric forecasting which is based on multiannual records concerning droughts. Statistics show that periods of normal rainfall account for only 30% of the time, rainy periods are never followed by periods of normal rainfall but always by droughts. Such observations on temperature cycles form the basis of agrometeorological forecasting.--Copyright 1974, Biological Abstracts, Inc.
W75-05855

A TYPHOON FLOOD COMPUTATION MODEL IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05985

INSTRUMENTS FOR INVESTIGATION OF FOGS AND CLOUDS AND MEASUREMENT OF HUMIDITY,
V. A. Zaytsev, and A. A. Ledokhovich.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 207, $3.75 in paper copy, $2.25 in microfiche. Air Force Systems Command Foreign Technology Division Report No. FTD-MT-24-398-74, April 1974. 18 p, 9 fig, 2 tab. Translated from Pribory Dlya Issledovaniya Tumanov i Oblakov i Izmereniya Vlazhnosti, p 72-86, 1970.

Descriptors: *Instrumentation, *Measurement, *Clouds, *Precipitation(Atmospheric), Meteorology, Fog, Humidity, Cloud physics, Weather, Aircraft, Weather data, Drops(Fluids), Sampling, Meteorological data.
Identifiers: Water content.

A combined aircraft-carried water-content meter and an electric water-content meter were described. The aircraft-carried meter consists of a probe that can be inserted into the airstream through an opening in the aircraft. Two interchangeable nozzles are used with this probe. The first nozzle records drop size data by a filter paper technique. The second nozzle is a drop absorbing device. This nozzle is weighed before and after exposure in order to measure the amount of water collected. From the measurements of these two nozzles, water content and equivalent rainfall rate are calculated. The various sources of errors were discussed. The electric water-content meter uses a bridge circuit to measure the temperature difference between an element exposed to cloud particles and a similar element protected from these particles. The cooling effects of the cloud particles are related to the water content. References and appendixes in the original report were not included in the translation. (Sims-ISWS)
W75-06041

BASES OF METHOD AND MEANS OF MODIFICATION OF HAIL PROCESSES,
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 3B.
W75-06126

HYDROLOGIC VARIATIONS AND THE EXTENT OF THE HOLOCENE LAKES IN THE DANAKIL DESERT, (IN FRENCH),
Centre National de la Recherche Scientifique, Bellevue (France), Laboratoire de Geologie du Quaternaire.
For primary bibliographic entry see Field 2H.
W75-06243

RELATIVE IMPORTANCE OF METEOROLOGICAL VARIABLES IN SNOWMELT,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
For primary bibliographic entry see Field 2C.
W75-06263

CORRECTION FOR THE WETTING LOSS OF A HELLMANN PRECIPITATION GAUGE,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-06267

THE REDESIGN OF THE RAINGAUGE NETWORK OF ZAMBIA,
Hydrometeorologicky Ustav, Prague (Czechoslovakia).
For primary bibliographic entry see Field 7A.
W75-06268

AIR BUBBLES IN ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
For primary bibliographic entry see Field 2C.
W75-06275

THE WATER DROP REBOUND PROBLEM: DYNAMICS OF COLLISION,
Arizona Univ., Tucson. Inst. of Atmospheric Physics.
G. B. Foote.
Journal of the Atmospheric Sciences, Vol 32, No 2, p 390-402, February 1975. 13 fig, 24 ref. NSF Grant GA-24134.

Descriptors: *Drops(Fluids), *Meteorology, Movement, Numerical analysis, Shape, Weber number, Deformation, Energy, Impact(Rainfall).
Identifiers: *Drop collisions, Rebound, Dynamics of liquid drops, Navier-Stokes equation, Internal motion, Drop oscillations.

A method for studying the dynamics of liquid drops by numerical integration of the Navier-Stokes equations was used to examine the motion of colliding drops, with application to the raindrop problem. Consideration was limited to drops of nearly equal size impacting along their line of centers. The numerical solutions were developed to study the problem of water drop rebound in the presence of air, a situation in which the drops fail to make physical contact, but the results also have application to a wider variety of phenomena. The internal motion of the drop, changes in the surface configuration, and the associated energetics of the collision were discussed. The variations with impact speed were presented. Calculations were made for drops of 40 micrometers to 1 millimeter diameter. It was demonstrated that except for a small viscous effect the collision characteristics, including the drop shape at the stage of maximum deformation and the time for rebound, suitably normalized, are uniquely determined by the Weber number (We) for the drop. The functional relations were shown for We less than 5. It was found that over a large range of We the bouncing time is close to the lowest-order period of oscillation, and hence varies essentially as the square root of the drop mass. Comparison of the results with available experimental data showed good agreement. (Jones-ISWS)
W75-06278

RELATIONSHIPS BETWEEN RAINFALL PARAMETERS AND INTERCEPTION BY TROPICAL FOREST,
New England Univ., Armidale (Australia).
I. J. Jackson.
Journal of Hydrology, Vol 24, No 3/4, p 215-238, February 1975. 6 fig, 8 tab, 25 ref.

Descriptors: *Rainfall, *Tropical regions, *Interception, Vegetation, Drainage, Throughfall, Rain forests, Stemflow, Evaporation, Precipitation(Atmospheric), Saturation, Canopy, Equations, Rainfall intensity.
Identifiers: *Tanzania, Gross rainfall, Net rainfall evaporation.

The process of rainfall interception by vegetation was discussed and related to a number of variables including rainfall intensity, duration, and intervals between storms in East Africa. In general terms, the results were not encouraging. Differences between data sets and regression models were apparent. The gross rainfall model that combined day and night single falls was marginally better than when intermittent falls were added. Similarly, the multiple-regression analysis of intermittent falls was unsatisfactory, and together with the complexity of these situations, suggested that their separation from single rainfall periods is worthwhile. The disappointing results of this analysis under tropical conditions, particularly high rainfall and evaporation rates, may not be relevent to higher latitudes. Even for single falls, 'averaging' of intensity over the rain period was a problem. The effects of wind shake and variations in evaporation rate during and between storms complicated the picture. In addition, measurement errors were not considered. Only a very detailed water-balance approach will be satisfactory. Unfortunately, such an approach is impossible for many investigations where a knowledge of interception is required, particularly in developing countries subject to financial and manpower restraints. (Roberts-ISWS)
W75-06291

THE WATER BALANCE OF AN EXCEPTIONALLY WET CATCHMENT AREA IN WEST AFRICA,
Edinburgh Univ. (Scotland). Dept. of Forestry and Natural Resources.
For primary bibliographic entry see Field 2A.
W75-06292

CORRELATION ANALYSIS OF THE CELLULAR STRUCTURE OF STORMS OBSERVED BY RAINGAUGES,
Lancaster Univ., Bailrigg (England). Dept. of Environment Sciences.
D. G. Felgate, and D. G. Read.
Journal of Hydrology, Vol 24, No 3/4, p 191-200, February 1975. 4 fig, 2 tab, 22 ref.

Descriptors: *Precipitation(Atmospheric), *Rainfall intensity, *Rain gages, Storms, Numerical analysis, Winds, Correlation analysis, Analytical techniques, Rainfall.
Identifiers: Rain cells, Cross-correlation functions, England(Cardington).

Storm rainfall patterns often show random cellular structure which can be described by both spatial and temporal correlation functions calculated from short-interval precipitation measurements. A network of 16 raingages with approximately 1-km spacings was operated at Cardington by the British Meteorological Office from 1957 to 1962. The gages measured the amount of rain falling in intervals of two minutes during a series of mainly summer storms. Techniques developed for the study of moving diffraction patterns produced by radio sounding the ionosphere were applied to this data. The spatial scale of the pattern, its velocity, and its mean lifetime may be deduced from the time variations in rainfall recorded at three suitably spaced gages. This analysis was applied to various groups of gage records from a particularly long storm and has shown good agreement with the relevant upper air data. A dominant surface rainfall 'cell' size of 2.8 km by 1.3 km was found from the two-minute total rainfall records. This initial study demonstrated the potential of this correlation technique in describing the small scale structure of rainstorms, in quantitative terms, by using records from a small number of fast-response gages. (Jones-ISWS)
W75-06293

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: II. INFLUENCE OF SOIL MOISTURE AND WEATHER,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
For primary bibliographic entry see Field 2I.
W75-06317

2C. Snow, Ice, and Frost

FOREST AND METEOROLOGICAL INFLUENCES ON SNOW AND SNOWMELT WATER AND THEIR MANAGEMENT,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05913

A SUB-ALPINE SNOWMELT RUNOFF MODEL,
Wyoming Univ., Laramie. Dept. of Civil Engineering.
L. E. Allen.
Available from the National Technical Information Service, Springfield, VA. 22161 as PB-240 754. $11.25 in paper copy, $2.25 in microfiche. PhD Thesis, May 1974. 407 p, 10 fig, 8 tab, 95 ref, 6 append. OWRT-A-010-WYO(3).

Descriptors: *Snowmelt, *Watersheds(Basins), *Model studies, *Runoff, Hydrology, Hydrographs, Daily hydrographs, Streamflow, Streamflow forecasting, Hydrologic aspects, Routing, Precipitation(Atmospheric), Computer models, Topography, Hydrologic data, Computer programs, Runoff forecasting, Snow cover, Snow, Rocky Mountain region, *Wyoming, Discharge(Water), On-site data collections.
Identifiers: North Fork basin(Wyo), Subalpine region.

A digital computer model for simulating daily watershed runoff from snowmelt under subalpine conditions was developed in first generation form for the Nash Fork basin in southeastern Wyoming. Solar radiation is the primary energy source for snowmelt, and its interaction with the snowpack is the core of the model. The watershed was subdivided into segments, one segment on either side of a stream reach, and each segment was divided by cover condition into a forested and an unforested area. Snow distribution patterns were consistent as to time. The areal extent of snowcover was calculated with a submodel derived through stepwise multiple regression techniques. Insolation, measured in or near the basin, was adjusted to the latitude, slope, and aspect of each segment in the basin, then adjusted for the albedo of the snow surface and combined with the long wave radiation flux for the net radiation exchange producing potential snowmelts. These snowmelts were adjusted for snowpack conditions, snowcover areas, and for rainfall effects, resulting in the runoff from each cover condition of each segment for each day. The runoff were then routed through flow points as daily discharges for the model output. Comparison of simulated flows with observed flows indicated reasonably satisfactory model performance. Appendixes contain program variable definitions, model user instructions, program listing, tabulated data, calculated hydrographs, and observed and calculated streamflows. (Humpreys-ISWS)
W75-05971

INVESTIGATION OF SOLAR ENERGY FOR ICE MELTING.
Armour Research Foundation, Chicago, Ill.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 111, $4.25 in paper copy, $2.25 in microfiche. Final Report, June 1, 1949. 54 p, 4 fig, 4 tab, 22 ref, append.

Descriptors: *Ice, *Iced lakes, *Lake ice, Solar radiation, Melting, Heat transfer, Lakes, Rivers, Absorption, Temperature.

The possibility of melting ice formed on the surfaces of rivers and lakes in the northern parts of the United States by applying a layer of a material that would absorb more of the available solar energy was investigated. The following studies were made: (1)Heat losses from water surfaces during the winter months were calculated based on a literature survey. Under the conditions existing in the northern United States, the growth of an ice sheet and the effect of the solar energy absorbed on the rate of the ice formation was analyzed. (2) The effect of an absorbent layer applied to the ice surface on the growth of the ice sheet was studied. The extent to which the melting rate could be altered by such a layer was investigated. In all these analyses steady state conditions were assumed. Results were: (1) When conditions are such that melting does not occur, the addition of an absorbent layer would make the melting possible if the

air temperature is about 32F and the intensity of solar energy is that prevailing during February and March. (2) An absorbent layer would increase the rate of melting by a factor of 2 to 3 when melting takes place under natural conditions. (Sims-ISWS)
W75-06135

LABORATORY PREPARATION OF ARTIFICIAL SEA AND SALT ICE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
W. F. Weeks, and G. F. N. Cox.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 694, $3.25 in paper copy, $2.25 in microfiche. Special Report 206, June 1974. 13 p, 4 fig, 36 ref.

Descriptors: *Ice, *Sea ice, *Laboratory tests, Laboratory equipment, Research and development, Ice-water interfaces, Sea water, Freezing, Salinity, Crystal growth, Crystals.
Identifiers: *Artificial ice, *Salt ice.

The characteristics of several successful schemes that have been used to produce artificial sea and salt ice for laboratory studies were described. Difficulties that have been encountered in developing suitable experimental designs for investigating a variety of specific sea ice problems (salinity, grain size, substructure and orientation variations; preparation of single crystals and underwater ice) were discussed and suggestions were given for improved methods. (Sims-ISWS)
W75-06253

ICE ENGINEERING - QUANTIFICATION OF SUBSURFACE ICE THICKENING TECHNIQUES,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
J. L. Barthelemy.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-781 640, $3.75 in paper copy, $2.25 in microfiche. Technical Report R-811, May 1974. 37 p, 19 fig, 18 ref, 3 append.

Descriptors: *Ice, *Civil engineering, *Freezing, *Construction, Ice-water interfaces, Sea ice, Ice loads, Cold regions, Cold weather construction, Laboratory tests, On-site investigations, Equations.
Identifiers: Ice growth, Ice engineering, Freezing cells, Subsurface ice thickening.

Because of the extreme conditions and the lack of readily available building materials in polar regions, construction by conventional means is often unfeasible. Methods involving the localized freezing of seawater into useful structures at coastal polar locations are being developed. One technique previously developed and tested is surface flooding. An alternate method involves subsurface thickening by short-circuiting the insulating property of an existing ice sheet. Especially promising are natural-convection heat exchangers called freezing cells. These devices are simply constructed, self-powered, and easily installed. Their performance and ice production capabilities were described by a series of equations, presented in generalized (dimensionless) form so as to be applicable to a system of any size. The theoretical development was supported by laboratory and field-test results. Analysis indicates that these devices, although limited to low operating efficiencies, are preferable to the more efficient but complex systems which increase size, weight, and operational requirements. (Sims-ISWS)
W75-06254

RELATIVE IMPORTANCE OF METEOROLOGICAL VARIABLES IN SNOWMELT,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
J. F. Zuzel, and L. M. Cox.
Water Resources Research, Vol 11, No 1, p 174-176, February 1975. 6 tab, 11 ref.

Descriptors: *Snowmelt, *Meteorological data, *Forecasting, Regression analysis, Winds, Air temperature, Vapor pressure, Radiation, *Idaho, Correlation analysis.
Identifiers: Net radiation, Boise(Idaho).

To improve predictive equations of the snowmelt process, the relative importance of various meteorological parameters must be understood. Factor analysis and regression analysis were used to determine the effectiveness of wind, air temperature, vapor pressure, and net radiation in predicting snowmelt. Analyses of meteorological and snowmelt data collected at a site near Boise, Idaho, in May 1973 showed that the standard error of daily snowmelt prediction could be decreased 13% by using vapor pressure, net radiation, and wind in predictive equations rather than just air temperature. (Jones-ISWS)
W75-06263

EVAPORATION FROM SNOW COVER,
Finnish Hydrological Office, Helsinki.
For primary bibliographic entry see Field 2D.
W75-06271

DETERMINATION OF SNOW WATER EQUIVALENT AND SNOWMELT WATER BY THICKNESS OF SNOW COVER DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
G. Kovacs, and G. Molnar.
Hydrological Sciences Bulletin, Vol 19, No 4, p 435-447, December 1974. 6 fig, 4 tab, 30 ref.

Descriptors: *Snowmelt, *Snowpacks, *Bulk density, Snow cover, Stratification, Melt water, Water equivalent, Equations.
Identifiers: *Hungary.

In studies on the accumulation and melting processes of snow, bulk densities were determined for fresh snow (gamma sub min), for snow saturated by capillary water (gamma sub k), and for melting snow (gamma sub max). Correlation studies showed the magnitudes of gamma sub k and gamma sub max to depend greatly on the number (R) of snow layers. The equations involving the bulk densities listed above form the basis of the computation charts prepared by the authors. These can be applied to two thus far unsolved problems: (1) the reconstruction of past time series of water equivalent values for observing stations with data on the thickness of the snow cover only, and (2) forecasting the volume of snowmelt water from data of the thickness of the cover and duration of the melting period. (Jones-ISWS)
W75-06272

AIR BUBBLES IN ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
J. N. Carras, and W. C. Macklin.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 427, p 127-146, January 1975. 14 fig, 3 tab, 25 ref.

Descriptors: *Ice, *Bubbles, *Hail, Physical properties, Laboratory tests, Freezing, Meteorology, Cloud physics, Measurement.

On the assumption that the concentration of air bubbles formed in freezing water is a function of the freezing rate, an expression for the concentration of air bubbles in accreted ice was deduced. This expression was confirmed by measurements of the bubble concentrations and size distributions in frozen bulk water and in ice accreted on rotating cylinders. Consequently, in both the wet and dry growth regimes it is the rate of freezing which essentially determines the bubble concentration. The size distribution of bubbles is determined by the amount of air available for bubble growth. This depends on the rate at which air diffuses out of the individual droplets during the freezing process. In the wet growth regime the freezing rate depends on the rate at which heat is dissipated from the accreting object by forced convection and also, depending on the fraction of unfrozen water, on the way in which the spongy deposits are finally frozen. In the dry growth regime the freezing rate of the accreted droplets depends on their size and speed of impact, since these determine the extent to which the droplets spread, and on the temperature of the deposit. The air bubble concentrations and size distributions were determined. (Sims-ISWS)
W75-06275

FREEZING RATES OF WATER DROPLETS,
University of New England, Armidale (Australia). Dept. of Physics.
W. D. King.
Journal of the Atmospheric Sciences, Vol 32, No 2, p 403-408, February 1975. 2 fig, 13 ref, 1 append.

Descriptors: *Drops(Fluids), *Freezing, Ice, Heat flow, Supercooling, Numerical analysis.
Identifiers: *Freezing rates.

The freezing rates of water droplets were calculated. The interfacial position was specified as a power series in time, and expressions for determining the first five coefficients were given. The five-term series solution was compared with an exact numerical one for a particular case, and the agreement was within 1% during most of the freezing process. For small droplets, the solution reduced to a previously published one, and the results of experiments in which the freezing times of droplets were measured confirmed this. (Jones-ISWS)
W75-06277

DEGLACIATION OF THE LABRADOR CONTINENTAL SHELF,
Bedford Inst., Dartmouth, (Nova Scotia). Atlantic Geoscience Center.
R. H. Fillon.
Nature, Vol 253, No 5491, p 429-431, February 6, 1975. 3 fig, 29 ref.

Descriptors: *Glaciers, *Glacial drift, *Continental shelf, Ice cover, Glaciology, Ice breakup, Climatology, Sea ice, Atlantic Ocean, Ice, Geomorphology, Topography, Oceanography, Remote sensing.
Identifiers: Hamilton Bank, *Labrador Shelf.

It has long been inferred from studies of glacial features on land that the North American Quaternary glaciers extended far out on the Atlantic continental shelf. Only within the last ten years, however, have offshore studies on the Scotian Shelf convincingly demonstrated the presence of a system of submarine moraines. Moraines and other relict glacial land forms on the outer Labrador Shelf were identified. Identification of probable end moraines and the ubiquitous distribution of coarse gravel and cobbles, as well as the excellent state of preservation of glacial land forms, strongly imply that the entire continental shelf was glaciated by the Laurentide ice sheet during the Wisconsinan. An initially cold-based ice sheet on the bank is strongly implied. Thus deglaciation of the Labrador Shelf in the Hamilton Bank area may have been directly caused by a decreased resistance to spreading by decoupling the ice from the substrate. This occurred probably during a period of rising summer air temperature which warmed the ice sheet and precipitated a change from cold to wet based glacial conditions. (Sims-ISWS)
W75-06279

FLOATING ICE SHEETS,
Foundation of Canada Engineering Corp. Ltd., Calgary (Alberta). Arctic Div.

For primary bibliographic entry see Field 8G.
W75-06280

ATMOSPHERIC CONCENTRATIONS AND SOURCES OF TRACE METALS AT THE SOUTH POLE,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-06315

2D. Evaporation and Transpiration

REGIMES OF STREAMFLOW AND THEIR MODIFICATION BY LOGGING,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05925

DIURNAL SOIL-WATER EVAPORATION: COMPARISON OF MEASURED AND CALCULATED SOIL-WATER FLUXES,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
R. D. Jackson, R. J. Reginato, B. A. Kimball, and F. S. Nakayama.
Soil Science Society of America Proceedings, Vol 38, No 6, p 861-866, November-December 1974. 8 fig, 2 tab, 20 ref.

Descriptors: *Evaporation, *Soil physics, Heat transfer, Soil water, *Soil water movement, Water transfer, *Diurnal distribution, Drying, Temperature, Measurement.
Identifiers: Isothermal theory, Philip and DeVries theory.

The Philip and DeVries theory and the 'isothermal' theory were used to predict diurnal soil water fluxes near the soil surface. The predicted values were compared with those obtained by measurements of soil-water content, soil temperature, and evaporation. Previously measured soil-water diffusivities were used in the theoretical calculations. The thermal vapor diffusivities were calculated using both the 'simple' and the 'complete' theory of Philip and DeVries. Comparison of measured and calculated fluxes indicated that the theory of Philip and DeVries predicts the measured values better at intermediate water contents, but the 'isothermal' theory predicts values better at high and very low water contents. (Roberts-ISWS)
W75-05963

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 3B.
W75-06095

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 3B.
W75-06121

METHOD FOR COMPUTING EVAPORATION FROM THE LAND SURFACE,
A. P. Vershinin.
Soviet Hydrology, Selected Papers No 6, p 484-495, 1972, 2 fig, 1 tab, 27 ref. Translated from Transactions of the State Hydrologic Institute (Trudy GGI), No 204, p 84-101, 1972.

Descriptors: *Evaporation, *Equations, Water balance, Heat budget, Mathematical models, Hydrologic budget, Soil moisture, Moisture content, *Methodology.
Identifiers: *Equations of motion, Global radiation.

Evaporation was described as one of the most important elements of the hydrologic and heat budgets of the active layer of the earth's surface. Yet the main patterns and mathematical models of evaporation were not sufficiently developed. Evaporation was classed with other elements of the hydrologic budget, such as the moisture content in the aeration zone and the vertical moisture exchange with groundwater. An attempt was made to represent a mathematical model of the interaction of these elements of the hydrologic budget as a single natural complex on the basis of several physical considerations and to express these elements in the form of working formulas. Several of the methods used to estimate evaporation were described; All were based on solving principal equations of motion and of water balance either in the soil or the atmosphere. All existing methods were divided into two groups, but the third way of describing evaporation processes, by using the main principles of the molecular-kinetic theory with thermodynamic principles, was not included. (Roberts-ISWS)
W75-06185

VAPORIZATION RESPONSE OF EVAPORATING DROPS WITH FINITE THERMAL CONDUCTIVITY,
Propulsion Sciences, Inc., Melville, N.Y.
V. D. Agosta, and S. S. Hammer.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA CR-2510, $4.25 in paper copy, $2.25 in microfiche. NASA Contractor Report 2510, January 1975. 58 p, 14 fig, 1 tab, 7 ref, append. Contract NAS 3-16761.

Descriptors: *Drops(Fluids), *Stability, Computer programs, Vapor pressure, Liquids, Thermal conductivity, Finite element analysis, Data processing, *Evaporation.
Identifiers: *Droplet vaporization, Rockets, Liquid oxygen.

A numerical computing procedure was developed for calculating vaporization histories of evaporating drops in a combustor where traveling transverse oscillations occurred. The liquid drop was assumed to have a finite thermal conductivity. The systems of equations was solved by using a finite difference method programmed for solution on a high speed digital computer. Oscillations in the ratio of vaporization of an array of repetitively injected drops in the combustor were obtained from summations of individual drop histories. A nonlinear in-phase frequency response factor for the entire vaporization process to oscillations in pressure were evaluated. In addition, a nonlinear out-of-phase response factor, in-phase and out-of-phase harmonic response factors, and a Princeton type n and tau were determined. The resulting data were correlated and presented in graphic form. Qualitative agreement with the open literature was obtained in the behavior of the in-phase response factor. Quantitatively, the results did not correlate with the results of a single drop model. (Roberts-ISWS)
W75-06215

EVAPORATION FROM SNOW COVER,
Finnish Hydrological Office, Helsinki.
R. Lemmela, and E. Kuusisto.
Hydrological Sciences Bulletin, Vol 19, No 4, p 541-548, December 1974. 5 fig, 3 tab, 6 ref.

Descriptors: *Evaporation, *Snow cover, Evaporation pans, Vapor pressure, Condensation, Snowmelt, Dew point, Weather patterns, Energy budget, Correlation analysis, Regression analysis.
Identifiers: *Finland, Snow surface.

The amount of evaporation from snow cover and its dependence on different climatic factors was discussed. The observations were made in an open experimental site in southern Finland between 1969 and 1973. The total period of observation was 107 days between February and April, before the melting period and after it commenced. The mean evaporation during the day (0700-1900 hours) was 0.26 mm, and during the night 0.03 mm. The correlation of the vapor pressure difference between snow surface and air with evaporation was high both during the day and night. On melting days, the magnitude of evaporation could be predicted quite accurately by means of the dew point temperature alone. The determination of the evaporation from the snow cover based on the energy balance was not presented. Only some preliminary studies had been made, and they were not promising. (Roberts-ISWS)
W75-06271

POTENTIAL EVAPORATION AS AN UNSTEADY PROCESS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
G. Balachandran, T. E. Unny, and S. I. Solomon.
Journal of Hydrology, Vol 24, No 3/4, p 291-301, February 1975. 1 fig, 20 ref.

Descriptors: *Evaporation, Heat transfer, Mass transfer, Specific heat, Moisture uptake, Thermal expansion, Humidity, Numerical analysis.
Identifiers: *Potential evapotranspiration, Wet surface, *Potential evaporation rate.

The actual process of evaporation from a completely flooded field was analyzed in order to remove the various inconsistencies existing in the definition and interpretation of potential evaporation. The analysis led to the conclusion that potential evaporation should be considered as an unsteady process. The term potential evaporation was accordingly restated as potential evaporation rate. This term is applicable to a particular point in space and facilitates consideration of potential evaporation rate for small fields. Considering potential evaporation rate as an unsteady process makes it possible to deal with problems where evaporation from fields are related to climatic modifications and to changes in the soil medium. It is possible to calculate the total potential evaporation for periods as short as one hour, which would be useful to gage irrigation requirements. An analysis was given for an idealized situation. A numerical example was given to show a practical situation. (Roberts-ISWS)
W75-06290

INDEXES TO TRANSPIRATION BY FOREST TREES,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. Kochenderfer, and R. Lee.
Ecologia Plantarum, Vol 8, No 2, p 175-184, 1973. 2 fig, 2 tab, 12 ref.

Descriptors: *Transpiration, *Water loss, Measurement, Forests, *Trees, Coniferous trees, *Decidious trees, Phytometers, Stomata, Leaves.
Identifiers: *Black cherry.

Five indexes to transpiration rates of forest trees were tested for consistency among four deciduous species and one coniferous species. The phytometer, quick-weighing, leaf disc, water stress, and stomatal indexes were remarkably consistent among the species. Black cherry (Prunus serotina) transpired at the highest rate per unit area of leaf surface in all of the tests, at different times during the growing season, and under a variety of environmental conditions. The differences among the other species were less clearly defined. (Forest Service)
W75-06336

2E. Streamflow and Runoff

HYDROCHEMISTRY OF THE ATHABASCA AND NORTH SASKATCHEWAN RIVERS IN THE ROCKY MOUNTAINS OF CANADA,
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 2K.
W75-05956

STATISTICAL ANALYSIS OF WATER TEMPERATURE RESIDUALS,
Missouri Univ., Rolla. Dept. of Computer Science.
B. E. Gillett, and L. L. Long.
Water Resources Research, Vol 10, No 6, p 1127-1132, December 1974. 9 fig, 5 ref.

Descriptors: *Water temperature, *Statistical models, *Mathematical studies, Temperature, *Regression analysis, *Fourier analysis, Water quality, *Missouri River, Model studies, Forecasting.
Identifiers: Water temperature residuals, Kolmogorov-Smirnov test.

Water temperature residuals, which are taken as the difference between the daily average water temperature (Missouri River, Boonville, Missouri) and the Fourier series regression fit to the data points, were analyzed. A 1-yr record length was used as a base period. The Kolmogorov-Smirnov test was used to determine, for a given number of extracted harmonics, the sample size required to yield a set of normal random variates with mean zero. With only the fundamental harmonic removed, a sample size of at least 180 is required to yield a sample average residual of less than 0.2F. When the fundamental and higher order harmonics were removed, this sample size was reduced considerably. (Jess-ISWS)
W75-05958

VARIATION OF MAINSTREAM LENGTH WITH BASIN AREA IN RIVER NETWORKS,
California Univ., Los Angeles. Dept. of Geology; and California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
R. L. Shreve.
Water Resources Research, Vol 10, No 6, p 1167-1177, December 1974. 12 fig, 2 tab, 33 ref. NSF Grant GA-18346.

Descriptors: Streams, *Drainage area, *Statistical models, *Monte Carlo method, *Kentucky, Drainage density, Hydraulics, *Channels, River basins, Networks, Variability.
Identifiers: *Channel sinuosity, Link lengths, Bivariate probability density, *Rockcastle Creek(Kent).

Mainstream length in river networks from various parts of the world varies statistically in proportion to basin area raised to a power that decreases from about 0.6 for small to medium basins (1 to 1000 sq km) to near 0.5 for the largest in the world (nearly 10,000,000 sq km). This relationship was predicted by the statistical theory of channel networks, which was founded on the basic postulates that (1) natural channel networks in the absence of strong geologic controls are very nearly topologically random and (2) interior and exterior link lengths and associated areas in basins with homogeneous climate and geology have separate statistical distributions that are approximately independent of location. The calculation was carried out by a Monte Carlo method. The necessary empirical data on link lengths and associated areas were obtained by measurement on maps of an 80-sq km basin (Middle Fork of Rockcastle Creek) in relatively flat-lying coal-bearing sandstones in eastern Kentucky. Agreement with observation was excellent for the small to medium basins, but the ratio of predicted to observed mainstream length progressively decreases to about 0.7 for the largest basins. This discrepancy was accounted for by moderate downstream increase in channel sinuosity and decrease in drainage density. (Bhowmik-ISWS)
W75-05960

PATTERNS OF VARIATION IN A FLUVIAL SYSTEM,
State Univ. of New York, Buffalo. Dept. of Geography.
For primary bibliographic entry see Field 2J.
W75-05961

CURRENT OBSERVATIONS FROM THE WESTERN MEDITERRANEAN DURING COBLAMED 69,
Naval Underwater Systems Center, Newport, R.I.
D. H. Shonting.
Limnology and Oceanography, Vol 10, No 5, p 866-874, September 1974. 9 fig, 3 tab, 12 ref.

Descriptors: *Ocean currents, *Ocean circulation, *Buoys, *Drifting(Aquatic), Ocean waves, Littoral drift, Oceanography, Sea breezes, Movement, Water circulation, Waves(Water).
Identifiers: *Mediterranean Sea, Surface motion, Vector diagrams, Kinetic energy.

Current in the upper 60 m in the western Mediterranean displayed dominant inertial character strongly modulated by wind changes, which also altered the mean flow. Kinetic energy variations associated with the current at 60 m corresponded with gross changes in wind and sea state and were equivalent to observed kinetic energy changes associated with coastal tides. Current records from a slowly drifting buoy were similar to fixed buoy records. Kinetic energy spectra indicated a -5/3 power frequency dependence. Spectral coherence was high for both vertical and horizontal separation, with the vertical motions strongly out of phase and the horizontal strongly in phase. (Sanderson-ISWS)
W75-05962

THE INDICATOR ORGANISMS AND THEIR ECOLOGICAL VARIABILITY,
Water Economics Research Inst., Krakow (Poland). Dept. for Water Protection.
For primary bibliographic entry see Field 5A.
W75-05970

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
For primary bibliographic entry see Field 4A.
W75-05973

EXTRAPOLATION OF STAGE-DISCHARGE RELATIONS FOR FLOOD COMPUTATIONS,
Swiss Federal Inst. for Snow and Avalanche Research, Davos-Weissfluhjoch.
For primary bibliographic entry see Field 4A.
W75-05976

COMPUTING FLOOD FREQUENCY IN THE HUMID EASTERN USA,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05981

EFFECT OF DAMS ON FLOOD FREQUENCY,
Papua and New Guinea Inst. of Tech., Lae (New Guinea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05982

A GENERAL FORMULA FOR DETERMINATION OF PEAK FLOOD,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 4A.
W75-05983

FLOOD COMPUTATIONS FOR THE HAWAIIAN ISLANDS,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05984

DESIGN PEAK FLOOD COMPUTATION FOR MAJOR AND MULTIPURPOSE RESERVOIRS ON NARMADA RIVER,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 4A.
W75-05986

ASSESSMENT OF 1966 PEAK DISCHARGE OF THE MEKONG AT VIENTIANE,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
T. Thammongkol.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 195-209. (1973) 5 fig, 3 tab, 9 ref.

Descriptors: *Peak discharge, *Floods, *Evaluation, Flow rates, Flood peak, Flood discharge, Model studies, Computer models, Analysis, Analytical techniques, Rivers.
Identifiers: *Mekong River, Thailand(Vientiane).

Results were presented of an evaluation of the 1966 peak discharge, the highest flood on record, of the Mekong at Vientiane. Stage height was 12.71 m (170.75 m MSL). Five approaches used to determine the peak discharge were: extension of rating curve, extension by studies of area and velocity, extension of discharge as a function of area times the square root of hydraulic radius, Manning formula, and the mathematical simulation of streamflow for the Luang Prabang-Vientiane reach. In the first four methods, stations at KM 1601 (Pa Mong damsite) and Ban Pha Tang, where the flood flow was confined in the river channel, were used as index stations. These two stations are, respectively, 19 and 25 km upstream from Vientiane. In the fifth method, the desired flow at Vientiane was considered to be composed of two parts: (1) the routed flow from Luang Prabang, the next upstream station; and (2) the intervening flow between Luang Prabang and Vientiane, which was computed from the Streamflow Synthesis and Reservoir Regulation (SSARR) watershed model incorporated with the rainfall data. From the first four methods, the peak discharges at KM 1601 was computed to be 25,000 and at Ban Pha Tang, 26,000 cu m/s. From judging the conditions of the river channel and flow at Luang Prabang as well as the quality of data, the peak discharge of 26,000 cu m/s was adopted. The computed peak discharge from streamflow simulation by SSARR model confirmed the results of 26,000 cu m/s derived from the first four methods. (See also W75-05973) (Humphreys-ISWS)
W75-05987

STOCHASTIC APPROACH TO LINEAR AND NONLINEAR RUNOFF ANALYSIS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05988

FLOOD PREDICTION - A BAYESIAN APPROACH,
West Virginia Inst. of Tech., Montgomery. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05989

SOME ASPECTS FOR THE SELECTION OF AN ADEQUATE PROBABILITY DISTRIBUTION FUNCTION FOR FLOOD ANALYSIS,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 4A.
W75-05990

UNIT HYDROGRAPHS AND STATISTICAL DENSITY FUNCTIONS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
G. N. Alexander.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 241-252 (1973). 5 fig, 24 ref.

Descriptors: *Hydrograph analysis, *Unit hydrographs, *Statistical methods, Hydrographs, Hydrology, Stochastic processes, Probability, Base flow, Rainfall-runoff relationships, Runoff, Rainfall, Parametric hydrology, Hydrologic aspects.
Identifiers: Statistical density functions, Gamma distribution, Deterministic hydrology.

Visual inspection shows that there is often a good resemblance between the shape of a flood hydrograph and the density function of a statistical distribution having time or duration as its variable. Assuming a Gamma distribution, this concept has been previously used in estimating runoff from rainfall and also in the deterministic procedure of flood routing. Statistical parameters such as 'location,' 'scale,' and 'shape' of pertinent distributions were considered. Shape was defined by a pair of moment-ratios, the theoretical distributions being represented by a point or line on a moment-ratio diagram, thus enabling comparison with observed values of shape. Observed hydrographs were compared with the Gamma and Weibull distributions on probability paper. The results indicate that there is considerable scope for the application of recognized statistical techniques in describing unit hydrographs, although there is insufficient evidence to discriminate between possible distribution types. (See also W75-05973) (Humphreys-ISWS)
W75-05991

FLOOD COMPUTATIONS FOR NONUNIFORM RAINFALL DISTRIBUTION,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
For primary bibliographic entry see Field 2A.
W75-05993

OPTIMUM RUNOFF FORECAST FOR A FLOOD-CONTROL RESERVOIR,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 4A.
W75-05994

METHODOLOGY FOR OPTIMIZATION OF FLOOD PROTECTION MEASURES ILLUSTRATED BY AN EXAMPLE IN THE GERMAN FEDERAL REPUBLIC,
Karlsruhe Univ. (West Germany). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05995

A STUDY OF THE PERAK RIVER FLOOD OF JANUARY 1967 AND AN EVALUATION OF THE FLOOD CONTROL ASPECTS OF TEMENGOR RESERVOIR,
Shawinigan Engineering Co. Ltd., Montreal (Quebec).
P. A. Banks, and T. Y. Huat.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 341-352. (1973) 5 fig, 1 ref.

Descriptors: *Flood control, *Flood damage, *Project planning, Regional flood, Design flood, Multiple purpose projects, Hydrology, Hydrographs, River regulation, River basin development, Floods, Damages, Frequency, Feasibility studies, Cost-benefit analysis, Reservoirs.
Identifiers: *Malaysia(Temengor reservoir), Perak River.

Following a feasibility study for power development on the Perak River, a large storm over northern West Malaysia produced a major flood causing considerable damage in the whole valley. The National Electricity Board of the States of Malaya initiated a study of the flood and evaluated the cost of the damage caused directly by flooding. A damage-frequency relationship which enabled the flood control benefits to be evaluated was established before and after the completion of the proposed dam. The spillway facilities proposed in the power scheme were modified to provide a greater measure of flood control, and the cost of this modification was related to the resulting benefits. The technical feasibility and economic benefit of providing flood control facilities in the development of the Temengor site for the production of power was demonstrated. Development of the power shceme incorporating these flood control features is now proceeding. (See also W75-05973) (Humphreys-ISWS)
W75-05999

NORMS AND CRITERIA FOR INITIATING SCIENTIFIC ASSESSMENT OF FLOOD DAMAGES IN NON-UNIFORM CONDITIONS IN MADHYA PRADESH STATE--INDIA,
Madhya Pradesh Government, Control Board for Major Projects, Bhopal (India).
D. R. Sikka.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 353-358. (1973).

Descriptors: *Flood damage, *Floods, Agriculture, Damages, Estimating, Evaluation, Land management, Cultivated lands.
Identifiers: India.

It was suggested that velocity records, area slope charts, and soil and land classification tables for the area subject to floods or required to be conserved for cultivation should be determined for ascertainment of damages to crops due to loss of soil. It is a tremendous task involving considerable survey and funds. The real 'flood loss' in both cases, for initiation of effective plans for protection of limited useful agricultural lands, is necessary not only for the present needs but for those of future generations. Adequate interest, funding, and legislated measures are essential for recognition of this concept for regulation of floods and their effects in such areas in the developing countries which visually may not look very severe. (See also W75-05973) (Humphreys-ISWS)
W75-06000

FLOOD ROUTING STUDIES OF GANDHISAGAR DAM,
Madhya Pradesh Irrigation Dept., Bhopal (India).
D. S. Sinha.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 385-396. (1973) fig.

Descriptors: *Flood routing, *Hydrologic aspects, *Hydrographs, Floods, Rivers, Flood control, Reservoirs, Design flood, Rainfall, Precipitation(Atmospheric), Meteorology, Reservoir operation, Regulation.
Identifiers: *India(Gandhisagar dam).

The Gandhisagar dam across the Chambal River was built with a spillway capacity of 450,000 cfs. The design flood was 750,000 cfs. Soon after construction, floods of over 750,000 cfs impinged on the reservoir. Based on hydrometeorological studies, the standard project flood was found to have a peak of 1,172,000 cfs. This meant that a big flood reserve would have to be maintained during the monsoon months and there would be corresponding reduction in the useful capacity of the reservoir. As the time travel of flood to the dam is very short, it was found that flood warning would also have limited use. The alternative of allowing occasional submersion of land and property above the present maximum water level is under governmental examination for making maximum use of available capacity. (See also W75-05973) (Humphreys-ISWS)
W75-06003

FLOOD PREDICTION METHOD OF RIVER WITH RESERVOIR AND CONFLUENCE OF TRIBUTARIES,
Kinki Univ., Osaka (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06005

FORECASTING FLOOD HYDROGRAPHS ON THE DANUBE USING THE PASSAGE THEORY,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W75-06006

BASINWIDE FLOOD FORECASTING SYSTEM FOR THE LOWER MEKONG BASIN,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 4A.
W75-06007

FORECASTING OF FLOOD CHARACTERISTICS OF THE NILE,
Technical Univ. of Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W75-06008

EFFICIENT GATE OPERATION OF THE VAALDAM TO MINIMIZE DOWNSTREAM FLOOD DAMAGE,
Department of Water Affairs, Pretoria (South Africa).
For primary bibliographic entry see Field 4A.
W75-06009

HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING,
Catholic Univ. of America, Washington, D.C.
G. K. Young, M. Chi, R. U. Jettmar, G. F. Tierney, and E. Neal.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 864, $5.25 in paper copy, $2.25 in microfiche. Completion Report, January 15, 1975. 97 p, 19 fig, 3 tab, 61 ref. OWRT C-3029(3730)(1). 14-31-001-3730.

Descriptors: Water resources, *Planning, *Runoff, Reservoirs, Economics, Droughts, Water supply, Analytical techniques, Hydrology, *Probability, Streamflow, *Estimating, Risks, *Synthetic hydrology, Stochastic processes, Markov processes, Decision making, *Model studies.

The objective is to determine the consequences of using simple or complex monthly streamflow synthetic data generators on economic decision making from the standpoint of reservoir design as well as regulation. The research method uses Monte Carlo experimentation. Two data generators are tested: a Markov model and a complex self-similar model. Typical economic loss functions are employed (flood, water supply and recreation) to find optimal sizes and methods of regulation. Complex data generators show higher design variances, but in expectations both synthetic generators give designs similar to the historic record. It also appears that operating rules are insensitive to choice of generating models.
W75-06070

STUDY OF STRATIFIED OVERFLOWS AND UNDERFLOWS,
Illinois Univ., Urbana. Water Resources Center.
For primary bibliographic entry see Field 5B.
W75-06081

STABILITY OF SINGLE-PEAKED WAVES,
Montreal Engineering Co. Ltd. (Quebec).
J. P. Jolly, and V. Yevjevich.
Journal of Hydraulic Research, Vol 12, No 3, p 315-335, 1974. 9 fig, 10 ref.

Descriptors: *Waves(Water), *Non-uniform flow, *Celerity, Flow, *Chezy equation, Stability, Momentum equation, Mathematics, Stage-discharge relations, Channels, Froude number, Numerical analysis, Equations, Hydraulics, Simulation analysis.
Identifiers: *Flow stability, *Vedernikov number, Method of characteristics.

A flood wave attenuates as it travels along a natural or artificially constructed channel. When the Froude number is above a certain value, the flow depth may increase downstream, such as in a tailrace structure of a powerhouse and in a canal with steep bed slope. The increase in flow depth defines the instability in open channel flow and is normally referred to as the passage of gradually varied waves to slug flow. With gradually varying flow the governing equations are two-dimensional, the equations of conservation of mass and conservation of linear momentum. These equations were integrated by the method of characteristics with the Chezy resistance law. The results of the simulations of supercritical flow resulting from single-peaked waves by integrating the governing equations were designated as numerical experiments. In these experiments both sinusoidal and asymmetric shaped waves were introduced. The base and shape of the inflow hydrograph as well as the stage-discharge relation affected the rates of amplification or attenuation that occur along a channel. The significance of the Vedernikov number was stressed in determining whether roll waves will form with uniform, steady flow and whether gradually varied, single-peaked waves will amplify. (Singh-ISWS)
W75-06118

AN IMPLICIT METHOD TO SOLVE SAINT VENANT EQUATIONS,
Centro di Ricerca IBM di Pisa (Italy).
F. Greco, and L. Panattoni.
Journal of Hydrology, Vol 24, No 1/2, p 171-185, January 1975. 5 fig, 2 tab, 9 ref.

Descriptors: *Momentum equation, *Continuity equation, *Numerical analysis, *River flow, *Water levels, Analytical techniques, Methodology, Streamflow, Routing, Hydrographs, Equations.
Identifiers: *Italy(Arno River), Implicit numerical method, Convergence speed.

The Saint Venant equations constitute a system of two nonlinear partial differential equations that cannot be solved analytically except in very special cases. An implicit numerical method for solving these equations was presented and applied to the river Arno in Italy. This method exploits the linearity in the discharge of the mass equation and expresses the discharge as a function of the water level in the equation of motion. The resulting nonlinear equation for a grid element contains only the water levels as unknown quantities. The solution of the system of equations for the entire reach, by the use of the Newton iteration method, was facilitated by the particular form of the matrix of the coefficients. The rapid rate of convergence and the limited storage allocation were characteristics of this implicit scheme. This method was compared with other implicit methods based on the same grid of points. (Singh-ISWS)
W75-06119

A GENERAL THEORY FOR FLOW IN ROUGH CONDUITS,
Washington State Univ., Pullman. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-06120

A SIMPLE PROCEDURE FOR SYNTHESIZING DIRECT RUNOFF HYDROGRAPHS,
University of the Witwatersrand, Johannesburg (South Africa).
For primary bibliographic entry see Field 2A.
W75-06123

ON FORCED OSCILLATIONS IN A ROTATING STRATIFIED FLUID,
East Carolina Univ., Greenville, N.C. Dept. of Mathematics.
For primary bibliographic entry see Field 8B.
W75-06124

DETERMINATIONS OF AN OPTIMAL IUH FOR LINEAR, TIME INVARIANT SYSTEMS FROM MULTI-STORM RECORDS,
Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06127

THE MATHEMATICAL MODELLING OF RIVERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
D. B. Spalding.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32787, $3.75 in paper copy, $2.25 in microfiche. January 1974. 35 p, 4 fig, 34 ref.

Descriptors: *River flow, *Model studies, *Heat budget, *Chemical analysis, *Dissolved oxygen, Analytical techniques, Environmental effects, Hydrodynamics, Water circulation, Turbulence, Computers, Rivers, Topography, *Mathematical models.
Identifiers: Curved boundaries.

A new calculation procedure was applied to the mathematical modeling of rivers. The procedure solves the governing differential equations numerically, and so predicts the three-dimensional distributions of water velocity (three components), temperature, turbulence energy and scale, oxygen content, and other practically-interesting variables. Because a 'marching-integration' technique is used, only two-dimensional computer storage is needed, even though the flow process is three-dimensional. Special features of the computer program incorporating the method are: a stretching grid, which accommodates itself to changing width and depth of the river along its length; and a curved boundary treatment, allowing changes in bed profile to be incorporated. (Singh-ISWS)
W75-06132

SURFACE RUNOFF HYDROGRAPH EQUATION,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 2A.
W75-06139

WSP2-WATER SURFACE PROFILE PROGRAM, USER'S GUIDE,
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 7C.
W75-06186

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06194

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06201

A METHOD OF IMPROVING THE UNIFORMITY OF THE STREAM IN AN OPEN WATER-CHANNEL,
Cambridge Univ. (England). Engineering Lab.
A. M. Binnie, and B. M. Sumer.
Journal of Hydraulic Research, Vol 12, No 3, p 299-313, 1974. 12 fig, 1 tab, 11 ref, 1 append.

Descriptors: *Hydraulics, *Channels, *Froude number, *Laboratory tests, *Waves(Water), Free surfaces, Roughness(Hydraulic), Momentum transfer, Profiles, Model studies, Streams.
Identifiers: *Sinusoidal waves, Kelvin waves, Self-induced waves.

Circulating water-channels with a free surface in the inlet contraction and the working section have a restricted range of operation. Above a stream Froude number, F, of about 0.5, self-induced stationary waves appear with their crests at right angles to the stream, and their amplitude increases sharply with increase of F. Described were attempts in small-scale apparatus to destroy these unwanted waves by means of another wave train caused by a ridge on the contraction bottom. Both types of wave were found to be shorter than sinusoidal waves and to depend on some other factor than F alone, therefore the tests had to proceed empirically. However, considerable improvements were possible. For example, a stream at F = 0.795 with a ridge in place was nearly as flat as one of the same depth at F = 0.49 with no ridge. Most of the trials were in a channel with slotted sides and bottom, but a few were made in a solid-walled channel. (Singh-ISWS)
W75-06207

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT, PROBLEMS RELATING TO CHANGES IN HYDRAULIC CAPACITY OF THE MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. River Stabilization Branch.
For primary bibliographic entry see Field 8B.
W75-06212

TR-20 PROJECT FORMULATION--HYDROLOGY, COMPUTER PROGRAM USER'S MANUAL,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06219

ECON2, PROJECT FORMULATION--ECONOMICS--COMPUTER PROGRAM USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06220

DAMS2, PROJECT FORMULATION--STRUCTURE SITE ANALYSIS, USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06221

A LIMNOLOGICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN THE NAVASOTA RIVER, TEXAS, AND A SELECTED FLOODPLAIN,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06242

SEDIMENT INERTIA AS CAUSE OF RIVER ANTIDUNES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 2J.
W75-06256

LIMNOLOGY OF DUFFIN CREEK AND THE LOCATION OF CENTURY CITY,
Waterloo Univ. (Ontario). School of Urban and Regional Planning.
For primary bibliographic entry see Field 5A.
W75-06264

ANALYTICAL MODELLING OF SURFACE RUNOFF HYDROGRAPHS FOR MAJOR STREAMS IN NORTHEAST THAILAND,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2A.
W75-06269

2F. Groundwater

METHOD FOR TRACING THE FLOW OF WATER IN SUBTERRANEAN FORMATIONS,
Union Oil Co. of California, Los Angeles. (assignee)
B. B. Saniford, and R. K. Knight.
U.S. Patent No 3,851,171, 5 p, 1 fig, 1 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1797, November 26, 1974.

Descriptors: *Patents, *Ground water movement, *Tracers, *Water resources, *Water flow, *Subsurface waters, Movement, Reservoirs, Oil reservoirs.
Identifiers: *Chemical tracers, Poly(Hydroxyalkyl), Bis(Triazinylamino) stilbene, Subterranean formations.

A method is disclosed for tracing the flow of water through a subterranean formation. A water-soluble substituted poly(hydroxyalkyl) bis(triazinylamino) stilbene is added to the water at a selected point and samples of water are withdrawn from the formation at one or more points remote from the point of addition and analyzed for the presence of this agent. (Sinha-OEIS)
W75-05884

ROLE OF BEDROCK IN WATERSHED MANAGEMENT,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05932

A STUDY OF CONVECTIVE-DISPERSION EQUATION BY ISOPARAMETRIC FINITE ELEMENTS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
For primary bibliographic entry see Field 5B.
W75-06015

FINITE ELEMENT SOLUTIONS FOR THE EQUATIONS OF GROUNDWATER FLOW,
Desert Research Inst. Nevada Univ., Reno.
R. L. Cooley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 813, $5.75 in paper copy, $2.25 in microfiche. Technical Report Series H-W, Hydrology and Water Resources Publication No. 18, January 1974. 134 p, 30 fig, 7 tab, 33 ref, 3 append. $5.00. OWRT A-048-NEV(1). 14-31-0001-3828.

Descriptors: *Groundwater movement, Saturated flow, Unsteady flow, Computer models, Numerical analysis, *Computer programs, *Finite element analysis, *Equations, Confined water, Flow measurement.

Theory and background as well as details for practical usage of computer programs for modeling ground-water flow are presented. Areal equations for confined and unconfined ground-water flow were developed by integration of three-dimensional flow equations over the vertical. Results show that all areal equations are best written in terms of mean head in the vertical. Discretization of the equations was accomplished through use of a finite difference-numerical integration method and a finite element technique. The two equivalent approaches incorporate continuous or discontinuous variable hydraulic parameters. Vertical cross sections and radial flow problems may be treated simply by parameter redefinition which is accomplished automatically in computer programs. Approximate analysis of convergence and stability of matrix equations resulting from discretization of the flow equations, indicates that all time discretization schemes are stable. However, oscillations can develop for large time steps for all schemes except the fully implicit type. Three basic computer programs incorporating the four solutions are described in detail, complete with card input instructions, and listings are given. These programs were written with emphasis on generality combined with minimization of input and ease of modification. Consequently, parameters are input on a zone by zone basis. Also, program modifications to handle a water-table aquitard and unconfined flow are described.
W75-06083

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 4B.
W75-06105

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
L. W. Gelhar.
Water Resources Research, Vol 10, No 3, p 539-545, June 1974. 6 fig, 1 tab, 19 ref. OWRT C-4119(No 9022)(1).

Descriptors: *Stochastic processes, *Dupuit-Forchheimer theory, *Groundwater recharge, Aquifers, Groundwater movement, Hydrology, Reservoirs, Analytical techniques, Anistrophy, Streams, Groundwater, Evaluation, Laplaces equation, Mathematical studies, Equations, Surface-groundwater relationships.
Identifiers: *Phreatic aquifers, Linear reservoir model, Lumped parameter, Dupuit aquifer model, Laplace aquifer model, Spectral density function, Variable recharge, Partially penetrating streams.

Three analytical models were developed to describe the spectral response characteristics of phreatic aquifers subject to time variable accretion and fluctuations in adjacent stream stage. A linear reservoir model will approximate the behavior of a more complete distributed linear model based on the Dupuit approximation if a single parameter is adjusted appropriately. A linearized two-dimensional analysis including the effects of vertical flow showed, under conditions of large anisotropy with relatively narrow partially penetrating streams, differences from the Dupuit analysis that may be important under some field conditions. Possible applications of the results in aquifer evaluation were suggested. (Visocky-ISWS)
W75-06138

ANALYSIS OF UNSTEADY FLOW TOWARD AN ARTESIAN WELL BY THREE-DIMENSIONAL FINITE ELEMENTS,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
Y. H. Huang, and S. L. Sonnenfeld.
Water Resources Research, Vol 10, No 3, p 591-596, June 1974. 4 fig, 9 ref. OWRT A-042-KY(4).

Descriptors: *Artesian aquifers, Groundwater, *Confined water, *Finite element analysis, *Mathematical models, *Computer models, *Unsteady flow, Equations, Model studies, Digital computers, Wells, Aquifers, Groundwater potential, *Groundwater movement, Subsurface flow, Computer programs, Drawdown, Mathematics.
Identifiers: Three-dimensional flow, Cylindrical elements, Variational calculus, Functionals, Radial symmetry.

A numerical method based on three-dimensional finite elements was presented for determining the unsteady drawdown around an artesian well. The uniqueness of the method lies in the use of cylindrical elements, the stiffness matrix of which can be easily derived. The method was programed for a high-speed computer, and the capability of the computer program was described. A comparison between the finite element and the exact analytical solutions for some simple cases indicated that the use of cylindrical elements gave accurate results. An example was given to illustrate the application of the method to non-homogeneous and asymmetric aquifers where the hydrogeologic boundaries could be approximated by the cylindrical elements. (Prickett-ISWS)
W75-06140

SUBSURFACE BIOLOGICAL ACTIVITY IN RELATION TO GROUND-WATER POLLUTION,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W75-06238

IN-SITU PERMEABILITY ANALYSIS USING BAROMETRIC PRESSURE FLUCTUATIONS,
California Univ., Livermore. Lawrence Livermore Lab.
A. E. Sherwood.
Report No. UCRL-51687, November 4, 1974. 18 p, 9 fig, 1 tab, 25 ref, append. AEC Contract W-7405-Eng-48.

Descriptors: *Permeability, *Atmospheric pressure, *Porous media, *Fourier analysis, Numerical analysis, Rock properties, Pressure, Computer

programs, Diffusivity, Hydrologic properties, Equations, Airswater interfaces, Transmission lines.
Identifiers: *In-situ permeability, *Pressure wave propagation, *Air saturated porous media.

Methods of inferring in-situ permeability from measurements of barometric pressure fluctuations were reviewed. The technique was used in air-saturated porous media at the Nevada Test Site. The two principal methods of analysis involve decomposition of pressure fluctuations into a train of sequential rectangular pulses and a Fourier series of sine waves. The equations for pressure wave propagation were shown to be identical in form to those for signal propagation on an electric transmission line. The transmission line theory offers a powerful method for following the pressure wave in a dissipative porous medium. Transmission line methods were used to investigate reflections from the end of a finite path, leakage to the surroundings from permeable side walls, and the signal perturbations introduced by a sampling probe. A computer program was developed to evaluate the response in radial flow to a step change in pressure. A comparison between pressure waves in radial and linear flow indicated that there are sufficient differences in attenuation and phase lag to permit discrimination between these geometric models. (Sanderson-ISWS)
W75-06241

DEVELOPMENT OF FRESH GROUND WATER NEAR SALT WATER IN WEST VIRGINIA,
Environmental Protection Agency, Wheeling, W. Va.
For primary bibliographic entry see Field 4B.
W75-06258

THE PERMEABILITY AND STORAGE OF AN UNCONFINED CHALK AQUIFER,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
S. S. D. Foster, and V. A. Milton.
Hydrological Sciences Bulletin, Vol 19, No 4, p 485-500, December 1974. 9 fig, 18 ref.

Descriptors: *Carbonate rocks, *Water table aquifers, *Permeability, *Storage coefficient, Saturated flow, Watersheds(Basins), Groundwater, Base flow, Hydrogeology, Geologic control, Limestones, Fissures(Geologic), Resistivity, Test wells, Aquifer testing, Pumping, Graphical analysis, Aquifer characteristics, Unsteady flow, Springs, Discharge(Water).
Identifiers: *Chalk aquifer(England), *Fissure storage.

In its saturated zone the Chalk, the most important British aquifer, is a dominantly fissure-flow and essentially fissure-storage formation. The results of a comprehensive investigation into its hydraulic behavior in an area of some 40 sq km of the East Yorkshire outcrop were evaluated. The hydraulics of idealized fissures were used to extend the interpretation. No strong lateral anisotropy of hydraulic properties is apparent in this area but vertical heterogeneity is very marked, with the main permeability development probably being along horizontal discontinuities in two layers of restricted thickness. (Visocky-ISWS)
W75-06274

VERTICAL PERMEABILITY FROM LIMITED ENTRY FLOW TESTS IN THICK FORMATIONS,
Amoco Production Co., Tulsa, Okla.
For primary bibliographic entry see Field 4B.
W75-06282

THE EFFECT OF PERMEABLE SURROUNDS ON THE PERFORMANCE OF CLAY FIELD DRAINAGE PIPES,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 8B.
W75-06283

NON-EQUILIBRIUM THERMODYNAMICS OF THERMO-OSMOSIS OF WATER THROUGH KAOLINITE,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
R. C. Srivastava, and P. K. Avasthi.
Journal of Hydrology, Vol 24, No 1/2, p 111-120, January 1975. 6 fig, 3 tab, 17 ref.

Descriptors: *Thermodynamics, *Heat flow, *Osmotic pressure, *Kaolinite, Flow, Permeability, Porous media, Entropy, Model studies, Darcys law, Viscosity, Activation energy, Thermal conductivity, Thermocline.
Identifiers: *Thermo-osmosis, Phenomenological coefficients, Pressure gradient, Transport heat, Vaporization heat.

An experiment on thermo-osmosis of water through kaolinite was reported and the data were analyzed in the light of irreversible thermodynamics. The values of phenomenological coefficients were estimated. Contrary to the expectations, the values of heat of transport of water as calculated from the thermo-osmotic pressure data were found to be extremely low in comparison to the activation energy for flow process. (Visocky-ISWS)
W75-06284

ON THE HYDROLOGY OF THE EDWARDS LIMESTONE, SOUTH CENTRAL TEXAS,
California State Univ., San Diego. Dept. of Geological Sciences.
P. L. Abbott.
Journal of Hydrology, Vol 24, No 3/4, p 251-269, February 1975. 10 fig, 1 tab, 22 ref.

Descriptors: *Areal hydrogeology, *Hydrogeology, *Geohydrologic units, *Groundwater movement. *Carbonate rocks, *Karst hydrology, Limestones, Dolomite, Aquifers, Vadose water, Circulation, Porosity, Water resources, Meteoric water, Seepage, Permeability, *Texas, Beds(Stratigraphic), Geologic history, Structural geology, Geologic formations, Faults(Geologic).
Identifiers: Carbonate hydrology, *Lithology, Cavernous aquifer, Limestone terrane.

The Edwards Limestone (Albian) is a mosaic of shallow water, back-reef, carbonate lithofacies averaging about 150 m thick, that have been dolomitized, chertified, and calcitized. Intermittent subaerial exposure during and shortly after deposition of the Edwards resulted in solution-enlargement of some primary voids. Slow upwarping of the northwestern margin of the subsiding ancestral Gulf of Mexico basin elevated the Edwards Group above sea level late in the Cretaceous. Down-to-the-coast, en echelon, normal faulting along the Balcones system during the Early Miocene accentuated the topographic position of the Edwards above sea level. Rejuvenated Gulfward flowing streams cut into the up-thrown fault block and exposed the uppermost Edwards Limestone in the bottoms of deep canyons, which created the discharge sites that initiated a continuously circulating groundwater system within the Edwards Limestone in the Miocene. The early porosity systems have increased in volume through the self-ramifying cavern solution process that occurs in carbonate rocks. The down-dip boundary of the aquifer, or 'bad-water line,' represents an early bypass boundary of the aquifer that has become deeply ingrained with time. Cavern development is largely sub-horizontal and reflects the control of bedding partings and beds of differing lithology. The Edwards Limestone aquifer has only a few widely separated natural discharge sites which, when viewed in scale, make the confined aquifer appear like a regional master conduit. This cavernous system is known as the Edwards underground reservoir and it supplies the water for most of south-central Texas. (Sanderson-ISWS)
W75-06287

FLOW IN A VERTICAL POROUS COLUMN DRAINED AT ITS BOTTOM AT CONSTANT FLUX,
Technion-Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
U. Kroszynski.
Journal of Hydrology, Vol 24, No 1/2, p 135-153, January 1975. 11 fig, 23 ref, 3 append. USDA Grant FG-IS-287.

Descriptors: *Model studies, *Aquifers, Groundwater, *Groundwater movement, *Porosity, Numerical analysis, Analytical techniques, Retention, Hydraulic conductivity, Moisture content, Head loss, Theis equation, Soil water, Finite element analysis.
Identifiers: *Vertical porous columns, Effective porosity, *Drainable porosity, Delayed yield, Vertical flow, Elastic storage, Moisture profiles.

A soil column, saturated at its lower portion and initially in condition of hydrostatical equilibrium was drained at a constant flux at its bottom. Due to the presence of the unsaturated zone above the water table, the motion of the saturation surface depended in a complex manner on time and on soil properties. After defining a characteristic length, the equation of unsaturated flow was solved numerically by a finite difference scheme for different values of drained flux, for two similar soils. Although moisture and head profiles were different for both soils, drawdown curves were found to be in good agreement during a certain time interval which depended on the value of the drained flux. The same problem was solved analytically by a linearization procedure. A simple expression which predicted saturation surface drawdowns quite accurately for small values of the drained flux and for moderate time intervals was derived. An effective porosity coefficient was defined and its variation with time was represented. The bearing of the results on flow in unconfined aquifers was discussed. (Schicht-ISWS)
W75-06295

SIMULTANEOUS PUMPING OF FRESH AND SALT WATER FROM A COASTAL AQUIFER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W75-06296

2G. Water In Soils

EFFECT OF RATE AND DATE OF SEEDING SHOSHONI WINTER WHEAT ON SOIL MOISTURE DEPLETION,
Arizona Crop Improvement Association, Inc., Tucson.
B. J. Kolp, R. G. Sackett, K. E. Bohnenblust, and G. P. Roehrkasse.
Agron J. Vol 65, No 6, p 929-930, 1973.

Descriptors: *Wheat, *Soil moisture, Soil-water-plant relationships.

The extent to which high rates and early planting of winter wheat (Triticum aestivum L.) depleted soil moisture was determined. 'Shoshoni' winter wheat was implanted at seeding rates of 17, 34, 50 and 67 kg/ha on 4 seeding dates, Aug. 19, Aug. 26, Sept. 4, and Sept. 11, 1965. In mid-Aug., Nov., April, and after harvest soil moisture was measured to a depth of 122 cm using the neutron

probe. Moisture depletion during the fall, winter, and spring growing periods was calculated. During stand establishment, the wheat planted Aug. 19 depleted soil moisture significantly more than wheat planted Sept. 4 and 11, and the wheat seeded at the rates of 34, 50 and 67 kg/ha depleted soil moisture significantly more than that at the 17 kg/ha rate. Kernel protein content of wheat harvested for planting dates Aug. 19, Aug. 26, Sept. 4 and Sept. 11 was 12.2, 13.3, 13.2, and 14.2% respectively. There were no significant differences in grain yield attributed to planting dates or rates. During the test period adequate spring moisture was received. During years of low spring precipitation, conservation of moisture by planting on the recommended date or later could be important.--Copyright 1974, Biological Abstracts, Inc.
W75-05854

THE HYDROLOGIC CHARACTERISTICS OF UNDRAINED ORGANIC SOILS IN THE LAKE STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
D. H. Boelter.
In: Histosols: Their Characteristics, Use and Classification, Soil Science Society America, Madison, Wisconsin, Special Publ. 6, Chpt. 4, p 33-46, 1974. 8 fig, 3 tab, 25 ref.

Descriptors: *Peat, *Organic soils, *Streamflow, *Soil physical properties, Hydrologic properties, Bogs, Runoff, Minnesota, Swamps, Groundwater, Water table, Forestry, Soil water, Michigan, Wisconsin.
Identifiers: Fiber content, Histosols, Wetland hydrology, Degree of decomposition, Peatlands.

Although the capacity of peat materials to take up and hold water has been recognized for many years, only recently have studies evaluated the physical and hydrologic characteristics of peat materials in their natural undrained profile. Water retention and hydraulic conductivity were found to vary greatly for different peat materials depending on their degree of decomposition. Although peatlands have sometimes been considered regulators of streamflow, the high water retention values and low hydraulic conductivities of moderately to well decomposed peat show that they give up too little water too slowly to maintain streamflow. Two-thirds of the annual streamflow from perched lake-filled bogs occurs prior to June 1 and they do not make any substantial contribution to streamflow during dry periods. The flat topography and high adsorption capacity of the peat materials result in temporary short-term storage which reduces storm flow runoff peaks, particularly after summer drying periods when bog water tables are low. (Forest Service)
W75-05924

ROOT DISTRIBUTION UNDER SOME FOREST TYPES NATIVE TO WEST VIRGINIA,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2I.
W75-05933

DIFFICULT ERODED PLANTING SITES IN NORTH MISSISSIPPI EVALUATED BY DISCRIMINANT ANALYSIS,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05938

DIURNAL SOIL-WATER EVAPORATION: COMPARISON OF MEASURED AND CALCULATED SOIL-WATER FLUXES,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W75-05963

INFLUENCES OF MULCH RATE AND SLOPE STEEPNESS ON INTERRILL EROSION,
Instituto Nacional de Tecnologia Agropecuaria, Marcos Juarez (Argentina). Estacion Experimental Agropecuaria.
For primary bibliographic entry see Field 2J.
W75-05964

DETERMINATION OF WETTING FRONT SUCTION IN THE GREEN-AMPT EQUATION,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
R. G. Mein, and D. A. Farrell.
Soil Science Society of America Proceedings, Vol 38, No 6, p 872-876, November-December 1974. 3 fig, 4 tab, 10 ref.

Descriptors: *Infiltration, *Unsaturated flow, *Soil moisture, *Wetting, *Equations, Mathematics, Mathematical studies, Capillary conductivity, Natural recharge, Percolation, Moisture, Approximation method, Soil analysis, Soil profiles, Soil water, Pore pressure.
Identifiers: *Wetting fronts, *Green-Ampt equation, Moisture fronts, Capillary suction.

Interest in the Green-Ampt equation to predict infiltration rates into uniform and layered soils has increased in recent years. The work reported was a study of the theoretical justification of determining the suction (at the wetting front) parameter in the equation from the hydraulic conductivity versus capillary suction relationship for the soil. The wetting front suction so determined and used in a form of the Green-Ampt equation which allows for the surface boundary condition initially being one of constant flux gives predictions of infiltration volumes comparable to those determined by numerical solution of the complex partial-differential equation of moisture flow. (Prickett-ISWS)
W75-05965

THE CLIMATIC ADAPTATION OF POPULATIONS OF COCKSFOOT (DACTYLIS GLOMERATA L.) FROM SOUTHERN FRANCE,
Waite Agricultural Research Inst., Glen Osmond (Australia).
R. Knight.
J Appl Ecol, Vol 10, No 1, p 1-12. 1973, Illus.

Descriptors: *Plant populations, Mediterranean, Drought, Adaptation, Ecotypes.
Identifiers: Cocksfoot, Dactylis glomerata.

Populations of D. glomerata were sampled along 2 transects in southern France both of which began near the Mediterranean coast, one going to 80 km north to the Massif Central, the other 450 km west to the Atlantic seaboard. These populations and a group of ecotypes and cultivars were grown in the Mediterranean-type climate of Adelaide, Australia. Seasonal yields, summer survival, heading dates and head numbers were assessed over 2 yr. These assessments were related to the climatic conditions prevailing at the respective collecting sites. The ombrothermic relation was used to provide an estimate of summer drought. There was variation in seedling vigor with populations from dry Mediterranean environments in particular, lacking vigor. At the first harvest there was more than a 20-fold variation in yield. Both transects covered the range from summer-dormant to summer-growing populations a variation that was related to the duration of the drought period and not to annual rainfall. The ability of a population to survive the summer was inversely correlated with its summer growth. Winter dormancy was detected only in high-altitude populations from the Massif Central. Although a wide variation in heading dates was obtained it could not be related to position in the transect and macroclimatic factors, but must have been due to microclimatic or biotic factors. Populations from near the Mediterranean produced the greatest number of heads. Seed retention was highest in populations that were summer-dormant, and these produced many naked seeds when threshed, whereas the summer-growing populations, readily shed seed when ripe, the seed being enclosed by glumes.--Copyright 1974, Biological Abstracts, Inc.
W75-06098

THE INFLUENCE OF ARTIFICIAL RAINFALL AND DI-1-P-MENTHENE ON KARBUTILATE MOVEMENT IN GREENHOUSE SOIL,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5B.
W75-06214

A STUDY OF SOIL MATRIC POTENTIAL AND TEMPERATURE IN HANFORD SOILS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resource Dept.
J. J. C. Hsieh, A. E. Reisenauer, and L. E. Brownell.
Report No. BNWL-1712, 1973. 71 p, 10 fig, 6 tab, 4 append. AEC Contract AT(45-1)-2130.

Descriptors: *Soil moisture, *Infiltration, *Soil temperature, *Soil water movement, *Soil water, Washington, Soil moisture meters, Moisture content, Soil physical properties, Instrumentation, Hydrologic properties, Soil profiles, Recharge.
Identifiers: *Water flux, *Thermocouple psychrometers, *Diode temperature transducers, Hanford reservation, Matric potential.

A new approach to subsurface rainfall movement was initiated by using the energy status of the moisture in the soil profile to quantify the total water flux. To provide the necessary data, in August 1970 a hole was drilled to a depth of 300 feet. Soil samples were taken to determine the hydraulic characteristics of the various sediment horizons. An instrumented cable of thermocouple psychrometers and diode temperature transducers was installed at specific intervals in the well hole. The results of 15 months of data collection do not permit a definite conclusion as to whether precipitation water will eventually reach the groundwater table. The matric potentials seem to indicate that the soil is becoming drier and that the water flux is extremely small. If any flow existed, this minute flow decreased further during the study period. (Sanderson-ISWS)
W75-06240

THE FATE OF SPILLED OIL IN THE SOIL,
Institute TND for Environmental Hygiene, Delft (Netherlands).
For primary bibliographic entry see Field 5B.
W75-06266

DESCRIPTION OF WATER AND AIR MOVEMENT DURING INFILTRATION,
Montana State Univ., Bozeman. Dept. of Civil Engineering.
R. L. Brustkern, and H. J. Morel-Seytoux.
Journal of Hydrology, Vol 24, No 1/2, p 21-35, January 1975. 10 fig, 4 ref. OWRR Contract B-033-Colorado, Grant 14-01-0001-1886.

Descriptors: *Infiltration, *Air, *Immiscibility, *Unsaturated flow, Equations, Darcys law, Continuity equation, Pore pressure, Atmospheric pressure, Saturation, Velocity, Permeability, Movement, Analytical techniques, Mathematical studies, Water table.
Identifiers: *Integral equation, Fractional flow function, Counterflow.

An approximate analytical solution for the problem of one-dimensional infiltration into a homogeneous porous medium was presented. The solution was made possible by assuming that capillary pressure can be partially neglected. Two equations involving two unknowns, water saturation and total velocity, were derived and then solved in a stepwise fashion to yield the saturation profile

and the total velocity at any time. Infiltration quantities were obtained by integration of the area under the saturation profile. Analytical concepts and procedures relevant to the determination of the evolving saturation profile were discussed in some detail. Particular attention was given to the nature and behavior of the fractional flow function. The occurrence of air counterflow during infiltration was also discussed. (Visocky-ISWS)
W75-06288

A NUMERICAL MODEL FOR THE SIMULATION OF UNSATURATED VERTICAL FLOW OF MOISTURE IN SOILS,
Institute for Land and Water Management Research, Wageningen (Netherlands).
G. P. Wind, and W. Van Doorne.
Journal of Hydrology, Vol 24, No 1/2, p 1-20, January 1975. 2 fig, 4 tab, 6 ref.

Descriptors: *Numerical analysis, *Computer models, *Soil moisture, *Unsaturated flow, Unsteady flow, Drainage, Capillary conductivity, Infiltration, Permeability, Moisture tension, Velocity, Rainfall, Water table, Costs, Model studies, Simulation analysis.
Identifiers: *Vertical flow.

A digital model for the simulation of non-steady unsaturated vertical flow of moisture in soils was described. By using an integrated formula for flow velocity errors due to averaging, two conductivity values were avoided. This confines the applicability to situations in which the soil is not too dry. The model also simulates the drainage process. It thus produces the depth of the groundwater table and the discharge data. Other output data are pool depth, runoff, flow velocity at every depth, moisture content, and tension for every layer. A discussion was given on the errors caused by averaging conductivity values in models. A chapter dealt with oscillations caused by too large time steps. The time steps must be chosen in such a way that errors will not be amplified but reduced. The last chapter gave the costs of computation. For soils with low permeability, the model seems to be very cheap to run. A digital model as the one described is fit for short runs with many soils. For long runs with one soil, and analogous model is more appropriate. (Visocky-ISWS)
W75-06289

THE EFFECT OF THE DEPTH OF AN IMPERMEABLE BARRIER ON WATER-TABLE HEIGHTS IN DRAINDED HOMOGENEOUS SOILS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
E. G. Youngs.
Journal of Hydrology, Vol 24, No 3/4, p 283-290, February 1975. 5 fig, 13 ref.

Descriptors: *Drains, *Ditches, *Soils, *Drainage effects, *Water table, Model studies, Rainfall rate, Groundwater barriers, Homogeneity, Seepage, Analysis, Theoretical analysis.
Identifiers: *Hodograph analysis.

The water-table height in a drained homogeneous soil at a given rainfall rate was greater the closer an impermeable barrier was below the drain. Upper and lower limits for the water-table height, between which the true value lies, were estimated from theoretical considerations. These show that the lower the rainfall rate for a given depth of impermeable barrier the greater was the effect on the water-table height. Hydraulic model and electric analogue experiments were in agreement with these results. (Schicht-ISWS)
W75-06294

FLOW IN A VERTICAL POROUS COLUMN DRAINED AT ITS BOTTOM AT CONSTANT FLUX,
Technion-Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06295

CHEMICAL SOIL STABILIZERS FOR SURFACE MINE RECLAMATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06330

ESTABLISHING FOREST ON SURFACE-MINE LAND AS RELATED TO FERTILITY AND FERTILIZATION,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06337

2H. Lakes

STUDIES ON THE PHYTOPLANKTON IN LAKE KEURUSSELKA; FINNISH LAKE DISTRICT,
Jyvaskyla Univ. (Finland). Dept. of Biology.
P. Eloranta.
Ann Bot Fenn. Vol 11, No 1, p 13-24, 1974.

Descriptors: *Phytoplankton, Lakes, Finland, Eutrophication, Algae.

Spatial and seasonal variations in the species composition and biomasses of the phytoplankton of Keurusselka were studied in 1971. The lake lies in the northeast of the Kokemaenjoki drainage basin, and is the object of a comprehensive study program, the physical and chemical properties of its waters having been treated in an earlier publication. Attention was paid to both the species composition and the proportions of the biomasses comprised by different algal groups (Cyanophyta, Chlorophyta, Chrysophyta, Pyrrophytal). The degree of eutrophication in the different parts of the lake was assessed on the basis of the biomasses. The fluctuations in the numbers of species were studied, as well as the factors influencing species numbers and species composition. Special consideration was given to the relations between biomass, water color, season and biotic diversity. The results revealed limitations in the applicability of the quotient systems.--Copyright 1974, Biological Abstracts, Inc.
W75-05853

STUDIES ON FRESHWATER BACTERIA: THE EFFECT OF ENCLOSURE IN LARGE EXPERIMENTAL TUBES,
Freshwater Biological Association, Windermere (England).
J. G. Jones.
J Appl Bacteriol, Vol 36, No 3, p 445-456, 1973.

Descriptors: *Aquatic bacteria, *Thermal stratification, Hypolimnion.
Identifiers: Acinetobacter, Aeromonas, Flavobacterium, Moraxella, Tarns.

A study of viable aerobic heterotrophic bacteria in the open water of Blelham Tarn (United Kingdom) in 2 large experimental tubes introduced into the tarn, demonstrated certain differences between the populations during the period of thermal stratification. Whereas a relatively stable mixture of several species was found in the tarn, the populations of the tubes were often dominated by cycles of single species, including those from genera tentatively identified as Acinetobacter, Flavobacterium group, Moraxella, coryneform group and Aeromonas. It was not known which factors had caused this change in the species composition, but it was noted that some nutrients, especially phosphate-P and Fe, became depleted in the tubes. The other major differences between the tarn and the experimental tubes was that complete deoxygenation of the hypolimnion was found only in the former. The bacterial populations of the tarn and the tubes were similar after overturn and during all periods when conditions were isothermal.--Copyright 1974, Biological Abstracts, Inc.
W75-05875

ON THERMAL STRATIFICATION IN LARGE BODIES OF WATER,
Moncton Univ. (New Brunswick). Dept. of Engineering.
M. Rahman, and N. Marcotte.
Water Resources Research, Vol 10, No 6, p 1143-1147, December 1974. 3 fig, 2 tab, 13 ref.

Descriptors: *Thermal stratification, *Bodies of water, *Isotherms, *Diffusion, Conductivity, Density stratification, Epilimnion, Turbulence, Solar radiation, Mathematical models, *Water temperature, Meteorological data, *Forecasting, *Thermal pollution, Path of pollutants, *Canada.
Identifiers: *Thermal budget method, Similarity technique, One dimensional unsteady model, Chaleur Bay(St Lawrence gulf), Grand Lake(New Brunswick).

A method of predicting water temperature in large bodies of water was presented. The vertical water column was subdivided into two layers: an isothermal surface layer and a temperature-stratified diffusion layer. Meteorological data, either real or imposed, were used for calculating the variation of water temperature with time in the surface layer utilizing the thermal budget method. Then in the diffusion layer the temperature profiles were obtained by solving the time-dependent energy equation by the similarity technique with variable density, conductivity, and diffusivity, and zero velocity. Calculated water temperatures were compared with the measured values. The comparison showed favorable agreement. (Bhowmik-ISWS)
W75-05959

DETERMINATION OF WATER TEMPERATURE IN SHALLOW WATER BODIES,
Polish Academy of Sciences, Golysz. Fish Culture Station.
M. Szumiec.
Acta Hydrobiol. Vol 15, No 3, p 247-357, 1973, Illus.

Descriptors: *Water temperature, *Lakes, *Ponds.
Identifiers: Bodies, Determination, Linear, Poland, Pond, Regression, Shallow, Temperature, Water.

Methods of measurement and of water temperature using the relationships between the ground and air temperature were discussed. For water bodies such as ponds, the existence of a linear regression between the 2 values was established and presented in the form of equations. A nomogram was calculated separately for each 10-day period of the warm part of the year (May-Sept.). The possibility of applying the results for water bodies situated in various regions of Poland is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-05969

THE ANNUAL TEMPERATURE CYCLE OF LOUGH NEAGH,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
C. E. Gibson, and D. A. Stewart.
Limnol Oceanogr, Vol 18, No 5, p 791-793, 1973, Illus.

Descriptors: *Water temperature, Northern Ireland.
Identifiers: Lough Neagh.

The annual cycle of water temperature in 1969 and 1970 is described for Lough Neagh, N. Ireland (United Kingdom). Water temperature appears to follow air temperature after a lag of 7 days. The annual heat budget is calculated as 13.8 x 1,000 cal cm-2 yr-1.--Copyright 1974, Biological Abstracts, Inc.
W75-06016

IMPACT OF TURBIDITY AND LAKE SEDIMENTATION,
Kansas State Univ., Manhattan.
G. R. Marzolf.
Preprint No. 1547, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 18 p, 1 fig, 2 tab, 17 ref.

Descriptors: *Turbidity, *Sedimentation, *Phytoplankton, *Ecology, *Lakes, *Sediment distribution, *Reservoir silting, Primary productivity, Aquatic productivity, Photosynthesis, Light penetration, Kansas, Particle shape, Particle size.
Identifiers: Tuttle Creek Reservoir.

A biological investigation was conducted on Tuttle Creek Reservoir. It was an attempt to understand some of the ecological interactions of organisms with suspended solids. Tables give the limnological features of the reservoir. The reservoir has relatively shallow water and long-fetch winds which inhibit any thermal stratification. This fact allowed for an assumption of homogeneity. Turbidity was high and was primarily due to silts and clays carried into the lake with high inflows. The material remains suspended because of wind conditions. Both in-sites and incubation measurements of photosynthetic activity in the lake were made. By any scheme of lake classification which uses autotrophic production as a criterion, Tuttle Creek Reservoir would be among the least productive lakes in North America. The annual mean rate of primary production is most likely light limited in the lake. The turbidity of the reservoir allowed only a minimum of light penetration. Siltation of reservoirs decreases their value as flood control mechanisms. When dams are always closed sedimentation is continuous. If the reservoir was filled only part of the time and drained at other times, it would double the time span of flood control capability resulting from that dam. (Poertner)
W75-06053

BIOCHROME ANALYSIS AS A METHOD FOR ASSESSING PHYTOPLANKTON DYNAMICS, PHASE 1,
Arkansas Univ., Fayetteville. Dept. of Botany and Bacteriology.
For primary bibliographic entry see Field 5B.
W75-06073

ADAPTATION OF GAME FISH TO HIGHLY ALKALINE DESERT LAKES,
Nevada Univ., Reno. College of Agriculture.
R. E. L. Taylor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 812, $3.25 in paper copy, $2.25 in microfiche. University of Nevada Center for Water Resources Research Technical Completion Report, September 1974. 3 p. OWRT A-042-NEV(2). 14-31-0001-3528.

Descriptors: *Saline waters, *Rainbow trout, *Nevada, *Saline lakes, Fish populations, *Water temperature, Alkalinity, Sulfates, Hydrogen ion concentration, Dissolved solids, Feasibility studies.
Identifiers: *Pyramid Lake(Nev).

Various species of rainbow trout were tested to analyze their adaptability to saline water. The feasibility of stocking Pyramid Lake, Nevada with rainbow trout as a means of replenishing the fish population of the lake was investigated. None of the species of rainbow trout tested could survive the transplant from fresh to saline water of Pyramid Lake when water temperatures differed. With no temperature differential at the time of transplant, however, the trout were able to survive. Temperature ranges between 45 and 64F were tested, all having successful results as long as the fresh and saline waters were of the same temperature at the time of transplant. The tests also show that rainbow trout can tolerate dissolved solids of 5,000 ppm, alkalinity of 1,340 ppm, sulfate of 245 ppm and a pH of 9.0. This study will enable the various agencies dealing with alkaline lakes to successfully introduce rainbow trout into their saline water areas.
W75-06084

AVAILABILITY OF SEDIMENT PHOSPHORUS TO MICROORGANISMS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5C.
W75-06090

STRATIFICATION AND BIOGENIC MEROMIXIS IN TASMANIAN RESERVOIRS,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-06116

CARBOHYDRATES FROM LAKE SEDIMENTS,
Nagoya Univ. (Japan). Water Research Lab.
N. Handa, and K. Mizuno.
Geochem J. Vol 7, No 4, p 215-230, 1973, Illus.

Descriptors: Asia, *Lakes, *Sediments, *Lake sediments, *Carbohydrates, Sedimentation, Chemical analysis, Filtration.
Identifiers: Arabinose, Fucose, Galactose, Glucose, Japan, Mannose, Rhamnose, Ribose, Suwa, Xylose, *Saccharides.

Carbohydrate analysis of the sedimentary samples from Lake Suwa (Japan) was conducted to ascertain the total amounts of carbohydrates present and their chemical nature, and to discuss the behavior of carbohydrates during the course of sedimentation. Total carbohydrate was determined in the range from 5.92-8.32 mg/g dry sediment in the samples from the surface to 24-cm depth of lake sediments. These values tended to decrease with depth. Lake sediments gave rhamnose, fucose, ribose, arabinose, xylose, mannose, galactose and glucose as the monosaccharide components when the sedimentary samples were treated with sufuric acid. These monosaccharides were identified as benzoylhydrazones or acetyl derivatives. When alkali extracts of lake sediments were treated by gel filtration using Sephadex G-25, low molecular weight carbohydrates and polysaccharide were separated. The polysaccharide, being major component of alkali extractable carbohydrate of lake sediment, was characterized by analyzing monosaccharide composition, degree of polymerization and type of glycosidic linkage between monosaccharide components. Results indicate that this polysaccharide of lake sediment is originated from diatoms living in this lake rather than from land vegetation. Monosaccharide composition of sedimentary samples from various depths was determined. Its vertical profile indicates that stabilities of monosaccharide components of sedimentary carbohydrate to microbiological attack increase in following order; glucose, galactose, fucose > mannose > ribose, rhamnose, arabinose. Vertical profile of low molecular weight carbohydrates indicates that the carbohydrates are intermediates during the decompositive processes of the polysaccharide in the sediment.--Copyright 1974, Biological Abstracts, Inc.
W75-06125

DISTRIBUTION OF DYNAMIC WATER LEVEL IN A SHALLOW LAKE,
Water Resources Center, Budapest (Hungary).
I. Bogardi, L. Ducksztein, and C. C. Kisiel
Hydrological Sciences Bulletin, Vol 18, No 4, p 473-484, December 1973. 7 fig, 5 tab, 8 ref. NSF Grant GK-35791.

Descriptors: *Shores, *Reservoir stages, *Lake stages, Mathematical studies, Correlation analysis, Least squares method, Probability, Statistics, Lakes, Lake breezes, Fetch, Seiches, Water level fluctuations, Methodology.
Identifiers: *Hungary(Lake Balaton).

Shoreline damage around a large, shallow reservoir may be incurred by high or low static water level as well as from dynamic water level rises induced by wind. The cumulative effects of both types of damage are additive. A homogeneous section of lake shore on Lake Balaton, Hungary, illustrated a case study. A proposed methodology estimated both the distribution function of monthly static water level and monthly maximum rise caused by wind (seiche plus waves). A convolution of the two distribution functions was performed to yield the distribution function of monthly maximum water level. Normal distributions were suggested for either static or dynamic water levels. Extensions and transferability of the methodology were discussed. (Jess-ISWS)
W75-06134

OPERATION AND MAINTENANCE PROGRAM, WISTER LAKE, POTEAU RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06170

DISSOLVED SILICA IN LAUREL LAKE: INFLUX, UPTAKE, AND DIFFERENTIAL ACCUMULATION DURING SUMMER STRATIFICATION,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5C.
W75-06190

PRELIMINARY OBSERVATIONS ON THE BIOGEOCHEMICAL CYCLE OF SILICA IN STOCKBRIDGE BOWL (LAKE),
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5C.
W75-06191

PREDREDGING ANALYSIS OF LAKE LANSING, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
T. C. Young, R. K. Johnson, and T. G. Bahr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 892, $5.25 in paper copy, $2.25 in microfiche. Michigan State University, Institute of Water Research, Technical Report No. 43, March 1975. 107 p, 24 fig, 14 tab, 17 ref, 3 append.

Descriptors: *Lake morphometry, *Lake morphology, Nutrients, Algae, Dredging, Surveys, *Limnology, Hydrologic data, Data collections, *Michigan, Aquatic animals, Lakes.
Identifiers: *Lake Lansing(Mich), Aquatic angiosperms, *Predredging surveys.

Data collected in anticipation of a lake restoration program were combined with data from several early investigations into the limnology of Lake Lansing, Michigan. Lake Lansing is characterized with respect to climate, hydrology, and other physical, chemical, and biological variables, including temperature, light penetration, carbon, phosphorus, nitrogen, algae, aquatic angiosperms, and fish. Conclusions concerning the current

trophic status of the lake and recommendations for further areas of study on research relevant to a renovation are presented.
W75-06199

HYDROLOGIC VARIATIONS AND THE EXTENT OF THE HOLOCENE LAKES IN THE DANAKIL DESERT, (IN FRENCH),
Centre National de la Recherche Scientifique, Bellevue (France), Laboratoire de Geologie du Quaternaire.
F. Gasse, J. C. Fontes, and P. Rognon.
Palaeogeogr Palaeoclimatol Palaeoecol. Vol 15, No 2, p 109-148. 1974, Illus, English summary.

Descriptors: *Lakes, *Deserts, Climates, Floods, Africa, Sedimentation, Groundwater.
Identifiers: Danakil Desert, Ethiopia, Holocene period, Sahara Desert.

During the Holocene period, lake basins existed in some parts of the Danakil Desert. These basins were supplied either by the Awash River or by ground waters flowing through high fissured basaltic flows. It is possible to reconstruct the areas and fluctuations of lake levels because of the preservation of old shore lines. Calcareous and diatomaceous bottom deposits give information about lacustrine paleo-environments (isotopic analyses, diatoms). It is suggested that the Holocene Period started with an extensive lacustrine episode between 11,000 and 7000 years B.P. At least 1 other transgressive stage, of lesser importance took place between about 2000 and 1000 years B.P. The lakes mainly supplied with ground waters (Afrera) exhibit evidence of chemical and biochemical sedimentation. The deposition continued after 7000 years B.P., and indicates a buffering effect owing to the aquifers. Hence, these basins do not have the simple behavior of a rain gauge recording the local climate fluctuations of the Danakil Desert. The Dobi Graben can be partly related to this kind of basin. Because of the strong turbidity of the flood waters, the lakes with both shallow and underground supplies are quickly filled up in the head of the alluvial plain of the Awash River. The lakes at the downward part of the plain (Gamari and terminal Lake Abhe) have been preserved from the solid supply during the 2 humid episodes. During the intermediate stage, the lacustrine regression allowed the transport of silts and muds as far as Lake Abhe. The Awash River has not ceased flowing and the progression of the alluvial deposits isolates some area of retention on the margins of the plain (lacustrine relicts at about 4000 and 5000 years B.P.). After subtracting the local hydrological influences, by means of comparison with the recent phenomena, this succession fits into the general pattern of the Holocene climatic events of the southern margin of the Sahara.—Copyright 1974, Biological Abstracts, Inc.
W75-06243

RECENT AND LATE QUATERNARY CHANGES IN WATER LEVEL,
Department of Energy, Mines and Resources, Ottawa (Ontario). Earth Physics Branch.
R. I. Walcott.
EOS, Transactions American Geophysical Union, Vol 56, No 2, p 62-72, February 1975. 9 fig, 1 tab, 55 ref.

Descriptors: *Water level fluctuations, *Sea level, *Oceans, *Great lakes, Geologic history, Tides, Tidal effects, Water levels, Paleolimnology, Paleoclimatology, Melting, Ice cover, Glaciers, Lakes, Surface waters, Precipitation(Atmospheric), Climatology, Geomorphology, Quaternary period.

Trends of sea level over the last few thousand years show large variations from place to place, not only within areas affected by glacioisostatic rebound, but in islands and along coastlines well removed from the near effects of rebound. Such variation is to be expected, since the ground will experience significant vertical displacements by the differential loading of sea level and ice mass changes. The dominating influences for short-term periodic variation in sea level are tidal and meteorological, and for long-term variation, the deformation of the earth by changes in surface loading and changes in the climate. In the Great Lakes the principal influence is climatic, variation in rainfall over 20-year periods being the most important. Transient variations in water level such as North Sea storm or Gulf coast hurricane surges are the most important variations in social terms; they may also be much more important in the geological record than was previously realized. (Sims-ISWS)
W75-06260

LATE GLACIAL AND POSTGLACIAL PRODUCTIVITY CHANGES IN A NEW ENGLAND POND,
Indiana Univ., Bloomington. Div. of Biological Sciences.
D. R. Whitehead, H. Rochester, Jr., S. W. Rissing, C. B. Douglass, and M. C. Sheehan.
Science (Wash DC). Vol 181, No 4101, p 744-747, 1973, Illus.

Descriptors: *Primary productivity, *Ponds, Diatoms, Crustaceans.
Identifiers: Sedimentary chlorophyll.

During the late glacial and postglacial the productivity of Berry Pond in Berkshire County, Massachusetts (USA), underwent a number of significant oscillations. This is suggested by data on sedimentary chlorophyll degradation products, diatoms, and Cladocera. The productivity changes were apparently controlled by changes in weathering, terrestrial vegetation in the watershed, litter production, and runoff. There are associated changes in cladoceran community structure.—Copyright 1974, Biological Abstracts, Inc.
W75-06261

THE BENTHIC MOLLUSKS OF LAKE CHAD: ECOLOGY, STUDY OF GROWTH, AND ESTIMATION OF BIOMASSES,
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
For primary bibliographic entry see Field 2I.
W75-06262

2I. Water In Plants

NUTRIENT BUDGET OF A DOUGLAS-FIR FOREST ON AN EXPERIMENTAL WATERSHED IN WESTERN OREGON,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2K.
W75-05923

ROOT DISTRIBUTION UNDER SOME FOREST TYPES NATIVE TO WEST VIRGINIA,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
J. N. Kochenderfer.
Ecology, Vol 54, No 2, p 445-448, Early Spring, 1973. 1 fig, 1 tab, 10 ref.

Descriptors: Soil profiles, Soil properties, Measurement, *Root distribution, *West Virginia, *Forests, *Soil types, Soil texture, *Hardwood.

Strip-mine high walls and road cuts less than 2 years old were used to observe root distribution in several soil and forest types common to north-central West Virginia. Seventy-seven to 89% of all the observed root endings were found in the upper 0.6 m of soil; the highest percentages occurred in the northern hardwood type. The number of roots was greatest in coarse soil and decreased as the soil texture became finer. (Forest Service)
W75-05933

PERFORMANCE OF SOYBEANS (GLYCINE MAX (L.) MERRILL) IN THE WET TROPICS AS AFFECTED BY N, P AND K,
H. A. D. Chesney.
Agron J. Vol 65, No 6, p 887-889, 1973.

Descriptors: *Soybeans, Crop production, Nitrogen, Potassium, Potash, Fertilizers.

The cultivation of soybeans (Glycine max) in wet, humid, equatorial countries that have short days is relatively new. Trials were set up on Arakaka clay loam (a yellow podzol, Typic Normudult) to determine soybean performance from application of N, P, and K, and source of N. The variables were: N, O, 22 and 44 kg/ha; P, O, 29 and 58 kg/ha; and K, O, 37 and 74 kg/ha. Urea, (NH4)2SO4 and uramite were the source of N. N significantly influenced yields only during 1 particularly wet season, when it caused a decrease. K significantly increased yields only during this same period of heavy rainfall, with the effect being greater at the higher application of N. Yields were increased by P at all harvests up to application rates of 58 kg/ha for the 1st 2 crops and 29 kg/ha for subsequent crops. The N x K interaction was the only 2-factor interaction that consistently had any significant effect on yield. Source of N had no effect on yield. Oil and protein contents of the seeds were not influenced by N, P, or K. Truog-P in the soil was unaffected by the application of N or K. Fertilizer P and K increased their levels in the soil. Adapted soybean varieties can be successfully cultivated in the wet tropics.—Copyright 1974, Biological Abstracts, Inc.
W75-05955

THE REED, PHRAGMITES COMMUNIS TRIN., IN THE BRUNNSVIKEN, STOCKHOLM 1971 (IN SWEDISH),
Stockholm Univ. (Sweden). Botany Inst.
H.-G. Wallentinus, K. Gustafsson, and B. Soderstrom.
Sven Bot Tidskr. Vol 67, No 2, p 81-96, 1973, Illus, English summary.

Descriptors: *Chemical analysis, *Biomass, Calcium, Magnesium, Nitrogen, Phosphorus, Potassium, Sodium.
Identifiers: *Phragmites-communis, Reed, Sweden, Typha-angustifolia.

Distribution, biomass and ion-contents of P. communis were investigated. Approximately 2% (=3.1 ha) of the water surface is inhabited by Phragmites, and 0.7% by Typha angustifolia. The mean biomass of above ground parts of Phragmites was 23 tons/ha. The contents of P, N, Na, K, Mg and Ca were measured for the material collected in June and Aug. The contents of P, N and K were lower in the autumn, those of Mg, Ca and possibly Na higher. The N/P-ratio was about 19 in June and about 27 in Aug.—Copyright 1974, Biological Abstracts, Inc.
W75-05967

PHYTOPLANKTON PRIMARY PRODUCTION AND ITS MAIN ASSOCIATED VARIABLES IN CATEDRAL BRANCH, MASCARDI LAKE, (IN SPANISH),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
R. E. Maglianesi, M. S. Radici, and M. O. Garcia.
Bol Soc Argent Bot. Vol 15, No 1, p 12-22, 1973, Illus, English summary.

Descriptors: *Phytoplankton, Aquatic plants, Ecosystems, Productivity.
Identifiers: Argentina, Catedral, Lake, Mascardi.

Variations in phytoplankton concentration and in the absolute and relative productivity occurring in the East branch (Catedral) of Mascardi lake (Rio

Negro Province, Argentine Republic) which seems o behave as a closed ecosystem, are described ere. The cell concentration per unit surface, cal-ulated for the euphotic zone, rapidly increased rom mid winter until spring and then progressive-y decreased. The winter circulation causes the in-rease of nutrients concentration in the euphotic one and consequently a greater phytoplankton roductive capacity towards this season. The daily hytoplankton gross productivity ranged between 0 and 200 mg C/sq m/day, with 2 maxima: one in ug. and another in Jan. These data lead to an an-ual primary production estimate of 46 g C/sq /yr.--Copyright 1974, Biological Abstracts, Inc.
775-05968

HE BENTHIC MOLLUSKS OF LAKE CHAD: COLOGY, STUDY OF GROWTH, AND ESTI-IATION OF BIOMASSES,
ffice de la Recherche Scientifique et Technique utre-Mer, Fort Lamy (Chad).
. Leveque.
ah O R S T O M Ser Hydrobiol. Vol 6, No 1, p 3-5, 1972, Illus.

escriptors: *Mollusks, *Lakes, *Aquatic popula-ons, Ecology, *Biomass, Aquatic animals, Benthic fauna, Africa.
dentifiers: Bellamya, Lake Chad, Cleopatra, Melania.

he influence of bottom characteristics upon the enthic mollusks population in lake Chad, as well s the existence of a threshold conductivity (600 icro mhos) limiting the presence of mollusks in ie northern part of the lake, was studied. The ther shallow depth does not appear to have any ffect upon the bathymetric distribution of organ-ms. After defining a number of biotopes in the ke, depending on the bottom characteristics and eographic position, the average population per mple for each biotope was calculated from the ta resulting from 2 expeditions that took place in 968 and 1970. For each biotope, the stock of the ecies generally obey Motomura's abundance istribution law. A number of 'nomocenoses' haracterized by the number of constituting spe-es, Motomura's constant (identical to a diversity dex) and density of populations were defined. omogeneity and validity of samples were studied sing Taylor's law. As a rule, mollusks have a oderate tendancy toward aggregation. This ndancy is more pronounced for mobile rosobranchia than for Lamellibranchia whose istribution is closer to random. A study of popu-tion affinities indicates the existence of 2 main opulation areas on the entire lake: the central ea, and the eastern and southern areas. The Grande Barriere' constitutes a junction between ie 2 main areas and represents geographical as ell as biological boundary between the northern nd southeastern basins. Although populations emained relatively stable from 1968-1970 one ould nevertheless observe the existence of an volutionary phenomenon in the Bol area where Melania have taken the place of Cleopatra on uddy sediments. This phenomenon is not limited Bol but was also observed on the part of eastern rchipelago in 1970. Concerning biomass, the total umber of mollusks was estimated to be 3.64 x 10 the 12th power individuals in 1970 and biomass 775,000 t (alcoholic weight, shells included). rosobranchia (90% of the total and 83% of iomass) and particularly Bellamya (45% of iomass) predominates. Biomass is not equally istributed, since 3/4 are concentrated in the Grande Barriere' area and contiguous biotopes 5% of the available zone). There is a strong ecrease in biomass towards the eastern part and pecially towards the northern part of the lake.--opyright 1974, Biological Abstracts, Inc.
775-06262

FIELD TEST OF A MODIFIED NUMERICAL MODEL FOR WATER UPTAKE BY ROOT SYSTEMS,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
R. A. Feddes, E. Bresler, and S. P. Neuman.
Water Resources Research, Vol 10, No 6, p 1199-1206, December 1974. 6 fig, 2 tab, 35 ref.

Descriptors: *Evapotranspiration, *Soil-water-plant relationships, *Water balance, *Root systems, Plant growth, Evaporation, Transpiration, Root zone, Water utilization, Soil moisture, Profiles, Computer programs, Simulation analysis, Hydraulic conductivity, Darcys law, Retention, On-site investigations.
Identifiers: *Root sink, *Water uptake, Red cabbage.

Data obtained from careful water balance studies on water uptake by the roots of red cabbage were compared with results obtained from a modified numerical model of Nimah and Hanks. In the modified model, the air dry moisture content at the soil surface may vary with time depending on meteorological conditions. The maximum possible rate of evapotranspiration was calculated by considering both meteorological conditions and crop properties. Data were quoted to suggest that the coefficient of the root sink may sometimes vary exponentially with depth. A period of 7 weeks was simulated, and the calculated weekly moisture profiles did not agree completely with those measured in the field. On the other hand, the calculated cumulative rates of evaporation and transpiration were in excellent agreement with the field data. When the original model was used without the suggested modifications, the agreement of these data with the field data was not as good, an indication that some of these modifications actually improve the predictive capabilities of the model. (Sanderson-ISWS)
W75-06265

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: II. INFLUENCE OF SOIL MOISTURE AND WEATHER,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
A. P. Draycott, M. J. Durrant, and A. B. Messem.
J Agric Sci. Vol 82, No 2, p 261-268, 1974, Illus.

Descriptors: *Plant growth, *Irrigation effects, Fertilizers, Potassium compounds, Sodium compounds, *Soil moisture, *Weather, *Vegetable crops, Rainfall.
Identifiers: *Beets, *Sugar beets.

The amount of soil moisture used by sugar beet was determined weekly between May and Oct. (1970-72) in plots testing 18,500 and 124,000 plants/ha with and without irrigation. When leaves covered more than 60% of the ground (after mid-June with the large density and after mid-July with the small density) the crop used water at the potential transpiration rate even with soil moisture deficits on plots without irrigation of up to 170 mm. Therefore as irrigation greatly increased sugar yield in 1970 and 1972, it probably did not do so simply by satisfying the crop's water need. In 1970 irrigation appeared to act partly by decreasing the time taken to attain complete leaf cover but in 1972 irrigation had only a slight effect on leaf cover but greatly increased sugar yield, particularly of the large population. With little rainfall, the large density rapidly exhausted the available moisture from the plow layer. It seems likely therefore that irrigation increased yield by giving more leaf cover early and by improving nutrient supply but not by supplying extra water for transpiration. Roots of the larger plant density extended deeper more rapidly than those of the small plant density but roots of both eventually reached 150 cm. This probably explains why the crop was able to use water at the potential rate for much of the season even in prolonged droughts. The maximum amount of water removed from each soil horizon depended on plant density, the water treatments and depth down the profile. The available water capacity estimated from soil texture suggested that with roots to 150 cm, there was 236 mm of available water in the soil. In practice, 124,000 plants/ha given no irrigation used 167 mm of this and 115 mm when irrigation was applied. These experiments, like earlier ones, suggest that on this soil sugar beet only gives large responses to irrigation when it is needed early in the season.--Copyright 1974, Biological Abstracts, Inc.
W75-06317

2J. Erosion and Sedimentation

METHODOLOGY FOR IN-STREAM REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05851

SWELL DAMPER,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France).
For primary bibliographic entry see Field 8B.
W75-05896

FLOATING WAVE BARRIER,
W. W. Bowley.
U.S. Patent No. 3,846,990, 4 p, 9 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 491, November 12, 1974.

Descriptors: *Patents, *Shore protection, *Beach erosion, *Waves(Water), Equipment.
Identifiers: *Wave damping, Wave action.

The floating wave barrier is designed to reduce or eliminate kinetic energy of water waves. It consists of several flat surfaced plates that are connected with at least one flexible line. One plate is connected to an anchor on the sea bottom. When the barrier is placed in the water, the plates are positioned at different vertical levels with one plate at or near the surface. The plates are relatively thin and do not present a substantial fixed force against the horizontal component of the wave velocity. When out of phase plate movement causes two plates to move toward each other, the water between them is placed under a compressive force in the vertical direction. This causes the water between the plates to be accelerated horizontally to form a reflected wave in the seaward direction and a transmitted wave in the landward direction. The reflected wave contacts other incoming incident waves to reduce their kinetic energy prior to contacting the barrier and the transmitted wave tends to fill up the wave trough directly preceding it to reduce the vertical force component of the water. These barriers are arranged parallel to the shore being protected at varying distances from the shore so that a given portion of the wave contacts more than one barrier prior to reaching the shore. (Sinha-OEIS)
W75-05898

SEDIMENT DEPOSITION IN RESERVOIRS ASSOCIATED WITH RURAL ROADS, FOREST FIRES, AND CATCHMENT ATTRIBUTES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of Paris Symposium, September 1974. Effects of Man on the Interface of the Hydrologic Cycle with the Physical Environment-Symposium Int. Assoc. Sci. Hydrol. Pub. No. 113, p 87-95, 1974. 5 tab, 10 ref.

Descriptors: *Erosion, *Deposition, *Sedimentation, Snow, Geology, Streamflow, Forest fires, Roads, Highways, Reservoirs,

Watershed management, Geomorphology, Elevation, Slope, Forests, Brushlands, Flood frequency, *Grazing.
Identifiers: *Rural roads, *Trap efficiency(Reservoirs), Watershed shape, Channel slope.

Deposition of sediment was measured in 48 northern California reservoirs having catchment areas exceeding 5 km2. The measurements were related by principal components analysis to four categories of variables: catchment, streamflow, snow, and land use. Catchment variables included characteristics of topography, geology, and the reservoir. Streamflow variables included relative intensity and amounts of flow during deposition. Snow variables were calculated from elevational distribution and latitude of each catchment. Intensity of land-use was characterized by development of roads for timber harvesting, mining, and recreation, and by uses not primarily related to roads, such as grazing and forest fires. Roads were of five classes--ranging from highways to dirt roads--and three locations--ridge-top, slope, and streamside. Forest fire variables included current fire history and the extent of high-elevation brushfield associated with burning and grazing. Explained variance in sediment deposition ranged from 78 to 83 percent--depending on the model used in analysis. Variables contributing the most to explained variance were, in decreasing order, snow, geology, streamflow, forest fires, and reservoirs. Roads located near streams contributed the most to deposition--twice as much as did roads located elsewhere. Improved secondary roads near streams were the single greatest contributor. (Forest Service)
W75-05916

PLANTING GRASS AND PINE FOR EROSION CONTROL,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05917

RELATIVE CONTRIBUTION OF SEDIMENT FROM SOURCE AREAS AND TRANSPORT PROCESSES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of a Symposium Forest Land Uses and Stream Environment, October 19-21, 1970. Oregon State University, Corvallis, p 55-63, August 1971. 2 fig, 15 ref.

Descriptors: *Erosion, *Suspended sediment, *Sediment transport, Sediment yield, *Water quality, *Turbidity, Bank erosion, Bedload, Mass wasting, *Landslides, *Watershed management, *Lumbering, Forest fires, Soil texture, Channel morphology, Stream erosion, Headwaters, Vegetation effects, Brush control, Roads, Washouts, Slope stability, Geology, Abrasion.
Identifiers: Soil creep, Flood effects, Erodibility, Surface-aggregation ratio, Channel armouring.

New findings are reported; a reanalysis of older studies is presented; and pertinent results in the literature are summarized. Past land use, forest fires, road building, 'poor logging,' and conversion of steep lands to grass have increased sediment discharge by factors ranging from 1.24 to more than 4. Projected future use is expected to increase sediment production by a factor of 4, with 80 percent associated with roads and 20 percent with logging. Major floods have increased subsequent turbidity of streamflow by a factor of 2. The increases were greater in logged areas of watersheds where roads were next to streams and landings were in draws than in undisturbed watersheds. Most landslides were associated with road development, next most with logged areas, and least with undisturbed forest area. The number of turbid days in streamflow varied by a factor of 2.34 with differences in silt plus clay content of soils, by 8.55 with differences in erodibility, and by 4.3 with the percent of gravel. Further, these soil characteristics were predictable from geologic rock types. In a sample calculation, 89 percent of channel bedload became suspended load enroute downstream. Soil creep contributed 15 percent to total sediment discharge from watersheds; channel bank erosion contributed 54 to 55 percent. (Forest Service)
W75-05926

ROLE OF BEDROCK IN WATERSHED MANAGEMENT,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05932

THE TORLESSE STREAM VORTEX-TUBE SEDIMENT TRAP,
Lincoln Coll. (New Zealand). Tussock Grasslands and Mountain Lands Inst.
J. A. Hayward, and A. J. Sutherland.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 41-53, 1974. 8 fig, 4 tab, 5 ref.

Descriptors: *Trapping, *Sediment transport, *Sediment yield, *Bed load samplers, *Channels, *Erosion, *Vortices, Stage-discharge relations, Froude number, Mannings equation, Trap efficiency, Particle size, Measurement.
Identifiers: Vortex-tube, Transport rates, Unsteady bed load transport, *New Zealand(Torlesse Stream).

A system for measuring the yield and transport rates of bed-load sediment was described. The technique is based on the vortex-tube principle to remove bed load from the stream to an off-channel recovery area. The system allows for both continuous or intermittent recording of sediment movement. Some preliminary results which indicate the unsteady nature of bed-load transport were presented. (Bhowmik-ISWS)
W75-05954

PATTERNS OF VARIATION IN A FLUVIAL SYSTEM,
State Univ. of New York, Buffalo. Dept. of Geography.
L. J. Onesti, and T. K. Miller.
Water Resources Research, Vol 10, No 6, p 1178-1186, December 1974. 2 fig, 7 tab, 34 ref.

Descriptors: *Geomorphology, *Drainage patterns(Geologic), Gradients(Streams), Drainage density, Graded, Meanders, Running waters, Streams, Geologic control, *Wisconsin, *River basins, Variability.
Identifiers: *Fluvial morphology, *Pecatonica River Basin(Wis), Stream order.

Sixteen hydromorphic variables, with observations grouped by stream order, were subjected to principal components analysis to investigate the manner in which variables interact in a downstream direction within a drainage basin. The degree of intercorrelation between variables in a fluvial system is influenced by geology, structure, and variation in the physical characteristics of stream basins. The contention is that since the degree to which these factors are effective varies downstream in an orderly way, the intensity of interaction between variables should also be so ordered. The results of the analysis support this because the variance accounted for by the first and second principal components increased systematically downstream, whereas that associated with principal components three through six generally decreased. The structure of the data was also examined in the context of varimax rotated components, and the changes that occur between lower- and higher-order stream basins were identified. (Jess-ISWS)
W75-05961

INFLUENCES OF MULCH RATE AND SLOPE STEEPNESS ON INTERRILL EROSION,
Instituto Nacional de Tecnologia Agropecuaria, Marcos Juarez (Argentina). Estacion Experimental Agropecuaria.
A. R. Lattanzi, L. D. Meyer, and M. F. Baumgardner.
Soil Science Society of America Proceedings, Vol 38, No 6, p 946-950, November-December 1974. 4 fig, 4 tab, 14 ref.

Descriptors: *Erosion control, *Soil erosion, *Mulching, *Agricultural runoff, *Sediment yield, Simulated rainfall, Erosion rates, Rill erosion, Slopes, Land management, Rain, Soil conservation, Runoff, Sediments, Infiltration, Rainfall intensity, Impact(Rainfall), Sheet erosion, Soil water movement.
Identifiers: Interrill erosion, Straw mulch, Splash erosion.

Soil and water losses from plots representing field areas between rills were studied for four rates of straw mulch at four slope steepnesses. Three simulated rainstorms totaling 2 hours at 6.4 cm/hour were applied to a 61- by 61-cm test area of Russell silt loam soil. Interrill erosion was reduced about 40% by mulch applied at a rate of only 0.5 metric tons/ha and about 80% by 2 tons/ha, as compared with no mulch. Erosion was negligible at the 8 tons/ha rate. Soil losses from the interrill areas at 20% slope were only about double those measured at 2% slope, whereas widely used erosion equations show that total field erosion would increase about 20-fold over this range of steepnesses. Water loss by runoff was independent of slope steepness, but it was slightly reduced by mulch at a rate of 2 tons/ha and was greatly reduced by the 8 tons/ha rate. After 40 minutes of rainfall, sealing of the soil surface by raindrop impact had reduced infiltration rates for treatments with 0 to 2 tons/ha of mulch to only 20% of those with 8 tons/ha. (Sanderson-ISWS)
W75-05964

MEASUREMENTS OF SEDIMENT OXYGEN DEMAND CHARACTERISTICS OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
For primary bibliographic entry see Field 5B.
W75-05972

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
For primary bibliographic entry see Field 4A.
W75-05973

PROBLEMS OF NUCLEAR GAUGING OF SUSPENDED SEDIMENT CONCENTRATION,
Research Inst. for Water Resources Development, Budapest (Hungary).
L. Rakoczi.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 85-96.(1973) 3 fig, 5 ref.

Descriptors: *Suspended load, *Measurement, *Sampling, *Instrumentation, Rivers, Surveys, Gages, Nuclear meters, Theoretical analysis, Calibrations, Sediments, Suspended solids, Running waters.

The in situ determination and recording of suspended sediment concentrations by nuclear methods may have several important advantages over the traditional sampling techniques. Lightweight portable instruments are available which can easily and safely be operated, and successful

chievements have been made in the field of fixed-ocation concentration recorders. However, the ield calibration of the nuclear gages involves everal difficulties and its accuracy depends rimarily on the accuracy of the simultaneous raditional sediment sampling. Further develop-ient is required in lowering the minimum detecta-le concentration and in increasing the sensitivity f the nuclear instruments. (See also W75-05973) Humphreys-ISWS)
V75-05978

ELIABILITY OF BED-LOAD SAMPLING,
esearch Inst. for Water Resources Development, udapest (Hungary). Dept. of Surface Waters.
Csoma.
n: Flood Investigation, Volume II; Proceedings of ie International Association for Hydraulic esearch Symposium on River Mechanics (4 ol.), Bangkok, Thailand, January 9-12, 1973. sian Institute of Technology, Bangkok, Thai-nd, p 97-107 (1973). 5 fig, 3 tab, 11 ref.

escriptors: *Bed load, *Sampling, *Reliability, Statistical methods, On-site investigations, Sedi-ient discharge, Measurement, Estimating, tochastic processes, Sediments, Probability, nalysis.

he results of bed-load measurements are subject o deviations due to the random fluctuation of ediment movement as well as to constant and ran-om errors of sampling. It was demonstrated that ie bed-load transport values obtained by a series f samplings under the same hydraulic conditions an be approximated by a distribution function. A tatistical method was presented for characteriz-g the reliability of bed-load measurements. (See lso W75-05973) (Humphreys-ISWS)
V75-05979

IECHANISM OF BED LOAD TRANSPORT IN HANNEL FLOWS,
'sesoyuznyi Nauchno-Issledovatelskii Institut 'odosnabzheniya, Kanalizatsii, Gidrotekh-icheskikh Sooruzhenii i Inzhenernoi idrogeologii, Baku (USSR).
. A. Ibad-Zade.
n: Flood Investigation, Volume II; Proceedings of ie International Association for Hydraulic esearch Symposium on River Mechanics (4 ol.), Bangkok, Thailand, January 9-12, 1973. sian Institute of Technology, Bangkok, Thai-nd, p 467-477. (1973) 4 fig, 1 tab, 3 ref.

escriptors: *Sediment discharge, *Bed load, Alluvial channels, Theoretical analysis, On-site ivestigations, Rivers, Sediment transport, elocity, Sediments, Equations, Estimation, low, Running waters, Energy transfer, uspended load, Movement, Evaluation.
dentifiers: *River mechanics, USSR.

he phenomenon of solids transport by stream is ost closely connected with the process of inter-al energy exchange in the stream cross section. ne of the principal properties of internal process ithin the stream cross section is the energy ansfer from the main zone (with the energy ex-ess) to the energy-deficient bottom zone. This ergy is used for channel development and bed ad transport. Formulas were derived for (1) cal-ulation of velocity of excess energy, energy ansfer and consumption by bed load transporta-on, and the condition of sediment movement in spension; and (2) estimation of bed load scharge. Experimental studies established rela-onships between grain size and water discharge, ickness of active layer and bottom velocity, and elocity of bed load transportation and bed load anulometry. The comparison of bed load scharges calculated by formulas and obtained by mploying 'tagged' sands, bathymetrical measure-ents, and acoustic depth sounding of bottom dges in all large rivers of the Caucasus was out-ned. A formula was presented and recommended for estimating bed load discharges. (See also W75-05973) (Humphreys-ISWS)
W75-06010

APPLICATION OF STATISTICAL METHODS TO THE DISTRIBUTION OF FALL DIAMETER AND FLOW TURBIDITY,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekh-nicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Y. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 479-490, (1973). 3 fig, 9 ref.

Descriptors: *Turbidity, *Suspended solids, Particle size, Statistical methods, Mathematical studies, Distribution patterns, Settling velocity, Distribution, Laminar flow, Turbulent flow, Analysis, Analytical techniques.

In calculations for channel formation of sediment movement and deposition it is important to estimate properly the granulometrical composition of sediments, their fall diameter, and sediment distribution in flow depth. It was theoretically proved that the distribution of granulometrical composition of sediments follows the normal distribution law. On this basis, some regularities of fall diameter distribution were obtained both for laminar settling zone and for turbulent settling zone that are in full agreement with experimental data of a number of investigators. From these relationships, the equation of fall diameter and mean fall diameter distribution was obtained. Also, an equation was determined for turbidity distribution with flow depth that is valid for any velocity distribution law. Comparison of obtained equations with experimental data was satisfactory. (See also W75-05973) (Humphreys-ISWS)
W75-06011

SEDIMENT DISCHARGE CONTROL BY MEANS OF SETTLING BASINS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekh-nicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06012

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekh-nicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06013

MODELLING OF ERODIBLE CHANNELS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekh-nicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
J. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 511-518, (1973). 2 ref.

Descriptors: *Model studies, *Theoretical analysis, *Alluvial channels, Hydraulic models, Velocity, Equations, Energy, Gradients(Streams), Hydraulics, Erosion, Roughness(Hydraulic), Rivers, Meanders, Mathematical studies.
Identifiers: Model scale, Distorted model.

A series of problems such as bed formation, velocity distribution, load transport, and sedimentation were solved starting from the energetic concept. The same concept was used as a basis of modeling of erodible channels. While modeling erodible channels' transporting capacity of flow, its energy both in total and in particular was a point of interest which was transfered from central region of flow cross sections to bottom zone with insufficient energy. On the basis of these studies, formulas were obtained for channel modeling of energy. In these formulas velocity distribution changes were taken into account, and this was extremely important for geometric distortion of the model. The method proposed was used for meander straightening modeling and gave a good convergence with the nature. (See also W75-05973) (Humphreys-ISWS)
W75-06014

PROBLEMS IN MEASURING TURBIDITY AS A WATER QUALITY PARAMETER,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-06022

MONITORING DREDGE SPOILS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-06035

COMPUTER SIMULATION OF SEDIMENT DEPOSIT IN AN ALLUVIAL CHANNEL,
South Dakota State Univ., Brookings.
For primary bibliographic entry see Field 8B.
W75-06051

A MODEL FOR PHYSICAL AND BIOTIC REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Entomology.
For primary bibliographic entry see Field 5B.
W75-06077

ANALYSIS AND DESIGN OF SETTLING BASINS FOR IRRIGATION RETURN FLOW,
Idaho Univ., Moscow.
For primary bibliographic entry see Field 5G.
W75-06078

HEAVY METAL DISTRIBUTION IN BOTTOM SEDIMENT AND WATER IN THE TENNESSEE RIVER-LOUDON LAKE RESERVOIR SYSTEM,
Tennessee University, Knoxville, Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-06088

THE BEACH EROSION HAZARD,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. N. Foster.
Water Research Foundation of Australia Report No 44, October 1974. 21 p, 5 fig, 69 ref.

Descriptors: *Beach erosion, *Shore protection, *Australia, Coastal engineering, Legislation, Dunes, Littoral drift, Sediment transport, Erosion control, Sands, Recreation demand, Recreation facilities.

The population of Australia lives mostly near the coast, and increasingly uses it as a recreational facility. A review of natural beach processes emphasizes the interdependence of the various zones of a beach in maintaining the stability of the whole; in particular, the frontal dune, which has often been subject to development. Once this has occurred, the difficulty of dealing with both natural and man-made erosion problems is con-

siderably increased. A directed program of data collection, and a rationalization of piecemeal legislation and regulation of beachfront development will be necessary both to mitigate the effects of past mistakes and avoid such mistakes in the future. (CSIRO-Aust)
W75-06113

CARBOHYDRATES FROM LAKE SEDIMENTS,
Nagoya Univ. (Japan). Water Research Lab.
For primary bibliographic entry see Field 2H.
W75-06125

INLET SEQUENCE: A VERTICAL SUCCESSION OF SEDIMENTARY STRUCTURES AND TEXTURES CREATED BY THE LATERAL MIGRATION OF TIDAL INLETS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 2L.
W75-06204

STRUCTURE AND DIRECTIONAL PROPERTIES OF SOME VALLEY SANDUR DEPOSITS IN SOUTHERN ICELAND,
Glasgow Univ. (Scotland). Dept. of Geology.
B. J. Bluck.
Sedimentology, Vol 21, No 4, p 533-554, November 1974. 15 fig, 13 ref.

Descriptors: *Sedimentology, *Deposition(Sediments), *Sand bars, Geomorphology, Channel flow, Channels, Sands, Gravels, Stratification, Ripple marks, Structure, Valleys.
Identifiers: Directional properties, Imbrication, Lineations, Sandur, *Iceland.

Sediments in the valley sandurs of Markarfljot and Landmannalaugar accrete in complex lateral (transverse) bars. Directional structures within the bars are more variable in orientation than the channels which contain them. This greater variability is mainly due to the diversification of the flow, at the low stage, as it moves through the accretion topography of the sandur. Different directional structures preferentially record different stages of the flow: imbrication and lineation form mainly in response to the high flow stage, and have a low degree of dispersion; cross-stratification records the low stage of flow, and has a wide dispersion. Cross-stratification is produced in four main ways: by small deltas, by megaripples, by ripple topped bars, and by migrating accretionary bar banks. Small deltas form at low flow stage; accretionary banks at high. (Sims-ISWS)
W75-06205

SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH,
Nicholls State Univ., Thibodaux, La. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 2L.
W75-06211

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W75-06218

A STUDY OF RHEOLOGIC PROPERTIES OF ESTUARIAL SEDIMENTS,
California Univ., Berkeley. Hydraulic Engineering Lab., and California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 2L.
W75-06222

THE DYNAMICS OF INLETS AND BAYS,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W75-06223

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 8B.
W75-06225

GEOMORPHOLOGY AND SEDIMENTS OF THE INNER NEW YORK BIGHT CONTINENTAL SHELF,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W75-06226

EFFECTIVENESS OF BRIDGE PIER RIPRAP PRACTICE IN WASHINGTON STATE,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W75-06228

INTERDISTRIBUTARY BAY SEQUENCES AND THEIR GENESIS,
Oxford Univ. (England). Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 2L.
W75-06237

NON-COMBUSTIBLE SUSPENDED MATTER IN SURFACE WATERS OFF EASTERN ASIA,
Woods Hole Oceanographic Institution, Mass.
S. Honjo, K. O. Emery, and S. Yamamoto.
Sedimentology, Vol 21, No 4, p 555-575, November 1974. 15 fig, 15 ref. NSF Grant GA-30631.

Descriptors: *Oceanography, *Suspended solids, *Pacific Ocean, Sea water, Sampling, Organic matter, Silts, Diatoms, Microscopy, Electron microscopy, Measurement, Filters, Sedimentation.
Identifiers: *China Sea, Non-combustible matter.

A total of about 1100 well-distributed samples of suspended matter in surface waters off the length of eastern Asia are available. From these samples, 180 were selected for detailed examination of the non-combustible fraction by using optical and electron microscopy along with computer methods of particle measurement and counting. The results showed that, generally, all major components of the suspended matter are most abundant in the nearshore belt (combustible fraction, mineral grains of silt size, skeletal debris, and clay minerals), the result of mechanical transport of detrital sediment and chemical transport of nutrients from the land. Mineral grains of silt size average about 2%, skeletal debris plus clay minerals about 23%, and combustible organic matter about 75% of total sample weights, but the last two categories vary over a wide range depending upon geographical positions of the samples. Most evident is an oceanward decrease in percentage and concentration of the total noncombustible fraction and an oceanward increase in median diameter of the mineral grains. (Sims-ISWS)
W75-06239

FORMATION AND DEVELOPMENT OF BEACH CUSPS ON DEL MONTE BEACH, MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2L.
W75-06250

SEDIMENT INERTIA AS CAUSE OF RIVER ANTIDUNES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
G. Parker.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings Paper 11127, p 211-221, February 1975. 3 fig, 1 tab, 14 ref.

Descriptors: *Sediment transport, *Tractive forces, *River beds, *River flow, *Alluvial channels, Froude number, Viscosity, Analytical techniques, Roughness(Hydraulic), Dunes, Bed load, Movement, Hydraulics, Rivers, Sediments.
Identifiers: *Antidunes, Bed forms, Sediment inertial effects, Flow instability.

The formation of antidunes on riverbeds was explained in terms of sediment inertial effects. Due to inertia, bed sediment in transport cannot respond immediately to flow changes. To quantify the effect, a simple equation for sediment momentum balance was derived. A stability analysis indicated that riverbeds are unstable for a specific range of Froude numbers and that the instability leads exclusively to antidune formation. The instability, which was scaled by a dimensionless number representing the ratio of sediment inertia to friction, is a result of a spatial lag of bed load behind bed stress. An analytical relation for spatial lag was obtained, and the lag was estimated for some experimental data. The limits of antidune formation were compared with data. (Singh-ISWS)
W75-06256

BED MATERIAL SIZE CHANGES AND SEDIMENT TRANSPORT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
K. G. Renard.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 6, p 1001-1010, November-December 1974. 7 fig, 3 tab, 8 ref.

Descriptors: *Sediment transport, *Sediment load, *Sedimentology, *Sediment discharge, Tractive forces, Transfer, Movement, Flow, Particle size, Settling velocity, Watersheds(Basins), Mannings equation, *Arizona, Model studies.
Identifiers: *Walnut Gulch watershed(Ariz), Laursen sediment transport model.

Data collected on the Walnut Gulch Watershed were used to illustrate sediment transport problems in ephemeral streams and to verify the Manning-Laursen conceptual model used to describe sediment transport with varying streambed material. Experience with an ephemeral stream such as Walnut Gulch indicates that the Laursen sediment transport relation provides a good estimate of the sediment concentration if the bed material composition is known. Because the bed composition changes between flow events, long term sediment yields are hard to predict unless some historical data are available about the bed material. Because the fine fractions are more easily transported, it is especially important to accurately estimate the fine fraction of the size distribution. (Gibb-ISWS)
W75-06281

SOME CONSIDERATIONS OF STRAIGHTNESS IN CHANNEL FORM RELATING TO THE ESTUARY OF THE MACLENNAN RIVER, SOUTH OTAGO (NEW ZEALAND),
Newcastle Univ. (Australia). Dept. of Geography.
For primary bibliographic entry see Field 2L.
W75-06285

SEDIMENT YIELD FROM STRIP-MINED WATERSHEDS IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06332

2K. Chemical Processes

NUTRIENT BUDGET OF A DOUGLAS-FIR FOREST ON AN EXPERIMENTAL WATERSHED IN WESTERN OREGON,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. L. Fredriksen.
In: Proceedings--Research on Coniferous Forest Ecosystems--A Symposium. Bellingham, Washington--March 23-24, 1972, p 115-131, (1972). 3 fig, 2 tab, 14 ref. PNW-1602.

Descriptors: Nitrogen, Phosphorus, Silica, Sodium compounds, Potassium, Calcium, Magnesium, Streamflow, *Douglas fir trees, Precipitation(Atmospheric), Cations, Weathering, Nutrient removal, *Oregon, *Demonstration watersheds, *Nutrient requirements.

Annual loss of nitrogen, phosphorus, silica, and the cations sodium, potassium, calcium, and magnesium followed the same pattern as annual runoff which is heavily dominated by winter rainstorms arising from the Pacific Ocean. Even though 170 and 135 cm of water passed through this Douglas-fir ecosystem for the 2 years reported here, this ecosystem conserved nitrogen effectively as indicated by an average annual dissolved nitrogen outflow of 0.5 kg/ha from an annual average input of 1.0 kg/ha in precipitation. There was a small annual net loss of phosphorus (0.25 kg/ha). Cation input in precipitation was less than 10 percent of sources from mineral weathering--indicating that mineral weathering was the principal source of cations to the system. Average annual net losses of calcium, sodium, magnesium, and potassium were: 47, 28, 11, and 1.5 kg/ha, respectively. Silica loss of 99 kg/ha-yr was the largest of all constituents and came entirely from within the forest system. Although loss of sediment was low during the period of study, loss of nutrients by soil erosion may become of major importance over a longer time scale due to widely spaced unsampled catastrophic erosion. (Forest Service)
W75-05923

PROBLEMS AND TECHNIQUES IN SAMPLING WATER FOR ANALYSIS,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-05931

HYDROCHEMISTRY OF THE ATHABASCA AND NORTH SASKATCHEWAN RIVERS IN THE ROCKY MOUNTAINS OF CANADA,
McGill Univ., Montreal (Quebec). Dept. of Geography.
J. J. Drake, and D. C. Ford.
Water Resources Research, Vol 10, No 6, p 1192-1198, December 1974. 4 fig, 3 tab, 12 ref.

Descriptors: *Rocky Mountain region, *Geochemistry, *Water chemistry, Streams, Hydrogeology, Geologic control, Carbonate rocks, Ions, Watersheds(Basins), Surface-groundwater relationships, Correlation analysis, Calcite, Snowmelt, Mixing, Mathematical models, Discharge(Water), *Canada.
Identifiers: *Athabasca River(Canada), *North Saskatchewan River(Canada), Ionic ratios.

The hydrochemical behavior of the Athabasca and North Saskatchewan Rivers at their points of departure from the Rocky Mountains during the period May 1967 to February 1970 was shown to be well represented by a model based upon the mixing of two water bodies. These component sources contribute varying proportions of the total discharge through the year. One of them has properties that are in keeping with the theoretically expected and the observed characteristics of surface runoff water in the area and essentially represents snowmelt water. The properties of the other component are similarly in keeping with those expected and observed for groundwater in the rock and glacial aquifers of the area. (Visocky-ISWS)
W75-05956

METHODS AND PROBLEMS IN ANALYSIS OF PESTICIDES IN THE ESTUARINE ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06025

BIOLOGICAL PROBLEMS IN ESTUARINE MONITORING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06026

DETERMINATION OF METALS IN SEA WATER,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W75-06027

ADSORPTION OF ORTHOPHOSPHATE ON BOROSILICATE AND 'CITRATE OF MAGNESIA BOTTLES' POLYETHYLENE AND POLYVINYL SURFACES IN A DISTILLED WATER AND SEAWATER MATRIX,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06029

DEVELOPMENT OF A STANDARD MARINE ALGAL ASSAY PROCEDURE FOR NUTRIENT ASSESSMENT,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06030

DEVELOPMENT OF A METHOD FOR MEASURING DISSOLVED COLOR IN WASTEWATERS AND RECEIVING STREAMS,
Dept. of Environmental Systems Engineering. Clemson Univ., S.C.
For primary bibliographic entry see Field 5A.
W75-06086

MODIFICATION OF A COMMERCIAL INSTRUMENT FOR LOW TEMPERATURE ABSORPTION,
Auburn Univ., Ala. Dept. of Chemistry.
W. C. Neely, and T. D. Hall.
Applied Spectroscopy, Vol 28, No 6, p 578-580, November-December 1974. 3 fig, 13 ref. OWRT A-035-ALA (5).

Descriptors: *Water quality, *Analytical methods, Instrumentation, *Cryogenics, Absorption, *Spectroscopy, Ultraviolet radiation, Measurement.
Identifiers: *Low temperature absorption.

Many authors have noted the importance of low temperature absorption spectra and have described various attachments to obtain these with commercial instruments. The present modification appears to be superior to most of the reported methods for low temperature absorption measurements between room temperature and -180C in the ultraviolet and visible region. The obtainable accuracy is approximately plus or minus 1%. Distortion inducing curved surfaces are eliminated, and light-reducing multiple interfaces are minimized. The greatest disadvantage is that this instrument is single beam.
W75-06092

SPECTROANALYTICAL PARAMETERS OF FUNGAL METABOLITES. IV. MONILIFORMIN,
Auburn Univ., Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06093

IMPROVED FIELD WATER ANALYSIS TESTS,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
H. Rosen.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-782 104, $4.25 in paper copy, $2.25 in microfiche. Technical Report No. 74-83, May 1974. 48 p, 5 fig, 6 tab, 2 ref, 3 append.

Descriptors: *On-site tests, *Water analysis, *Analytical techniques, Water properties, *Testing procedures, Analysis, Evaluation, Chemical analysis, Instrumentation, Chemistry, Laboratory tests, Chlorides, Alkalinity, Hardness(Water), Sulfates, Hydrogen ion concentration, Turbidity, Water purification, Physical properties, Coagulation.
Identifiers: Dip strips, Quantabs, Barium chloranilate, Impregnated paper strips.

Three tests which had previously been developed for a candidate water test kit were sent to the USA Test and Evaluation Command for evaluation. These tests were for chloride, alkalinity, and hardness. The chloride and alkalinity partially met the criteria, but the hardness test failed to meet the criteria. In addition, a new test for sulfate was developed which shows much promise but which must be tested and developed further. (Henley-ISWS)
W75-06122

POLAROGRAPHIC OXYGEN SENSORS.
Midwest Research Inst., Kansas City, Mo.
Available from the National Technical Information Service, Springfield, Va. 22161 as NASA CR-2505, $3.25 in paper copy, $2.25 in microfiche. Report No. NASA CR-2505, January 1975. 23 p, 3 fig, 4 tab. NASW-2454.

Descriptors: *Oxygen, *Polarographic analysis, *Instrumentation, *Analytical techniques, *Oxygen requirements, Aeration, Control systems, Chemical analysis, Automatic control, Water quality control, Oxygen demand, Respiration, Productivity, Water properties, Dissolved oxygen analyzers, Measurement, Sport fishing, Gases.
Identifiers: *Space cabin atmospheres, Biomedical studies, Electrochemical cells.

Early biomedical studies of space cabin atmospheres found that oxygen measuring instruments which could hold calibration and accuracy for periods up to 2 weeks were not available. The new membrane-type oxygen sensors are inherently stable, and permit direct reading of oxygen in gas mixtures and in liquids. (Henley-ISWS)
W75-06136

MASS SPECTROMETRY AS USED TO DETERMINE TRACE ORGANIC CONSTITUENTS IN AQUATIC SYSTEMS,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06188

DETERMINATION OF ORGANIC COMPOUNDS IN AQUATIC SYSTEMS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.

For primary bibliographic entry see Field 5A.
W75-06189

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
For primary bibliographic entry see Field 4B.
W75-06236

MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHZ,
Rockwell International Corp., Downey, Calif. Space Div.
W. W. Ho, A. W. Love, and M. J. Van Melle.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA CR-2458, $3.75 in paper copy, $2.25 in microfiche. NASA Contractor Report 2458, December 1974. 35 p, 17 fig, 5 tab, 4 ref. NAS 1-10691.

Descriptors: *Sea water, *Water properties, *Electrical properties, Remote sensing, Electromagnetic waves, Temperature, Salinity, Estuaries, Bays, Measurement, Instrumentation, Radio waves.
Identifiers: Sea surface temperature, *Dielectric properties, Radiometers.

For the remote determination of salinity and temperature of water surfaces of estuaries and bay regions to accuracies of 1 ppt salinity and 0.3 kelvin surface temperature, the combination of L-band (1.4 GHz) and S-band (2.65 GHz) radiometers as brightness temperature detectors was obtained because the brightness temperature of 1.4 GHz depends mainly on the salinity and at 2.65 GHz mainly on the surface temperature. The determination of the brightness temperature versus salinity with the water surface temperature as a parameter for 1.4 GHz was performed with a capillary tube inserted into a resonance cavity. Detailed analysis of the results indicated that the measured values are accurate to better than 0.2% in the electric property epsilon prime and 0.4% in epsilon double prime. This implies that the calculated brightness temperature as a function of temperature and salinity is better than 0.2 kelvin. This in turn gives the possibility to reduce the measured data obtained with the two-frequency radiometer system with 1 ppt accuracy to values in the salinity range 5 to 40 ppt. (Sims-ISWS)
W75-06247

THE APPLICATION OF ELECTRODEPOSITION TECHNIQUES TO FLAMELESS ATOMIC ABSORBTION SPECTROMETRY PART II. DETERMINATION OF CADIUM IN SEA WATER,
Oslo Univ. (Norway). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06301

MOLECULAR EMISSION CAVITY ANALYSIS (MECA) - A NEW FLAME ANALYTICAL TECHNIQUE, PART IV THE DETERMINATION OF ARSENIC AND ANTIMONY,
Birmingham Univ. (England). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06302

AN ANALYTICALLY USEFUL COULOMETRIC GENERATION OF MICRO AMOUNTS OF METAL IONS, PART II. ELECTROGENERATION OF LEAD (II),
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-06304

A STUDY OF THE OPTIMAL CONDITIONS FOR FLAMELESS ATOMIC ADSORPTION SPECTROMETRY OF IRIDUM, PLATINUM AND RHODIUM,
Ghent Rijksuniversiteit (Belgium). Lab. of Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-06307

SOLVENT EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF NICKEL (II) WITH THIOTHENOYLTRIFLUOROACETONE,
Indian Inst. of Tech., Bombay. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06308

THE SEPARATION OF ZINC AND COPPER FROM SEAWATER BY ADSORPTION COLLOID FLOTATION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06309

ION EXCHANGE BEHAVIOR OF MERCURY (II) IN MIXED SOLVENTS: SEPARATION FROM ZINC (II), CADMIUM (II), GOLD (III), AND THALLIUM (III),
Roorkee Univ. (India). Chemical Lab.
For primary bibliographic entry see Field 5A.
W75-06310

QUANTITY AND QUALITY OF STREAMFLOW AFTER UREA FERTILIZATION ON A FORESTED WATERSHED: FIRST-YEAR RESULTS,
No Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-06338

2L. Estuaries

ON THERMAL STRATIFICATION IN LARGE BODIES OF WATER,
Moncton Univ. (New Brunswick). Dept. of Engineering.
For primary bibliographic entry see Field 2H.
W75-05959

PROCEEDINGS OF SEMINAR ON METHODOLOGY FOR MONITORING THE MARINE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C., Office of Monitoring Systems.
For primary bibliographic entry see Field 5A.
W75-06020

METHODS AND PROBLEMS IN ANALYSIS OF PESTICIDES IN THE ESTUARINE ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06025

BIOLOGICAL PROBLEMS IN ESTUARINE MONITORING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06026

DEVELOPMENT OF A STANDARD MARINE ALGAL ASSAY PROCEDURE FOR NUTRIENT ASSESSMENT,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06030

MONITORING DREDGE SPOILS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-06035

COMPARISON OF SPECIES DIVERSITY AND FAUNAL HOMOGENEITY INDICES AS CRITERIA OF CHANGE IN BIOLOGICAL COMMUNITIES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06036

SAMPLING METHODS FOR MICROBIOLOGICAL ANALYSES,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W75-06037

MICROBIOLOGICAL METHODS FOR MONITORING MARINE WATERS FOR POSSIBLE HEALTH EFFECTS,
Environmental Protection Agency, Narragansett, R.I. Northeastern Water Supply Lab.
For primary bibliographic entry see Field 5A.
W75-06038

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5A.
W75-06039

GALVESTON HARBOR: FACTORS AFFECTING POLLUTION AND POLLUTION MONITORING,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-06040

A TIME-DEPENDENT, TWO-DIMENSIONAL MATHEMATICAL MODEL FOR SIMULATING THE HYDRAULIC, THERMAL, AND WATER QUALITY CHARACTERISTICS IN SHALLOW WATER BODIES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-06046

THE BEACH EROSION HAZARD,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2J.
W75-06113

THE HYDRAULICS OF THE SOUTH AUSTRALIAN GULF SYSTEM. I. CIRCULATION,
Flinders Univ., Bedford Park (Australia).
For primary bibliographic entry see Field 5B.
W75-06115

THEORETICAL ANALYSIS OF CONDITIONS IN A SALT WEDGE,
Washington Univ., Seattle. Dept. of Oceanography.
M. Rattray, Jr., and E. Mitsuda.
Estuarine and Coastal Marine Science, Vol 2, No 4, p 375-394, October 1974. 14 fig, 3 tab, 25 ref. NSF Grant GA-30745X3.

Descriptors: *Washington, *Saline water intrusion, *Path of pollutants, Saline water-freshwater interfaces, *Estuaries, Steady flow, Mathematical models, Saline water, Stratification, Water circu-

lation, Velocity, Profiles, Stress, Boundary layers, Slopes, Friction, Entrainment, River flow, Reynolds number, Flumes, *Mississippi River, Theoretical analysis.
Identifiers: *Salt wedges, *Duwamish River(Wash), Halocline.

Theoretical results were obtained for salt-wedge estuaries which give the velocity profile, stress distribution, and shape and length of the wedge for steady-state flow conditions. It was assumed that the cross section is rectangular. Cases were presented for both constant depth and uniformly sloping bottom. The dynamics resemble those found in open channel flow with the addition of a laminar boundary layer at the interface between the wedge and the upper layer. The theory gives reasonable predictions for the length and shape of salt wedges observed in flumes and in the Mississippi and Duwamish Rivers. (Visocky-ISWS)
W75-06117

STABILITY OF SINGLE-PEAKED WAVES,
Montreal Engineering Co. Ltd. (Quebec).
For primary bibliographic entry see Field 2E.
W75-06118

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W75-06128

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
W. S. Richardson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 787, $4.75 in paper copy, $2.25 in microfiche. Report No. CG-D-18-75, February 1974. 84 p, 3 fig, append. DOT-CG-20859-A.

Descriptors: *Currents(Water), *Instrumentation, Oceans, *Path of pollutants, On-site tests, Sampling, Aerial photography, Measurement, Aircraft, *Florida, *Computer programs, Coasts, *Atlantic Ocean.
Identifiers: Airborne current measurements.

Modifications and improvements to expendable probes for the measurement of oceanic currents from aircraft were described. These probes can also be used from helicopters or surface craft. The probe contains two floats, each containing a dye packet, and a timing mechanism that releases the floats after they reach the bottom of the body of water into which they were dropped. At a preset time, a red float is released and, after a preset time delay, a white float is released. These floats rise under their own buoyancy at a known rate. Upon surfacing, the floats capsize and dispense a highly visible, bright green dye to assist in locating the colored floats. The direction and speed of the surface current can be calculated from either visual or photograph observations of the float positions. Some results showing measurements along the Atlantic coast of southern Florida were presented. An appendix consists of a manual on the operation, assembly, and use of this probe. This manual described in detail the construction, assembly, and use of the probe. An appendix of the manual contains a listing of the Fortran program used to calculate the surface current from photographic measurements of the float locations. (Sims-ISWS)
W75-06129

SUBMARINE UPWELLING DUE TO A STEADY THERMAL FRONT IN A VISCID FLUID,
Department of the Environment, Ottawa (Ontario). Marine Sciences Directorate.
T. S. Murty, and G. V. Rao.
Manuscript Report Series No. 35, 1974. 71 p, 7 fig, 17 tab, 26 ref, append.

Descriptors: *Upwelling, *Ocean currents, *Stratification, *Circulation, *Numerical analysis, Momentum equation, Continuity equation, Density, Temperature, Velocity, Analysis, Atlantic Ocean, Pacific Ocean, Model studies.
Identifiers: Thermal front, Stream function.

Although customary scale considerations have yielded a range of 0.001 to 0.01 centimeters per second for the vertical motion in the oceans, in special situations such as oceanic thermal fronts, the value could be much higher. A primitive twenty-level numerical equation model was developed to compute the vertical motions in these situations. Seven case studies of fronts, four in the Atlantic Ocean and three in the Pacific Ocean, were made. Typical values of the vertical velocities calculated with the model were usually about 0.1 centimeter per second, with a maximum of about 1 centimeter per second. Though these values may appear too large to be realistic, some recent observations suggested that such large vertical motions could arise in special situations. (Adams-ISWS)
W75-06131

MASS AND SALT TRANSFERS AND HALOCLINE DEPTHS IN AN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science; and Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
R. R. Long.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 112, $3.25 in paper copy, $2.25 in microfiche. Technical Report No. 5 (Series C), August 1974. 12 p, 7 fig, 11 ref, append. ONR Contract No N00014-67-A-0013.

Descriptors: *Estuaries, *Mass transfer, *Water circulation, *Oceanography, *Currents(Water), *Salinity, Mixing, Sea water, Stratification, Circulation, Froude number, Flow, Hydrology, Model studies, Mathematical models, Theoretical analysis.
Identifiers: *Halocline, Salt transfer.

The problem of mass and salt circulations in a fjord-type estuary, into which there is a steady discharge of fresh water, was re-examined. A contribution to this problem was made by Stommel and Farmer, who examined the relation between the fresh-water supply and the density difference between the upper and lower fluids. These are frequently separated by a pronounced halocline. Stommel and Farmer assumed a critical condition at the entrance to the estuary and closed the problem by assuming an 'over-mixed' state in which the salinity of the upper fluid is a maximum subject to the other constraints of the problem. In the present paper critical conditions (with a simple justification) were also assumed, but the problem was closed by assuming constant and equal Froude numbers in each layer in the double flow at the entrance. The result was closer to the experimental observations of Stommel and Farmer than their own theory. The depth of the halocline in the estuary was also predicted by using recent laboratory experiments relating the depth to the entrainment velocity. The theoretical prediction agreed well with measured depths in an experiment. (Sims-ISWS)
W75-06133

THE INFLUENCE OF SURFACE WAVES ON WATER CIRCULATION IN A MID-ATLANTIC CONTINENTAL-SHELF REGION,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
C. H. Whitlock, and T. A. Talay.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TND-7771, $3.75 in paper copy, $2.25 in microfiche. NASA TN D-7771, December 1974. 45 p, 11 fig, 5 tab, 24 ref.

Descriptors: *Ocean waves, *Ocean circulation, *Waves(Water), *Circulation, *Continental shelf, Currents(Water), Atlantic Ocean, Winds, Tides, Analysis, Velocity.
Identifiers: *Swells, Gulf Stream, Wind shear, Stokes waves.

The importance of wave-induced currents in different weather conditions and water depths (18.3 m and 36.6 m) was assessed in a mid-Atlantic continental-shelf region. A review of general circulation conditions was presented. Factors that perturb the general circulation were examined by using analytic techniques and limited experimental data. Actual wind and wave statistics for the region were examined. Relative magnitudes of the various currents were compared on a frequency of annual occurrence basis. Results indicated that wave-induced currents were often the same order of magnitude as other currents in the region and became more important at higher wind and wave conditions. Wind-wave and ocean-swell characteristics were among those parameters that must be monitored for the analytical computation of continental-shelf circulation. (Adams-ISWS)
W75-06137

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 8C.
W75-06179

UNSTEADY SALINITY INTRUSION IN ESTUARIES, (PART I AND PART II),
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
D. R. F. Harleman, J. S. Fisher, and M. L. Thatcher.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-782 804, $3.75 in paper copy, $2.25 in microfiche. Technical Bulletin No 20, July 1974. 35 p, 15 fig, 2 tab, 12 ref. Contract No DA-22-079-CIVENG-65-20.

Descriptors: *Estuaries, *Tidal effects, *Saline water intrusion, *Mathematical models, Laboratory tests, Model studies, Continuity equation, Momentum equation, Velocity, Analysis, Numerical analysis, Profiles.
Identifiers: *Transient flow, *Freshwater inflow, Diffusion coefficients.

In Part I, a one-dimensional numerical model was developed for predicting the transient salinity intrusion under conditions of varying freshwater inflow. The model coupled the one-dimensional continuity and momentum equations for unsteady tidal motion in an estuary with the mass transport equation for salt. The model incorporated variable estuary geometry and roughness, time-dependent boundary conditions of tidal range at the ocean end, and variable freshwater inflow at the head end and from tributaries along the estuary. The numerical model predictions were compared with salinity measurements in a salinity flume over 25 tidal cycles during which time the freshwater inflow was decreased at a uniform rate. The results were also compared with field observations in the Delaware, Potomac, and Hudson estuaries. A user's manual was prepared for the model. In Part II, a two-dimensional analytical model was developed for predicting vertical distributions of velocity and salinity, averaged over a tidal cycle. The numerical model described in Part I was used to determine the logitudinal salinity gradient which was assumed to be independent of depth. The two-dimensional model was governed by vertical and longitudinal equations of motions, equations of

continuity and salt conservation, and an equation of state relating salinity and density. Dimensionless correlations between mean vertical mass and momentum transfer coefficients and gross estuary characteristics, based on previous experimental data, were used to predict vertical velocity and salinity flume. Comparisons of predicted and observed profiles were given. (Adams-ISWS)
W75-06184

WIND DRIFT SURFACE CURRENTS AND SPREAD OF CONTAMINANTS IN SHELF WATERS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 5B.
W75-06187

INLET SEQUENCE: A VERTICAL SUCCESSION OF SEDIMENTARY STRUCTURES AND TEXTURES CREATED BY THE LATERAL MIGRATION OF TIDAL INLETS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
N. Kumar, and J. E. Sanders.
Sedimentology, Vol 21, No 4, p 491-532, November 1974. 14 fig, 1 tab, 77 ref. NSF Grant GA-25792.

Descriptors: *Inlets(Waterways), *Tidal effects, *Barrier islands, *Sedimentology, Sediments, Erosion, Stream erosion, Bank erosion, Sediment transport, Geology, Geomorphology, Movement, Drilling, Boreholes, Channels, Tidal streams, Estuaries, Water circulation, *New York, Sedimentation.
Identifiers: *Long Island(NY).

Tidal inlets, narrow, comparatively deep gaps between barrier islands, are channels through which tidal currents flow vigorously as the water enters and leaves the backbarrier lagoons, bays, and intertidal flats and marshes. Many geologists have compared tidal inlets to river channels and have speculated that if an inlet shifts laterally, it should deposit a distinctive sequence of sediments, analogous to the point-bar sequence left by a meandering stream channel. Fire Island Inlet, located 56 km east of New York City, has migrated WSW at a mean rate of 64 m/year during the period 1825-1940. Waves approaching the coast, predominantly from the southeast, have shifted sediment along the shore toward the WSW. Deposition of sediment on the east side of the inlet has forced the tidal currents to erode the west side of the inlet, thus causing lateral migration. Because hydraulic conditions vary from the channel floor to the subaerial part of the spit which is present on the ENE side of the channel, sedimentary structures and textures vary systematically with depth. An inlet sequence which is formed by the lateral migration of a tidal inlet was proposed. The sediments belonging to various units in this sequence were identified in four borings made on those parts of Fire Island through which the Fire Island Inlet has migrated since 1825. This sequence should be applicable to other inlets also. (Sims-ISWS)
W75-06204

THE TRANSVERSE DISTRIBUTION OF VELOCITY IN ESTUARY FLOW,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
P. R. B. Ward.
Journal of Hydraulic Research, Vol 12, No 2, p 253-274, 1974. 8 fig, 1 tab, 11 ref.

Descriptors: *Estuaries, *Homogeneity, *Tidal effects, *Velocity, *Roughness(Hydraulic), Laboratory tests, Waves(Water), Friction, Flow, Channels.
Identifiers: Phase shifts, Strouhal number, Sidewall roughness, Transverse velocity variations, Inertial force.

Homogeneous estuary flows and tidal models of estuaries are known to exhibit a phase shift effect. The velocity versus time curves from various positions in the transverse direction (perpendicular to the long axis) may be shifted relative to one another by times of as much as 1 hour. An explanation of this phase shift was presented in terms of the magnitude of the relevant forces. A Strouhal number, proportional to fu sub o T/d, where f is the friction factor, u sub o is the longitudinal velocity, T is the tidal period, and d is the depth of flow, was shown to be important in describing the amount of phase shift. Two situations which resulted in horizontal phase differences were analyzed, and laboratory measurements of both cases were presented. In one case the phase difference resulted from a slow variation of depth with position z, and in the second case the phase shift resulted from the influence of very large sidewall roughness in a deep channel. (Bhowmik-ISWS)
W75-06206

COMPARISON OF OBSERVED ESTUARINE TIDE DATA WITH HYDRAULIC MODEL DATA BY USE OF CROSS-SPECTRAL DENSITY FUNCTIONS,
New York City-Rand Inst., N.Y.
J. J. Leendertse, and S-K. Liu.
R-1612-NYC, September 1974. 74 p, 29 fig, 6 tab, 5 ref, 1 append.

Descriptors: *Estuaries, *Hydraulic models, *Mathematical models, Model studies, Mathematics, Computer models, Tides, Currents(Water), Water circulation, Water levels, *New York.
Identifiers: Jamaica Bay(NY).

The effects on tide levels, currents, water quality, and navigation conditions of a proposed hurricane barrier across the entrance of Jamaica Bay are presently being studied. Because a physical model is used to predict current patterns and tide levels resulting from different barrier designs, it had to be precisely adjusted for the present condition in order to make accurate predictions. Cross-spectral analysis was used to establish the amplitude and phase relationships for different tidal components between pairs of tide level stations in the bay and in the model. This made it possible to compare very accurately the propagation and amplification of these tidal components in the model with those in the bay, even though actual tide level variations at the bay entrance could not be reproduced by the model. By means of this information the flow resistance in the model was further adjusted in two steps by adding resistance strips in the channels until the amplitude and phase relationships obtained from the model were in agreement with those obtained from prototype data for the tidal components. The phase lags and amplification of the semidiurnal tide in the Jamaica Bay model, after adjustments by use of the cross-spectral method, agree well with those obtained from field measurements. (Sims-ISWS)
W75-06209

SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH,
Nicholls State Univ., Thibodaux, La. Dept. of Environmental Engineering.
C. A. Whitehurst, and R. P. Self.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-26911, $3.75 in paper copy, $2.25 in microfiche. Louisiana State University, Baton Rouge, Research Monograph 3, May 1974. 26 p, 7 fig, 3 tab, 4 ref. NASA Grants 19-001-097, 19-001-024.

Descriptors: *Sedimentation, *Erosion, *Remote sensing, Sediment transport, Estuaries, Bays, Aerial photography, Infrared radiation, Photography, Water circulation, Tides, Tidal effects, Gulf of Mexico, Marshes, *Louisiana.
Identifiers: Lafourche Parish(La).

During the summer of 1972, studies of the marshlands in southern Louisiana were initiated with airborne infrared and multispectral imagery. The Fourchon study area is bound by the Gulf of Mexico on the south, Lake Champagne on the east, Pass Fourchon on the west, and the canal leading to Belle Pass on the north. It encompasses an area slightly greater than one square mile and is typical of the coastal environment of southern Louisiana. Problems exist in the use of airborne imagery in sedimentological studies of marshes because vegetational differences do not always reflect sediment differences and the homogeneous marsh sediments and minute differences do not show on the photographs. Spoil banks, canals, channels, beaches, and marshes are easily defined from aerial photographs since each of these environments contain different soils and sediments. Remotely sensed data can be used to explore for and map surficial or near surface sand bodies over wide areas. (Sims-ISWS)
W75-06211

AN INVESTIGATION OF SURFACE AND INTERNAL WAVE-INDUCED TURBULENCE IN SHALLOW WATER THERMAL MICROSTRUCTURE,
Naval Postgraduate School, Monterey, Calif.
J. W. Powell.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 632, $4.75 in paper copy, $2.25 in microfiche. MS Thesis, March 1974. 83 p, 25 fig, 7 tab, 14 ref. ONR Project NR 083-275.

Descriptors: *Turbulence, *Temperature, *Waves(Water), *Correlation analysis, *Frequency analysis, *Pacific Ocean, *California, Analysis, Velocity, Thermocline, Stability, On-site data collections.
Identifiers: Wavenumber, Microstructure, Mission Beach(Calif).

Measurements of temperature, wave height, and orthogonal water particle velocity were made in May 1973 one mile off Mission Beach, California. A detailed analysis of the temperature field was made by using digital temperature and isotherm contour plots. Billow turbulence microstructure appeared to be the dominant mechanism, except for one run in which evidence of double-diffusion microstructure was found. Spatial correlation lengths, calculated from the plot of the covariances, were of the order of 130 cm and less when the signal was high-pass filtered for waves of 100 seconds and longer. No depth dependence was noticed. Both frequency and wavenumber spectra were calculated and a correspondence between the spectra was noted at the frequency and wavenumber of the surface wave-induced particle displacements. The Thornton, Boston, Whittemore model of wave-induced temperature fluctuations was tested and found to model the temperature spectra quite well, especially in a narrow band of frequencies associated with surface waves. The turbulent temperature spectrum, calculated as the difference between the actual and wave-induced spectra, had a slope which was near -5/3 above 0.1 Hz but more negative at lower frequencies. (Adams-ISWS)
W75-06213

BOLINAS LAGOON INLET, CALIFORNIA,
California Univ., Berkeley. Hydraulic Engineering Lab.
J. W. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 747, $3.75 in paper copy, $2.25 in microfiche. Army Coastal Engineering Research Center, Fort Belvoir, Virginia, Miscellaneous Paper No. 3-74, May 1974. 46 p, 21 fig, 3 tab, 41 ref.

Descriptors: *Inlets(Waterways), *Hydraulic engineering, *Lagoons, *Bays, Waves(Water), Littoral drift, Sediments, Beaches, Tidal bores, Currents(Water), Sediment transport, *California.

Identifiers: Tidal prism, *Bolinas Bay(Calif).

The hydraulic and sedimentary characteristics of tidal inlets on sandy coasts have long been of interest to engineers involved in harbor design and maintenance. O'Brien (1931), in a study of west coast inlets, proposed a relationship between the minimum inlet area below mean sea level and the tidal prism. Other investigators in recent years have proposed similar relationships. A reanalysis of data from inlets on U.S. coasts by O'Brien (1967), resulted in a later observation (O'Brien, 1971); he believed that the equilibrium relationship between inlet area and tidal prism as he originally proposed seemed to be a first approximation only and that the next effort should be for quantative understanding of deviations from the approximation. If the flow area is determined by the tidal prism, then this area is in constant process of adjustment because the tide range, and the related tidal prism, varies continually. The Bolinas Bay-Bolinas Lagoon system is a natural laboratory in which a large amount of data has been compiled on hydrography, wave action, tidal hydraulics, sediment transport and sedimentation, and the ecosystem. However, the data are insufficient to adequately define the importance of the inlet area and tidal prism. The source, nature, and availability of data on the Bolinas Lagoon inlet were summarized as a guide to possible future studies at Bolinas, and at other inlets. (Sims-ISWS)
W75-06217

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
W. C. Krumbein, and W. R. James.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 572, $4.75 in paper copy, $2.25 in microfiche. Army Coastal Engineering Research Center, Fort Belvoir, Virginia, Technical Memorandum No. 44, June 1974. 79 p, 33 fig, 3 tab, 12 ref. DACW72-70-C-0011, 71-C-0007, 72-C-0002, 72-C-0010.

Descriptors: *Beaches, *Beach erosion, *Deposition(Sediments), Shores, Coasts, Coastal engineering, Shore protection, Waves(Water), Sands, Markov processes, Groins(Structures), Engineering structures, Flow control, Sediment transport, Soil analysis, Soil aggregates, Physical properties, *California.
Identifiers: Point Mugu(Calif).

Contour maps of beach foreshore properties, such as mean grain size and beach slope, give spatial continuity to beach observations, and repetitive sampling endows the areal patterns with continuity in time. Maps were made at intervals over a 3-year period on the same stretch of beach located upcoast from Point Mugu, California. These maps included open unimpeded segments and segments immediately upbeach and downbeach of an impermeable steel sheet piling groin. A rectangular foreshore grid, 100 by 125 feet on edge, with rows parallel to the waterline was used as a convenient mapping cell. Aggregate properties of the beach, such as bulk density, shear resistance, water content, and conventional textural and geometric attributes, were mapped from samples collected at the grid points. The mapped properties form a highly interlocked complex of foreshore responses to ongoing shore processes. The influence of foreshore erosion and deposition on these properties during successive tidal cycles was examined. The results show strong differences in some aggregate properties in erosional and depositional subareas. (Sims-ISWS)
W75-06218

A STUDY OF RHEOLOGIC PROPERTIES OF ESTUARIAL SEDIMENTS,
California Univ., Berkeley. Hydraulic Engineering Lab., and California Univ., Berkeley. Sanitary Engineering Research Lab.
R. B. Krone.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 313, $5.25 in paper copy, $2.25 in microfiche. Technical Bulletin No. 7, September 1963. 91 p, 38 fig, 10 tab, 14 ref. Contract DA-22-079-CIVENG-61-7.

Descriptors: *Sedimentology, *Mechanical properties, *Estuaries, *Sediments, Sediment transport, Viscosity, Measurement, Rheology, Physical properties, Particle size, Silts, Shear strength, Suspended solids, Sedimentation, Viscometers, Viscous flow, Instrumentation.

Sediments from deposits in several representative estuaries were examined for mineral content and particle size distribution, and were found to contain large amounts of clay minerals. The porosities and shear strengths of sediment aggregations were obtained from measurements of rheological properties of suspensions over a range of sediment concentrations and at varying shearing rates. An Ostwald-type capillary viscometer equipped with variable driving pressures was used for measurements at high shearing rates, and a concentric cylinder viscometer with a wide annular gap was constructed for measurements at low shearing rates. The shear strengths for primary aggregates, measured by using the capillary viscometer, were found to relate to the shear strengths of higher order floes, measured by using the concentric cylinder viscometer, when the character of the inter-aggregate contact was taken into consideration. (Sims-ISWS)
W75-06222

THE DYNAMICS OF INLETS AND BAYS,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
D. B. King, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 474, $4.75 in paper copy, $2.25 in microfiche. Technical Report No. 22, March 1974. 82 p, 34 fig, 28 ref. ONR Contract N00014-68-A-0173-0020.

Descriptors: *Inlets(Waterways), *Bays, *Tidal waters, Model studies, Water circulation, Tidal streams, Dynamics, Fluid mechanics, Hydraulics, Flow rates, Flow characteristics, Waves(Water), Sediment transport, Discharge(Water).

The equations for tidal flow through inlets into bays have been studied by many investigators. Perhaps the best known is the one by Keulegan in 1951. He considered nonlinear friction but assumed no inertia in the inlet, no river discharge, constant inlet cross section and bay surface area over a tidal cycle, and uniform bay elevation. These assumptions were analyzed in four models; an inertia model, a river discharge model, a changing area model, and a shallow water wave model; and their effects were predicted. The results were presented in graphical and equation form. They were then compared to real inlets and the limitations of each model were discussed. The models showed when certain conditions are sufficiently different for the Keulegan model to be inaccurate. For these conditions, the new models predict the more accurate results. (Sims-ISWS)
W75-06223

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 8B.
W75-06225

GEOMORPHOLOGY AND SEDIMENTS OF THE INNER NEW YORK BIGHT CONTINENTAL SHELF,
Coastal Engineering Research Center, Fort Belvoir, Va.
S. J. Williams, and D. B. Duane.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 577, $4.75 in paper copy, $2.25 in microfiche. Technical Memorandum 45, July 1974. 81 p, 22 fig, 6 tab, 68 ref, 2 append.

Descriptors: *Geomorphology, *Sediments, *Continental shelf, Sands, Coarse sediments, Seismic studies, Beaches, Estuaries, Topographic mapping, Topography, Oceanography, Geology, Bathymetry, Sludge disposal, New York, New Jersey.
Identifiers: *New York Bight, Sand sources, Beach nourishment.

Approximately 445 mi of continuous seismic reflection profiles and 61 vibrating cores were obtained from the Inner New York Bight which encompasses about 250 sq mi of the offshore from northern New Jersey and western Long Island. The major physiographic features include Sandy Hook and Rockaway Beach, both prograding barrier islands, Shrewsbury Rocks, and the Hudson (submarine) Channel. Shrewsbury Rocks mark the demarcation between two distinct geomorphic provinces. The area north of Shrewsbury Rocks is underlain by Coastal Plain strata which have been deeply eroded by Pleistocene glacial processes and covered by sand and gravel outwash. South of Shrewsbury Rocks, Coastal Plain strata have been evenly truncated and covered by a veneer of residual material. Cores reveal that fine to medium sand is the predominant sediment type on the inner shelf. Isolated patches of coarse sand and rounded pea gravels are present off Long Island where fluvial materials are exposed. Fine sand, silt, and muds comprise the sea floor at the head of the Hudson Channel and along the body. Sand suitable for beach nourishment projects is found in abundance throughout the shallow shelf parts of the Inner New York Bight. Sea floor topography is fairly flat and sand occurs as blanket deposits. It was estimated that over 2-billion cu yd of clean sand is available for retrieval by dredging. Comparison of bathymetric maps made from 1845 to 1970 confirmed that significant parts of the natural Hudson Channel have been filled from ocean disposal of up to 1-billion cu yd of assorted anthropogenic materials, from early construction in New York City and channel dredging within the estuaries and bays. (Sims-ISWS)
W75-06226

FORM-PROCESS RELATIONSHIPS ON ISLAND COASTS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
M. L. Hernandez-Avila, and H. H. Roberts.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 595, $4.75 in paper copy, $2.25 in microfiche. Technical Report 166, August 1974. 76 p, 23 fig, 37 tab, 30 ref. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Islands, *Coasts, *Beaches, Geomorphology, Seashores, Bays, Swamps, Coastal marshes, Waves(Water), Ocean waves, Winds, Correlation analysis, Statistical methods.
Identifiers: *Form-process relationships, Lesser Antilles, Cliffs, Wave power distribution, Breaker-point wave power, Offshore slope.

Variations in geometric properties and spatial arrangement of major coastal morphologic landforms (beaches, cliffs, rocky shores, and swamps) of the islands of Barbados, Dominica, Grenada, St. Lucia, and St. Vincent were compared to coastal process sectors established by variations in mean wave power levels. Multivariate analysis of variance results indicated that the spatial arrangement of coastal morphologic landforms cannot be predicted from wave power distribution alone. Coastal landform classes do not exhibit distinguishing wave power levels. The main process-response parameter interaction was shown to be between breaker-point wave power and offshore slope, which are inversely correlated, especially

on cliffy and rocky coasts. Correlation analysis revealed that coastal geometric properties other than offshore slope steepness and morphologic landform width relate more to geomorphic and structural inheritance than to physical dynamic processes alone. The results of statistical and probabilistic analyses demonstrated the collective and individual contributions of geometric and process variables within the general context of two process-response conceptual models. A significant amount of the variability in geometric properties of the coastal morphologic landform units was attributed to wave power distribution patterns. (Sims-ISWS)
W75-06229

FLEXIBLE BREAKWATERS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 8B.
W75-06232

CURRENT MEASUREMENTS UNDER THE GULF STREAM NEAR CAPE HATTERAS, NORTH CAROLINA,
Rhode Island Univ., Kingston. Narragansett Marine Lab.
P. L. Richardson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-781 283, $5.75 , $2.25 in microfiche. Technical Report 74-3, May 1974. 136 p, 24 fig, 10 tab, 68 ref, 10 append. ONR Contract N00014-68-A-0215-0003.

Descriptors: *Ocean currents, *Atlantic Ocean, Oceanography, Water circulation, Current meters, Currents(Water), Measurement, Velocity, Eddies, Temperature, Salinity, Silicates, *North Carolina.
Identifiers: *Gulf Stream, Western Boundary Undercurrent, *Cape Hatteras(NC), Gulf Stream countercurrent.

Measurements were made in the Gulf Stream and Western Boundary Undercurrent in order to determine how the two currents cross each other near Cape Hatteras, North Carolina. Deep current measurements were made along a line normal to the Gulf Stream axis and 100 m above the ocean floor in depths from 1300-4100 m. Six current meter records were obtained in May, June, and July 1971. Current velocities up to 47 cm/sec towards the southwest were recorded under the Gulf Stream axis. All six records had their peak velocities in the southwest quadrant and four of the deepest records (2800 to 4000 m) had their mean velocity vector in the southwest direction. During the period of observations the Gulf Stream did not extend to the bottom in this area except as brief current reversals to the northeast. The Western Boundary Undercurrent was flowing under the Gulf Stream and toward the southwest parallel to the bottom contours. The transport of the Undercurrent, estimated by two geostrophic velocity sections and deep current meter observations, was 24,000,000 cu m/sec. (Sims-ISWS)
W75-06233

A DIAGNOSTIC CALCULATION OF CONTINENTAL SHELF CIRCULATION,
Florida State Univ., Tallahassee. Dept. of Oceanography.
C-Y. Peng, and Y. Hsueh.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 740, $6.25 in paper copy, $2.25 in microfiche. Technical Report, August 1974. 150 p, 67 fig, 27 ref. ONR Contract N00014-67-A-0235-0002; NSF Grants GX-33502, GA-29734, GA-26563.

Descriptors: *Circulation, *Continental shelf, *Model studies, *Mathematical models, Oceanography, Coasts, Velocity, Currents(Water), Density, Mass transfer, Flow, Topography.
Identifiers: Baroclinicity, Coastal geometry.

An attempt was made to compute from observed density the three-dimensional velocity field in a continental shelf region that is bounded by the coast on one side and open to the ocean along the rest of its perimeter. The bottom topography of the shelf region was found to be of crucial importance. On the basis of the computed velocity field, it was shown that, in the presence of bottom topography, there is a release of potential energy in the density field to kinetic energy of the barotropic part of the motion. There also exists a kinetic energy exchange between the barotropic part and baroclinic part of the motion due to the work done by the bottom stress. (Sims-ISWS)
W75-06235

INTERDISTRIBUTARY BAY SEQUENCES AND THEIR GENESIS,
Oxford Univ. (England). Dept. of Geology and Mineralogy.
T. Elliott.
Sedimentology, Vol 21, No 4, p 611-622, November 1974. 5 fig, 36 ref.

Descriptors: *Bays, *Sedimentation, *Deltas, *Sedimentology, Tidal marshes, Coasts, Channels, Geomorphology, Geology, Deposition(Sediments), Avulsion, Flooding, Channel morphology, Sediments, Model studies, Mississippi River.
Identifiers: *Interdistributary bays, Alluvial ridges.

Interdistributary bay sedimentation is dominated by flood-generated incursions from the distributaries. There are three processes by which sediment-laden flood waters can be transferred to the bay: overbank flooding, crevassing, and avulsion. These processes combine to produce a family of sedimentary sequences, the majority of which are small-scale coarsening upwards sequences representing infilling of the bay. Subordinate related sequences include those of small-scale (crevasse) channels and larger scale (distributary) channels. Spits or beaches at the mouth of open interdistributary bays produce larger scale, wave-dominated coarsening upwards sequences. A model of bay sedimentation concerning a recently initiated (hypothetical) distributary was presented. Four phases of sedimentation (overbank flooding, crevasse splay, minor mouth bar–crevasse channel couplets and avulsion) characterize the history of the distributary, and it was postulated that the phases are genetically related to alluvial ridge development. (Sims-ISWS)
W75-06237

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART VI, CIRCULATION INVESTIGATIONS, CURRENT MEASUREMENTS IN THE OUTER LOS ANGELES HARBOR,
University of Southern California, Los Angeles. Allan Hancock Foundation.
K. S. Robinson, and H. Porath.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11558, $4.75 in paper copy, $2.25 in microfiche. Report USC-SG-7-74, July 1974. 91 p, 1 fig, 5 ref, 3 append.

Descriptors: *Water circulation, *Bays, *Harbors, Tidal effects, Measurement, Winds, Temperature, Circulation, Currents(Water), Current meters, Estuaries, *California.
Identifiers: *Los Angeles Harbor(Calif).

Surface currents in the Los Angeles Harbor were measured by three current meters. The main current producing forces appear to be tide and wind with the resulting current modified by the geometry of the basin. Current speeds were generally 0.1 to 0.2 knots at the surface and were more variable at stations near the outer breakwater than at stations near Terminal Island. A large counter-clockwise gyre was found during one period of observation, followed by a period of divergence in the same area one week later. Appendixes contain station locations; surface wind and current plots; and plots of tide, temperature, and current speed and direction. (Sims-ISWS)
W75-06245

APPLICATION OF MONOCHROMATIC OCEAN WAVE FORECASTS TO PREDICTION OF WAVE-INDUCED CURRENTS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
L. R. Poole.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TND-7861. NASA Technical Note D-7861, February 1975. 26 p, 4 fig, 2 tab, 16 ref.

Descriptors: *Ocean currents, *Ocean waves, *Forecasting, *Winds, Currents(Water), Waves(Water), Water circulation, Oceanography, Forecasting.
Identifiers: Wave-induced currents, Wave spectra, Stokes' drift.

The use of monochromatic wind-wave forecasts in prediction of wind-wave-induced currents was assessed. Currents were computed for selected combinations of wind conditions by using a spectrum approach which was developed from the Bretschneider wave spectrum for partially developed wind seas. These currents were compared with currents computed by using the significant and average monochromatic wave parameters related to the Bretschneider spectrum. Results indicate that forecasts of significant wave parameters can be used to predict surface wind-wave-induced currents. Conversion of these parameters to average wave parameters can furnish reasonable estimates of subsurface current values. (Sims-ISWS)
W75-06246

MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHZ,
Rockwell International Corp., Downey, Calif. Space Div.
For primary bibliographic entry see Field 2K.
W75-06247

FORMATION AND DEVELOPMENT OF BEACH CUSPS ON DEL MONTE BEACH, MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
J. G. Bodie.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 370, $4.25 in paper copy, $2.25 in microfiche. Ms Thesis, September 1974. 66 p, 18 fig, 3 tab, 24 ref.

Descriptors: *Beaches, *Waves(Water), *Deposition(Sediments), Sands, Seashores, Bays, Surf, Ocean waves, Geomorphology, On-site investigations, *California, Regression analysis.
Identifiers: *Beach cusps, Beach morphology, Del Monte Beach(Calif), Monterey(Calif).

Observations and measurements were made daily on Del Monte Beach in order to develop a qualitative description of the parameters affecting the formation of beach cusps. Multiple regression techniques were used to formulate an equation relating cusp width to the measured parameters. The life cycle of cusps was studied in order to gain insight into the factors affecting the growth and decay of cusps. It was determined that cusps are depositional in nature and develop sequentially from preferential areas of accretion on the beach. Cusp spacing was found to be a function primarily of wave height (energy) and wave period. Regularity of the wave regime during formation was found to result in uniform cusp spacing. Little migration was observed in mature cusps, and large changes in the wave regime or beach condition were required to alter the cusp profiles. The action of large wind waves, storm surges, and breaker

was observed to destroy beach cusps. (Sims-ISWS)
W75-06250

THE EFFECT OF DREDGING IN A POLLUTED ESTUARY ON THE PHYSIOLOGY OF LARVAL ZOOPLANKTON,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
For primary bibliographic entry see Field 5C.
W75-06255

THE APPLICABILITY OF REGIME THEORY TO TIDAL WATERCOURSES,
University of Strathclyde, Glasgow (Scotland). Dept. of Civil Engineering.
A. G. Chantler.
Journal of Hydraulic Research, Vol 12, No 2, p 181-192, 1974. 5 fig, 1 tab, 16 ref, 1 append.

Descriptors: *Estuaries, *Tidal streams, *Channel morphology, *Discharge(Water), Width, Flow, Depth, Velocity, Regime, Hydraulics.
Identifiers: *Regime theory, *Hydraulic geometry, Characteristic flow, Tidal watercourses.

During the last fifty years, regime theory has become firmly established in the literature. Its popularity in civil engineering practice as a rational basis for the design of irrigation canals doubtless results from its simplicity and from its record of success when applied with discretion and within the limits of its derivation. Regime theory has also been shown to constitute a viable framework for the analysis of planimetric and sectional geometry of natural watercourses on both prototype and model scales. To date, most of the studies reported have been concerned with channels in which the flow is unidirectional and generally subject to natural hydrographs. The results of the re-analysis of all published and available supplemental data were presented. The investigation indicated, however, for tidal channel conventional regime, relations alone are insufficient to describe the longitudinal variation of hydraulic geometry. It was suggested that an end effect was responsible for channel enlargement beyond the widths required to convey the flow at each section. Evidence was presented to show that the mean velocity was constant at all sections along an estuary for a characteristic flow condition. Tidal channel cross sections undergo a natural vertical exaggeration in the landward direction. The graphs of breadth to depth ratio against discharge for certain estuaries (four out of the six for which the appropriate data was available), were coincident provided that the values were referred to those at a characteristic central point for each estuary. (Bhowmik-ISWS)
W75-06257

DEGLACIATION OF THE LABRADOR CONTINENTAL SHELF,
Bedford Inst., Dartmouth, (Nova Scotia). Atlantic Geoscience Center.
For primary bibliographic entry see Field 2C.
W75-06279

SOME CONSIDERATIONS OF STRAIGHTNESS IN CHANNEL FORM RELATING TO THE ESTUARY OF THE MACLENNAN RIVER, SOUTH OTAGO (NEW ZEALAND),
Newcastle Univ. (Australia). Dept. of Geography.
W. N. Jenks.
Journal of Hydrology, Vol 24, No 1/2, p 89-109, January 1975. 3 fig, 4 tab, 29 ref.

Descriptors: *Channel morphology, *Geomorphology, Alluvial channels, Regime, Graded, Hydraulics, Model studies, Estuaries, Tidal streams, Stochastic processes.
Identifiers: *New Zealand(Maclennan River).

Patterns of regular deviation about a mean downstream vector characterize many natural waterways. Straight channels are distinctive in that they do not deviate, and occur relatively infrequently. A specific instance of straightness occurring within the estuary of the Maclennan River was examined and some new concepts that may lead to a wider understanding of the general case were presented. Specifically, 19 morphometric and 2 hydraulic variables were measured and analyzed through 37 channel cross sections representing the entire tidal system. A subset of 10 cross sections represented the straight reach. A model was developed to describe change occurring through space, and by implication through time, within these 21 sets of variates. Stochastic processes were found to replace least probable normal distributions with most probable log-normal frequencies. Minimum variance and quasi-equilibrium conditions prevailed. At a wider level of reference, a study of tidal meanders occurring at the extremities of the tidal system was made. From this, the conclusion was reached that channel processes operating within these areas through the Late Holocene have expended fluvial and tidal energies, input at the ends of the system, in such a manner as to inhibit change within the straight reach. Finally, the hydraulic exponents associated with the rate of discharge at half-ebb were considered as potential indices of channel stability. In conclusion, the contemporary hydraulic theories of least work, minimum variance, and most probable channel form were supported. (Jess-ISWS)
W75-06285

SIMULTANEOUS PUMPING OF FRESH AND SALT WATER FROM A COASTAL AQUIFER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W75-06296

USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 6A.
W75-06299

MINERAL SLEUTH WILL SCAN OCEAN FLOORS.
For primary bibliographic entry see Field 7B.
W75-06316

NON-CONSERVATION OF HEAVY METALS IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W75-06325

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

REVERSE OSMOSIS WATER PURIFYING SYSTEM FOR HOUSEHOLD USE,
For primary bibliographic entry see Field 5F.
W75-05891

WATER DISTILLATION APPARATUS,
Oral Corp., Boca Raton, Fla. (assignee)
For primary bibliographic entry see Field 5F.
W75-05893

PROCESS FOR PRODUCING AND MAINTAINING PURIFIED, STERILE WATER,
Secretary of the Interior, Washington, D.C. (assignee)
For primary bibliographic entry see Field 5D.
W75-05904

ION EXCHANGE WASTE WATER TREATMENT PROCESS,
Combustion Engineering, Inc., Windsor, Conn. (assignee)
For primary bibliographic entry see Field 5D.
W75-05906

THE DESALINATION OF SEAWATER BY THE USE OF NUCLEAR ENERGY,
Atomic Energy Establishment, Winfrith (England).
F. C. Wood.
Available from the National Technical Information Service, Springfield, Va 22161 as AEEW M-1261, $4.00 in paper copy, $2.25 in microfiche. Paper to the 3rd National Conference on Heat and Nuclear Energy Problems of the Bulgarian Peoples Republic, Varna (Bulgaria), May 28-June 2, 1974. 16 p, 4 fig, 3 tab, 8 ref.

Descriptors: *Desalination, *Desalination processes, *Nuclear powerplants, Desalination plants, Desalination apparatus, Membranes, Semipermeable membranes, Separation techniques, Reverse osmosis, Freezing, Flash distillation, Nuclear energy, Powerplants.

Although present needs are low, growing demands in industrialized countries for power and water will ultimately lead to the use of nuclear reactors to satisfy both requirements. Desalination processes are required which are capable of utilizing the high grade of energy produced by commercial power reactors in the form of mechanical work rather than as low grade heat. Vapor compression evaporation in hybrid and variable purpose plants will probably be the first such process to be developed, although pure power-using processes such as reverse osmosis and freezing may be the ultimate solution. (Sims-ISWS)
W75-06224

3B. Water Yield Improvement

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
R. J. Rutherford, and G. L. Byers.
Canadian Agricultural Engineering, Vol 15, No 1, p 9-11, June, 1973. 1 fig, 2 tab, 8 ref. OWRT A-015-NH(4).

Descriptors: *Evaporation, *Evaporation control, Water loss, Consumptive use, Evapotranspiration, Chemcontrol, Monomolecular films, Thin films, Water conservation, Wetlands, *New Hampshire, Ponds, Water yield improvement, *Retardants.
Identifiers: Jewell Pond(NH).

Evapotranspiration from the muck and peat bog of Jewell Pond in Stratham, New Hampshire, was 1.7 times as great as the evaporation from the open water surface during the summer of 1969. The wetland released 16.9 centimeters of water from storage during the same period. During the summer of 1970, an evaporation retardant was used to reduce open water evaporation. The objective of this management practice was to increase water yields and augment water supplied during dry months. The retardant successfully reduced evaporation by 47 percent. Additional water supplies obtained by the use of evaporation retardants could be used for domestic and commercial consumption. (Skogerboe-Colorado State)
W75-06095

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
R. J. Rutherford, and G. L. Byers.
Canadian Agricultural Engineering, Vol 15, No 1, p 9-11, June 1973. 1 fig, 2 tab, 8 ref. OWRT A-015-NH(4).

Descriptors: *Water yield improvement, *Wetlands, Evaporation, Conservation, Management, Water supply, Water balance, Evapotranspiration, Vegetation, Retardants, On-site data collections, Meteorology, Equations.
Identifiers: *Evaporation suppression.

The management technique of evaporation suppression on wetlands to increase water yields and augment water supplies during dry months was investigated. Also, the role of wetlands in water storage was evaluated. The site selected for study was a 10.9 acre wetland located in the town of Stratham, New Hampshire. Only 2.7 acres were open water surface. The remaining 8.2 acres consisted of muck and peat deposits supporting a dense growth of buttonbush. Meteorological data were collected and tabulated as well as pond level records. Surface runoff was insignificant and net groundwater flow was assumed to be constant from year to year. Data obtained during 1969 were tabulated and found comparable with similar projects in Wyoming and Minnesota. The second portion of the study was carried on in the summer of 1970 when an evaporation retardant (Octahexadecanol) was applied to the open water and reduced evaporation by 47%. The project had implications for both flood control and public water supply. (Roberts-ISWS)
W75-06121

BASES OF METHOD AND MEANS OF MODIFICATION OF HAIL PROCESSES,
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
I. T. Bartishvili, I. I. Gayvoronskiy, A. I. Kartsivadze, and G. K. Sulakvelidze.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 557, $3.75 in paper copy, $2.25 in microfiche. Air Force Systems Command Foreign Technology Division, Report No. FTD-MT-24-212-74, April 1974. 26 p, 2 tab, 1 ref. Translated from Trudy V Vsesoyuznogo Meteorologicheskogo S'yezda Sektsiya Aktivnykh Vozdeystviy Na Atmosfernyye Protsessy, Vol 4, p 3-22, 197

Descriptors: *Hail, *Weather modification, Meteorology, Precipitation(Atmospheric), Storms, Clouds, Cloud physics.
Identifiers: *USSR.

Research on the process of the formation of hail for the purpose of the development of methods of combating hail damage were initiated in 1953 in the Institute of Geophysics of the Georgian Academy of Sciences; subsequently, these investigations were carried out also in the High-Altitude Institute of Geophysics, the Transcaucasian Scientific Research Hydrometeorological Institute, and the Central Aerological Observatory. Some of the work done in the modification of hail by these groups was reviewed. A bibliography, mostly in Russian, listing reports and publications on the Russian hail modification work was included. (Sims-ISWS)
W75-06126

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 8C.
W75-06179

3D. Conservation In Domestic and Municipal Use

ANTI-BACKFLOW WATER CONTROL AND SOLUTION PROPORTIONER,
For primary bibliographic entry see Field 8C.
W75-05909

HISTORY OF WATER SUPPLY OF THE MOBILE AREA, ALABAMA,
Geological Survey, University, Ala. Water Resources Div.
J. F. Riccio, and C. A. Gazzier.
Available for $1.00 from Geological Survey of Alabama, University. Available also from the National Technical Information Service, Springfield, Va 22161 as PB-240 851, $3.75 in paper copy, and $2.25 in microfiche. Alabama Geological Survey Circular 92, 39 p, 1973. 15 fig, 3 tab, 14 ref. OWRT B-038-ALA(1), B-032-ALA(1). 14-31-0001-3553.

Descriptors: *Water supply, *History, Potable water, *Alabama, *Water sources, *Industrial water, *Domestic water, Water resources development, Surface water, Groundwater, Cities.
Identifiers: Geoarchaelogy, *Mobile(Ala), Big Creek Lake(Ala).

The histroy of water supply of the greater Mobile area is traced from its initial beginnings with the French settlement on Dauphin Island through the Subsequent French, British, Spanish and American occupations of the city of Mobile and its environs. Surface water from local streams and shallow ground water were utilized as a source of potable water supply by the colonists and later settlers. The Mobile Water Service System is the result of acquistion by the city of Mobile of the water rights of the Stein Water Works in 1898 and the Bienville Water Supply Company in 1907. Mobile's principal source of domestic and industrial water is the 3,600-acre Big Creek Lake completed in 1952. An additional source of industrial water is the Mobile River and Cold Creek, a tributary thereof. The principal sustained yield of both the surface- and ground-water resources of the area is approximately 11.84 billion gallons per day. Total water resources of the area, therefore, greatly exceed water demands of the foreseeable future.
W75-06071

DEVELOPMENT OF A HYDROLOGIC CONCEPT FOR THE GREATER MOBILE METROPOLITAN-URBAN ENVIRONMENT,
Geological Survey, Univeristy, Ala. Water Resources Div.
For primary bibliographic entry see Field 4B.
W75-06072

PEAK RATIOS AND ALTERNATE MODEL FACTORS FOR RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez.
For primary bibliographic entry see Field 6D.
W75-06085

CITY OF FRESNO--LONG RANGE PLAN: METROPOLITAN AREA, TRUNK SEWER SYSTEM.
Jenks and Adamson, Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W75-06102

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-06104

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 4B.
W75-06105

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
For primary bibliographic entry see Field 5D.
W75-06106

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
For primary bibliographic entry see Field 5D.
W75-06203

3E. Conservation In Industry

PHILOSOPHY AND METHODOLOGY OF METALLIC WASTE TREATMENT,
New York State Dept. of Environmental Conservation, Albany. Bureau of Industrial Wastes.
For primary bibliographic entry see Field 5D.
W75-06320

OBSTACLES TO TAMING CORPORATE POLLUTERS: WATER POLLUTION POLITICS IN GARY, INDIANA,
Hampshire Coll., Amherst, Mass. Dept. of Political Science.
For primary bibliographic entry see Field 5G.
W75-06322

MORE LIFE FOR DIAPHRAGM CELLS.
For primary bibliographic entry see Field 5G.
W75-06324

3F. Conservation In Agriculture

AGROMETEOROLOGICAL FORECASTING, AN IMPORTANT MEANS FOR DECISION MAKING IN AGRICULTURE (IN FRENCH),
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
For primary bibliographic entry see Field 2B.
W75-05855

DRIP IRRIGATION METHOD,
South Australia Rubber Mills Pty. Ltd. (Australia). (assignee)
A. J. Brock, and D. W. Fulton.
U.S. Patent No. 3,849,639, 4 p, 5 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1304, November 19,1974.

Descriptors: *Patents, *Irrigation system, *Water distribution(Applied), *Water conservation, Equipment, Irrigation engineering, Efficiencies.
Identifiers: *Drip irrigation.

A drip irrigation system has a main supply pipe; a secondary distribution pipe; joining means joining the secondary distribution pipe to the main supply pipe and placing it in liquid flow communication with the main supply pipe; a series of aperatures in the wall of and spaced from one another along the secondary distribution pipe; and a corresponding series of capillary tubes of coil shape. The capillary tubes have a greater diameter than the respective apertures of the series extending through those apertures and sealably retained by the resilient deformation of the wall of the secondary

distribution pipe. The method of installing the system over an area of land comprises the steps: joining a secondary distribution pipe to a main supply pipe for liquid flow; piercing the wall of the secondary distribution pipe to form a series of apertures; winding a series of capillary tubes onto formers, heating the capillary tubes to a sufficient temperature and for sufficient time that they retain a coil shape after removal from the formers, the outer diameter of the capillary tubes exceeds the diameter of the pierced apertures; removing the capillary tubes from the formers, and cutting lengths from the capillary tubes and inserting tube of each cut length through a respective pierced aperture. (Sinha-OEIS)
W75-05885

IRRIGATION SYSTEM,
P. Niederwemmer.
U.S. Patent No. 3,849,991, 5 p, 15 fig, 16 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1447, November 26, 1974.

Descriptors: *Patents, *Irrigation systems, *Subsurface irrigation, *Soil management, *Water purification, Water table, Desalination, Ditches.

The subsurface and surface flooding irrigation procedure is characterized by the creation of an artificial ground water table at a depth of about 0.7-1.00 m, i.e., beneath the root zone. A continuous supply of water is available to the plant roots at a soil level at which the oxygen required for root development is easily available to the plants. The surface of the soil remains dry, thus reducing evaporation considerably and unproductive water loss is largely eliminated in the system. The subsurface and water trapping irrigation system consists of the following components: 'Main afferent ditches' bring the water from a canal, river, lake or from a pumping station. 'Field afferent ditches and/or field dispersion ditches' take the water brought by the main afferent ditches and direct it through 'slide valves' which regulate the volume of flow and on into the underground irrigation lines. The slide valves are also so installed that they can trap the water in the lines when closed. The 'underground irrigation line' consists of a trough-shaped barrier layer, which can be made of various materials such as resistant plastic foils, asphalt or bitumen emulsions, or artificial or natural fabric strips; and, in addition, can be covered with various materials. The subsurface barrier layers are laid in parallel from the field afferent ditches in such a way that the two upper edges of the trough lie beneath the limit of soil cultivation. The barrier layers are not laid continuously but at intervals. (Sinha-OEIS)
W75-05887

AUTOMATIC IRRIGATION APPARATUS,
E. A. Platt.
U.S. Patent No. 3,860,172, 5 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 744, January 14, 1975.

Descriptors: *Patents, *Irrigation systems, *Surface irrigation, *Irrigation efficiency, Agriculture, Conservation, Ditches, Water delivery, Automation.
Identifiers: *Automatic irrigation equipment.

The apparatus consists of an elongated bag of a flexible, water impervious material adapted to collect a generally continuous flow of water until the bag contains a predetermined volume of water. One end of the bag is provided with a discharge arrangement in the form of a support platform which normally maintains the end of the bag at a selected elevation representative of the desired predetermined volume. The positioning of the platform is controlled by a weight biasing means which is overcome by the static pressure of the water within the bag. When the predetermined volume of water in the bag is reached the bag end is lowered and the volume of water is discharged into an irrigation ditch system. The water is automatically discharged into the irrigation system at time intervals dependent upon the rate of flow of water into the bag. (Sinha-OEIS)
W75-05901

DRIP IRRIGATION,
E. N. Costa.
U.S. Patent No. 3,860,179, 5 p, 11 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 747, January 14, 1975.

Descriptors: *Patents, *Irrigation systems, *Conduits, *Turbulent flow, Equipment, Application equipment.
Identifiers: *Drip irrigation.

A combined flow and discharge fitting for a continuous drip irrigation system comprises a flow conduit having at least one capillary tube partially embedded in the wall of the flow conduit. The method of continuous drip irrigation includes the step of discharging water drop-wise from a flow conduit via a number of spaced capillary tubes. At least some of the capillary tubes have different effective lengths to compensate for differences in internal pressure in the conduit, and to permit turbulent flow rates to be used in the conduit. (Sinha-OEIS)
W75-05902

ANALYSIS AND DESIGN OF SETTLING BASINS FOR IRRIGATION RETURN FLOW,
Idaho Univ., Moscow.
For primary bibliographic entry see Field 5G.
W75-06078

EVALUATION OF AGRICULTURAL POLICY ALTERNATIVES TO CONTROL SEDIMENTATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4D.
W75-06079

OPTIMIZATION OF WATER USE EFFICIENCY THROUGH TRICKLE IRRIGATION AND THE STRESS DAY INDEX,
Texas A and M Univ., College Station. Water Resources Inst.
E. A. Hiler, and T. A. Howell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 821, $7.50 in paper copy, $2.25 in microfiche. Technical Report No. 62, December 1974. 229 p, 30 fig, 26 tab, 109 ref, 2 append. OWRT A-024-TEX(1). 14-31-0001-3844 and 4044.

Descriptors: Irrigation, Systems analysis, Dynamic programming, Water utilization, Irrigation efficiency, Sorghum, Optimization, Crop production, Crop response, Growth rates, Model studies.
Identifiers: Trickle irrigation.

Effects were evaluated of high frequency irrigation on grain sorghum growth and yield and guidelines were developed for the optimal utilization of a scarce resource--water--under high frequency irrigation. An experiment was conducted in fully instrumented field lysimeters which had undisturbed soil cores. Rainfall was eliminated as a variable by an automated movable shelter which protected the lysimeters from rain. Soil and crop measurements included soil water content, leaf temperature, leaf resistance, leaf water potential, leaf area index, and crop height. Wind speed, air temperature, dew-point temperature, and net radiation were measured above the crop. Yield and water use efficiency of grain sorghum under high frequency irrigation were decreased most by water deficits occurring during the boot-to-bloom period. Yield models of the multiplicative- and additive-type were compared to the yield data. Within the range of the data, each model was an acceptable representation of the actual results of independent experiments. Environmental and soil water balance models were also developed and tested. Stochastic dynamic programming was used to maximize the expected yield per unit of available irrigation water. The results indicated that irrigation requirements could be reduced by almost one-half without appreciable loss in yield if the irrigation water was supplied optimally throughout the season. Also, pre-irrigation (irrigation at or prior to germination) was preferred to using a like-amount of water, supplied optimally later in the season. This research demonstrated the potential of high frequency irrigation to improve water use efficiency. Application of operations research techniques greatly enhanced the irrigation decision selection under uncertain outcomes.
W75-06089

THE COLORADO: A WEARY RIVER,
For primary bibliographic entry see Field 4A.
W75-06100

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
For primary bibliographic entry see Field 4A.
W75-06171

FIELD TEST OF A MODIFIED NUMERICAL MODEL FOR WATER UPTAKE BY ROOT SYSTEMS,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
For primary bibliographic entry see Field 2I.
W75-06265

THE ANALYSIS OF INFLOW INTO SOME EXPERIMENTAL AGRICULTURAL DRAINS,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 4A.
W75-06273

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: II. INFLUENCE OF SOIL MOISTURE AND WEATHER,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
For primary bibliographic entry see Field 2I.
W75-06317

SIMULATION TECHNIQUES FOR WATER PROJECT ANALYSES,
Texas State Office of Information Services, Austin.
For primary bibliographic entry see Field 6A.
W75-06328

USING POULTRY LITTER, IRRIGATION AND TALL FESCUE FOR NO-TILL CORN PRODUCTION,
Agricultural Research Service, Athens, Ga.
J. R. Carreker, S. R. Wilkinson, J. E. Box, Jr., R. N. Dawson, and E. R. Beaty.
J Environ Qual. Vol 2, No 4, p 497-500, 1973, Illus.

Descriptors: *Irrigation effects, *Litter, Corn, Crop production, Fescues, Cultivation.
Identifiers: Poultry filter, No-tillage.

A cropping system is needed in the Southern Piedmont (USA) and related areas for increasing production of grain and forage, controlling erosion, and providing a place for safe utilization of poultry litter. No-till corn (Zea mays L.) production in tall fescue (Festuca arundinacea Schreb.) appears to offer such a system. Corn was no-till

planted and irrigated in live sod and in sod that was killed with 2.2 and 0.28 kg/ha atrazine and paraquat, respectively. N, P, K, and lime applied uniformly to all treatments included 145, 98, 185, and 3,330 kg/ha in 1970 and 145, 138, 323, and 3,330 kg/ha in 1971, respectively. Subplot treatments were 5.6, 11.2, 22.4 and 44.8 metric tons/ha poultry litter, and 335 kg/ha N. Measurements with electrical resistance blocks showed that soil-water content under the corn was never below 50% of the water between field capacity and wilting point. Corn population was higher and yields are better in the killed sod than in live sod both years. Yield in the killed sod were very satisfactory with 9500 kg/ha (15.3 bu/acre) from 5.6 metric tons/ha poultry litter plus 145 kg/ha N and 12,960 kg/ha (207 bu/acre) from 480 kg/ha N. Tall fescue present in the live sod after corn harvest was above 2000 kg/ha in 1970 and above 6000 kg/ha in 1971. Dead grass plus poultry litter residues after killed sod in 1970 ranged from 6360 kg/ha with N only to 30,200 kg/ha with 44.8 metric tons/ha poultry litter. Poultry litter provides a vast resource of plant nutrients. No-till corn in tall fescue with irrigation and poultry litter will produce needed grain, conserve soil and water, and turn a waste product into a resource. --Copyright 1974, Biological Abstracts, Inc.
W75-06348

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

MODERN TECHNIQUES IN PLANNING THE MANAGEMENT OF WILDLAND RESOURCES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
D. I. Navon, and H. W. Anderson.
In: Proceedings of the Joint FAO/U.S.S.R. International Symposium on Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970. Food and Agricultural Organization, United Nations, (Rome), p 359-368, 1972. 29 ref.

Descriptors: *Forest management, Water resources, *Flood control, *Sediment control, *Deposition(Sediment), *Lumbering, *Planning, Systems analysis, Linear programming, Economics, Social values, *Ecosystems.
Identifiers: Multivariate analysis, Social goals.

To plan the management of wildland resources requires the use of basic scientific knowledge and modern mathematical techniques in the context of social goals and institutions. Some of the most helpful techniques in carrying out this task include multivariate regression, factor analysis, and mathematical programming. With multivariate and factor analysis, statistical relations can be identified in the complex of physical, social and economic variables which make up the management system. The use of these techniques is illustrated in developing rational and efficient decisions in planning the management of water and other resources. An example is given of the system and the models developed to evaluate intense fire protection in the mountains of southern California, through their effects on floods and sedimentation. The system involved a vegetation index of management, a precipitation index of time variation, and geologic and vegetation indexes of spatial variation within mountain watersheds. By characterizing the management process as discrete treatment-response phenomena, mathematical programming techniques can be used to generate and evaluate management plans consisting of combinations of these treatments. While the ultimate goal of planning is to generate a plan maximizing social welfare, in practice it is only possible to generate alternative plans which are consistent with social goals and which optimize some measurable index of performance. The selection of a particular plan must be left to human judgment. The use of modern techniques in the planning process provides sound premises for this choice by generating efficient management alternatives expressed in terms of measurable inputs and outputs. (See also W75-05912) (Forest Service)
W75-05915

SEDIMENT DEPOSITION IN RESERVOIRS ASSOCIATED WITH RURAL ROADS, FOREST FIRES, AND CATCHMENT ATTRIBUTES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05916

ROOT DISTRIBUTION UNDER SOME FOREST TYPES NATIVE TO WEST VIRGINIA,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2I.
W75-05933

PIPELINES IN FORESTED WETLANDS: CROSS DRAINAGE NEEDED TO PREVENT TIMBER DAMAGE,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05939

INTEGRATED RIVER BASIN DEVELOPMENT AND REGIONAL PLANNING IN NEW ZEALAND,
Nelson Catchment Board (New Zealand).
For primary bibliographic entry see Field 6B.
W75-05952

PATTERNS OF VARIATION IN A FLUVIAL SYSTEM,
State Univ. of New York, Buffalo. Dept. of Geography.
For primary bibliographic entry see Field 2J.
W75-05961

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand. 518 p, 1973. Proceedings in 4 vols.

Descriptors: *Conferences, *Floods, *Sediment transport, *Sediment discharge, *Flood discharge, *Flood control, *Flood damage, *Warning systems, Measurement, Peak discharge, Velocity, Flood frequency, Gaging, Bed load, Sampling, Reservoirs, Flood forecasting, Rivers, Watersheds(Basins), Channels, Flood flow, Flow rates, Dams, Multiple-purpose projects, Flood protection, Foreign countries, Hydrology, Small watersheds.
Identifiers: *River mechanics.

River mechanics was discussed at a symposium held at Bangkok in 1973. The three broad topics discussed in Volume 2 were: (1) flow and sediment measurement; (2) flood computation; and (3) flood damage, warning, and control. (See W75-05974 thru W75-06014) (Humphreys-ISWS)
W75-05973

A METHOD TO DETERMINE THE VECTORS OF THE AVERAGE VELOCITY FIELD IN UNIFORM FLOW,
Karlsruhe Univ. (West Germany), Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 8B.
W75-05974

EXTRAPOLATION OF STAGE-DISCHARGE RELATIONS FOR FLOOD COMPUTATIONS,
Swiss Federal Inst. for Snow and Avalanche Research, Davos-Weissfluhjoch.
J. Martinec.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, p 25-35, 1973. 5 fig, 3 tab, 6 ref.

Descriptors: *Stage-discharge relations, *Discharge measurement, *Roughness(Hydraulic), *Flow measurement, *Rating curves, *Velocity, Roughness coefficient, Flood stages, Flow rates, Flood data, Cross-sections, Channels, Rivers, Alluvial channels.
Identifiers: *Stage extrapolation.

Principles of computing and extending discharge rating curves were outlined by using experimental material measured on characteristic rivers in 1954-1971. The performance of velocity formulas in a broad range of the relative roughness of river channels was assessed. Changes of the roughness in relation to discharge were examined Examples showed a reduction of the channel capacity to 50% by ripple formation at high water stages and an opposite trend of the effective roughness in an irregular channel. It was concluded that in alluvial streams a deterioration of flow conditions with the rising stage can be expected. (See also W75-05973) (Terstriep-ISWS)
W75-05976

SHOALING MEASUREMENTS IN NAVIGABLE WATERS BY THE U.S. ARMY CORPS OF ENGINEERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Div.
For primary bibliographic entry see Field 8B.
W75-05977

PROBLEMS OF NUCLEAR GAUGING OF SUSPENDED SEDIMENT CONCENTRATION,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2J.
W75-05978

RELIABILITY OF BED-LOAD SAMPLING,
Research Inst. for Water Resources Development, Dudapest (Hungary). Dept. of Surface Waters.
For primary bibliographic entry see Field 2J.
W75-05979

RECENT RESEARCH IN RUNOFF ESTIMATES FROM SAMLL RURAL WATERSHEDS,
Federal Highway Administration, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-05980

COMPUTING FLOOD FREQUENCY IN THE HUMID EASTERN USA,
Pennsylvania State Univ., University Park. Dept of Civil Engineering.
B. M. Reich.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 121-132. (1973) 10 fig, 16 ref.

Descriptors: *Flood frequency, *Watersheds(Basins), *Design flood, *Pennsylvania, Hydrologic aspects, Peak

discharge, Flood recurrence interval, Flood peak, Statistical methods, Annual flood, Frequency, Storm runoff, Topography, Precipitation(Atmospheric), Rainfall, Humid areas,
Identifiers: Ungaged watersheds.

Hydraulic designs, estimates of sediment transport, or channel stability are based on hydrologic estimates of large floods. A short method for predicting design floods on ungaged water sheds in the 40 to 48 inch year-round precipitation in Pennsylvania was presented. Its development from stream gage records was discussed. Relationships of flood peaks to landscape and climate features were sought. Various stratifications were tried in the hope of finding homogeneous subsets possessing strong predictive relationships. For instance the coefficient of determination (sq R) for the Piedmont subset reached 0.94 in comparison to the multi-state's subsets' 0.87. Similarly elimination of 18 from the original 61 Ohio watersheds in the Appalachian Plateau subset increased sq R from 0.85 to 0.89. The resulting equations involve area to the powers of 0.71, 0.74, and 0.81. In the Piedmont, one equation also requires multiplication by about the fourth power of the daily maximum rainfall of 2.33 year return period. Cavernous limestone was shown to reduce the mean annual flood to as little as 40% of an otherwise similar watershed on other rocks' estimate. Glaciation in the northwest decreased floods to about 2/3 of their size in the unglaciated Appalachian Plateau, but is associated with increased floods in the east. Long return period estimates were made simply by multiplying the mean annual value by 2 for 10 years, or 3 for 50 years, etc. Derivation of a typical regional dimensionless Gumbel frequency-line was presented. (See also W75-05973) (Humphreys-ISWS)
W75-05981

EFFECT OF DAMS ON FLOOD FREQUENCY,
Papua and New Guinea Inst. of Tech., Lae (New Guinea). Dept. of Civil Engineering.
E. M. Laurenson.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 133-146. (1973) 7 fig, 1 tab, 2 ref.

Descriptors: *Flood frequency, *Watersheds(Basins), *Dams, *Analytical techniques, Analysis, Probability, Flood forecasting, Flood peak, Hydrographs, Annual flood, Streamflow, Flood routing, Storage, Statistical methods, Flood control.
Identifiers: Flood frequency routing.

Construction of a storage dam on a river normally reduces the magnitude of the flood of any given frequency downstream. The reduction is greatest close to the dam and diminishes in the downstream direction. Methods were presented for estimating the change in the flood frequency curve at various points downstream of the dam. Separate procedures were required to account for the effects of the dam itself and of tributary streams, channel storage, and effluent streams. (See also W75-05973) (Humphreys-ISWS)
W75-05982

A GENERAL FORMULA FOR DETERMINATION OF PEAK FLOOD,
Madhya Pradesh Irrigation Dept., Bhopal (India).
S. R. L. Gupta.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 147-158. (1973) 8 fig, 3 tab, 4 ref.

Descriptors: *Flood peak, *Watersheds(Basins), *Methodology, Runoff, Precipitation(Atmospheric), Frequency, Equations, Analytical techniques, Floods, Discharge(Water), Drainage area, Large watersheds, Storage, Valleys, Shape, Slopes.
Identifiers: India.

A general formula suggested for determining peak flood discharge was developed from watersheds ranging in size from 5.2 to 195.5 square miles. Factors taken into account for formula development included: (1) precipitation - its return period, and distribution in time and space; (2) the shape, slope, rugosity, nature, and size of catchment area; and (3) the valley storage. Nomograms were presented as aids for solving the formula. (See also W75-05973) (Humphreys-ISWS)
W75-05983

FLOOD COMPUTATIONS FOR THE HAWAIIAN ISLANDS,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
Y.-S. Fok, and L. S. Lau.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 159-169. (1973) 16 ref.

Descriptors: *Flood discharge, *Hawaii, *Watersheds(Basins), *Analytical techniques, Peak discharge, Runoff, Flood frequency, Design flood, Statistical methods, Regression analysis, Correlation analysis, Rational formula, Hydrograph analysis, Unit hydrographs, Model studies.

In the Hawaiian islands, because of the characteristic steep and small watersheds and the extraordinarily intense storms, severe floods may occur without warning. Due to lack of uniformity in the design criteria, various flood determination methods have been used by governmental agencies and private consulting firms for the determination of design peak discharges. Flood computational methods used include rational, envelope curve (from maximum peak discharges of all stream gages), flood frequency, standard project flood, and hydrograph synthesis methods. Other computational methods developed from research studies include multiple regression, multiple correlation, and instantaneous unit hydrograph analysis. Flood hydrology research efforts at present are partly focused on modification of the Stanford Watershed Model to develop hydrologic simulation techniques for use in Hawaiian islands and on evaluation of the characteristics of the instantaneous unit hydrograph based on the water budget method. (See also W75-05973) (Humphreys-ISWS)
W75-05984

A TYPHOON FLOOD COMPUTATION MODEL IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05985

DESIGN PEAK FLOOD COMPUTATION FOR MAJOR AND MULTIPURPOSE RESERVOIRS ON NARMADA RIVER,
Madhya Pradesh Irrigation Dept., Bhopal (India).
L. A. Panjwani.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 183-193. (1973) 3 fig, 2 tab, 7 ref.

Descriptors: *Design flood, *Large watersheds, *Unit hydrographs, *Multiple-purpose reservoirs, Flood peak, Flood discharge, Analysis, Methodology, Maximum probable flood, Hydrographs, Floods, Reservoirs.
Identifiers: *India(Narmada River).

Eleven major and multipurpose reservoirs are envisaged for construction on the Narmada River in central India. Among these, Bargi and Narmadasagar are the two key reservoirs. The unit hydrograph approach for design peak flood computation, despite certain obvious drawbacks and limitations when applied to large drainage basins, has wide acceptance among Indian engineers. The unit hydrograph methodology adopted for computation of design peak flood for these two reservoirs was described. The impact of floods passing through these two reservoirs on the other proposed reservoirs downstream was also described. (See also W75-05973) (Humphreys-ISWS)
W75-05986

ASSESSMENT OF 1966 PEAK DISCHARGE OF THE MEKONG AT VIENTIANE,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 2E.
W75-05987

STOCHASTIC APPROACH TO LINEAR AND NONLINEAR RUNOFF ANALYSIS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05988

FLOOD PREDICTION - A BAYESIAN APPROACH,
West Virginia Inst. of Tech., Montgomery. Dept. of Civil Engineering.
A. S. Paintal.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 221-228. (1973) 1 fig, 2 ref.

Descriptors: *Flood forecasting, *Statistical methods, *Probability, Estimating, Floods, Flood recurrence interval, Frequency, Risks, Hydrology.
Identifiers: *Poisson probability, *Bayesian probability.

A method was described for predicting the Probability of occurance of 'critical' flood at a site from limited data by using Poisson probability and Bayesian probability concepts. An expression was developed for computing the probability of observing r sub o number of critical floods in t sub o number of years, having observed r number of floods in t number of years. The Bayesian development was used to yield a forecast of the probability of finding time equal to or less than t sub o to next flood occurance if r number of floods have been observed in t number of years. The Bayesian forecasts reflects the influence of information and could be used in a statistical decision theory context to optimise hydrologic design decisions. (See also W75-05973) (Humphreys-ISWS)
W75-05989

SOME ASPECTS FOR THE SELECTION OF AN ADEQUATE PROBABILITY DISTRIBUTION FUNCTION FOR FLOOD ANALYSIS,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
D. Koberg, and H. Eggers.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 229-239. (1973) 2 fig, 4 ref.

Descriptors: *Flood forecasting, *Annual flood, *Statistical methods, Probability, Flood recur-

rence interval, Flood peak, Hydrology, Floods, Analysis, Data collections.
Identifiers: *Probability distribution functions, Likelihood ratio test, Chi-square test, Kolmogoroff test.

Annual flood peaks are considered as a simple random variate repeated independently each year. Estimation of a flow of given return period involves the decision according to which probability function flood peaks are distributed. This process of decision was discussed in detail, especially aspects of the investigator's personal influence on the results. An example based on 31 samples was given to show these influences. The likelihood ratio test was recommended as the perferable procedure in deciding on the distribution of a random variate. (See also W75-05973) (Humphreys-ISWS)
W75-05990

UNIT HYDROGRAPHS AND STATISTICAL DENSITY FUNCTIONS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
For primary bibliographic entry see Field 2E.
W75-05991

FLOOD ESTIMATION METHODS FOR UNGAGED CATCHMENTS-A REVIEW,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
R. D. Verma, and R. M. Advani.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 253-264. (1973) 1 tab, 37 ref.

Descriptors: *Flood discharge, *Watersheds(Basins), *Reviews, *Forecasting, Runoff forecasting, Methodology, Peak discharge, Hydrographs, Systems analysis, Precipitation excess, Unit hydrographs, Hydrograph analysis, Flood routing, Rational formula, Estimating, Maximum probable flood.
Identifiers: *Ungaged watersheds.

The various important methods available in the literature for the estimation of flood discharges for catchments with no stream flow data were reviewed. This review indicated that little is known for the estimation of rainfall excess. A number of physical models, systems analysis models, and system synthesis models are available to predict the response of a catchment to rainfall excess. However, because a number of parameters are involved, these models are quite complicated to use for practical problems. Although considerable research was done during the last decade for the estimation of flood discharge, the problem still remains unsolved for ungaged natural catchments. However the methods of storage routing and streamflow synthesis seem to be the most promising. There is a need to develop better methods for accurate estimation of rainfall excess and for determination of critical parameters for a catchment. (See also W75-05973) (Humphreys-ISWS)
W75-05992

FLOOD COMPUTATIONS FOR NONUNIFORM RAINFALL DISTRIBUTION,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
For primary bibliographic entry see Field 2A.
W75-05993

OPTIMUM RUNOFF FORECAST FOR A FLOOD-CONTROL RESERVOIR,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
V. Klemes.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 277-289. (1973) 5 fig.

Descriptors: *Flood control, *Flood forecasting, *Cost-benefit analysis, *Reservoir operation, Flood protection, Flood routing, Reservoir design, Reservoir storage, Reservoirs, Storage capacity, Optimization, Flood damage, Hydrology.
Identifiers: *Flow reduction, *Optimum forecast, Single purpose reservoir.

The increase of benefits due to runoff forecast was studied for the operation of a single flood-control reservoir. It was shown that, for a given forecast period, the benefit derived from the forecast increases with reservoir storage capacity up to a certain point beyond which the reverse is true. This indicates that for a given type of forecast there is always a unique storage capacity for which the benefit reaches a maximum. The optimum forecast period for a flood-control reservoir of a given capacity was found by introducing a cost function. (See also W75-05973) (Terstriep-ISWS)
W75-05994

METHODOLOGY FOR OPTIMIZATION OF FLOOD PROTECTION MEASURES ILLUSTRATED BY AN EXAMPLE IN THE GERMAN FEDERAL REPUBLIC,
Karlsruhe Univ. (West Germany). Dept. of Civil Engineering.
E. Mosonyi, W. Buck, and W. Kiefer.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulc Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 291-302. (1973) 6 fig, 2 tab, 4 ref.

Descriptors: *Flood protection, *Flood damage, *Economics, *Cost comparisons, River training, Flood control, Detention reservoirs, Land use, Agriculture, Buildings, Design flood, Floods, Flood data, Evaluation, Methodology, Costs, Optimization.

The methodology of optimization of flood protection measures, exemplified by a selected small river valley in the Black Forest was studied. Unit damages for agricultural losses were determined for pastures and for grain land and were differentiated for every season. Unit damages for buildings were based on data received from an insurance company that insures buildings against floods. Damages caused by floods and costs for flood control structures were compared for various design floods and two types of flood protection measures (river training and reservoirs). It was shown that in such cases river training measures are not economically feasible, but construction of small reservoirs is justified. (See also W75-05973) (Humphreys-ISWS)
W75-05995

FLOOD CONTROL IN THE PLAIN RIVERS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W75-05996

BENEFIT-ESTIMATE OF DRAINAGE AND FLOOD-CONTROL WORKS IN SMALL WATERSHEDS OF SEMI-ARID CLIMATE,
Technion-Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 6B.
W75-05997

HIGHLIGHTS OF FLOOD PROTECTION WORKS DONE ON RIVER NARMADA AT HOSHANGABAD IN MADHYA PRADESH STATE - INDIA,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 4D.
W75-05998

A STUDY OF THE PERAK RIVER FLOOD OF JANUARY 1967 AND AN EVALUATION OF THE FLOOD CONTROL ASPECTS OF TEMENGOR RESERVOIR,
Shawinigan Engineering Co. Ltd., Montreal (Quebec).
For primary bibliographic entry see Field 2E.
W75-05999

NORMS AND CRITERIA FOR INITIATING SCIENTIFIC ASSESSMENT OF FLOOD DAMAGES IN NON-UNIFORM CONDITIONS IN MADHYA PRADESH STATE--INDIA,
Madhya Pradesh Government, Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 2E.
W75-06000

FLOOD DAMAGE IN NEW ZEALAND,
Ministry of Works, Wellington (New Zealand).
R. K. Howard.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 359-373. (1973) 1 fig, 2 ref.

Descriptors: *Flood damage, *Flood protection, *Costs, Flood plains, Watersheds(Basins), Flood control, Floods, River basin development, Overflow, Erosion.
Identifiers: *New Zealand.

New Zealand is a country of rugged topography and high rainfall. Early settlement was located near water transport and this fixed the present pattern of development with many urban communities situated in flood prone areas. Large-scale land development has significantly altered the natural hydrological characteristics and caused greater flood concentration, loss of fertile soil, lowering of water quality, and instability of many river channels. Flood damage costs were examined and measures adopted to control flooding and mitigate losses were stated. It was concluded that although the annual cost to New Zealand of flood damage is small in comparison to the gross national product (0.23%), it is still a substantial sum and represents a total loss to the nation. With increasing population and growing standards of living, this damage can be expected to rise unless flood-control measures are continued and especially if the associated measures described are not vigorously pursued. The river works will of course continue to suffer from flood damage but in time, as training works become more effective and more use is made of permanent materials, this damage should be held at a reasonable level. (See also W75-05973) (Humphreys-ISWS)
W75-06001

FLOOD MANAGEMENT IN DEVELOPING COUNTRIES,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06002

FLOOD ROUTING STUDIES OF GANDHISAGAR DAM,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 2E.
W75-06003

FLOOD WARNING THROUGH A HYDROLOGICAL-CUMsMATHEMATICAL MODEL AND VHF TELEMETRY,
Irrigation and Power Research Station, Poondi (India).
E. P. Kumaraswamy.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 397-407. (1973).

Descriptors: *Warning systems, *Flood forecasting, *Model studies, *Hydrologic aspects, River forecasting, Mathematical models, Hydraulic models, Networks, Remote sensing, Telemetry, River flow, Water levels, Surface waters, Rainfall, Simulated rainfall.
Identifiers: *India.

Described was a technique being developed at Poondi for forecasting floods and flows in the rivers of Tamilnadu, through the combined use of a mathematical model, a hydrological model, and VHF telemetry for each river basin. A hydrological model simulating the entire peninsular India between the latitudes 7 degrees N and 17 degrees N is under construction to a scale of 1/10,000. It is initially a rigid bed impermeable model. Rainfall will be simulated in intensity and distribution over space and time through shower nozzles. Surface run-off will be measured at river sections corresponding to their present gaging sites. Mathematical models are being postulated, and by a trial and error procedure, the parameters and constants for each mathematical model will be evolved through the operation of the hydrological model. Electronic radio sensors will be located strategically in the prototype for recording and transmitting rainfall, water levels, and other parameters. After the hydrological model is calibrated, the infiltration characteristics of the catchment area will be introduced with the objective of making the model more realistic. (See also W75-05973) (Humphreys-ISWS)
W75-06004

FLOOD PREDICTION METHOD OF RIVER WITH RESERVOIR AND CONFLUENCE OF TRIBUTARIES,
Kinki Univ., Osaka (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06005

FORECASTING FLOOD HYDROGRAPHS ON THE DANUBE USING THE PASSAGE THEORY,
Research Inst. for Water Resources Development, Budapest (Hungary).
J. Csoma, Z. Szigyarto, and T. Juracski.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 419-430. (1973) 1 fig, 2 tab, 9 ref.

Descriptors: *Flood forecasting, *Hydrograph analysis, *Flood waves, Discharge(Water), Rivers, Water levels, Hydrographs, Floods, Flood flow, Flood stages.
Identifiers: Hungary(Danube River), Passage theory, Hydrograph transformation.

The passage theory was applied to predict hydrographs of flood waves on the Danube remaining below overbank stages; the results obtained were used to evaluate the applicability of the method. A brief review was presented on the reliability of methods described in the literature, then, primary data related to the trial hydrograph forecasts were summarized. A discussion of the results was presented with the main conclusion that the reliability of the method is comparable to that of the principal methods described in the current literature. (See also W75-05973) (Humphreys-ISWS)
W75-06006

BASINWIDE FLOOD FORECASTING SYSTEM FOR THE LOWER MEKONG BASIN,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
S. Sangsnit.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 431-442. (1973) 3 fig, 3 tab, 6 ref.

Descriptors: *Flood forecasting, *Watersheds(Basins), *Streamflow forecasting, Hydrologic aspects, International waters, Water levels, Rivers, River forecasting, Programs, Forecasting, Computer models, River basins, Warning systems, Foreign countries.
Identifiers: *Lower Mekong Basin.

The flood forecasting system for the lower Mekong basin, started during the 1970 flood season on a trial basis and continued in 1971 and 1972, uses a modified Streamflow Synthesis and Reservoir Regulation (SSARR) computer model developed by the U.S. Corps of Engineers. Forecasts manually computed for stations in the delta, however, have been based on correlation of upstream hydrograph, local precipitation, and tidal cycle. Input data for the SSARR model are: all available precipitation and discharge data from reporting stations, computations of local inflows between mainstem gaging stations, and quantitative precipitation forecasts and outlooks for each of the eleven contributing sub-basins. Each forecast computation consists of a backup period of four prior days and a quantitative precipitation forecast for the next ten days beyond the current morning. Forecasts are manually adjusted to revise unreasonable and inconsistent estimates pinpointed by the SSARR program because computer reruns are not presently feasible. These adjustments consider the most likely error and probable effect on computed forecasts. All river stage forecasts, prepared for periods of one, two, three, four, and five days ahead for ten selected key stations are released to the appropriate government agencies of the four riparian countries on a regular basis, seven days a week, during the flood season. In the first two years, forecasts proved to be sufficiently reliable. (See also W75-05973) (Humphreys-ISWS)
W75-06007

FORECASTING OF FLOOD CHARACTERISTICS OF THE NILE,
Technical Univ. of Budapest (Hungary).
M. Szalay.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 443-454. (1973) 4 fig, 5 tab, 4 ref.

Descriptors: *Flood forecasting, *Hydrograph analysis, *Annual flood, Annual peak discharge, Floods, Water year, Runoff, Hydrographs, Estimating, Flood discharge, Peak discharge, River basins, River flow, Annual.
Identifiers: *Nile River.

The Nile and its tributaries have practically a single flood wave, lasting over the whole hydrological year. Regular features of the annual hydrographs, together with a similitude existing between these hydrographs enables the development of a particular method of predicting flood characteristics. With the knowledge of 2 months runoff volume at an upper gaging station of the Blue Nile, annual runoff volume of the Main Nile as well as its annual peak flood discharge can be forecast with a fair degree of accuracy. All previous attempts to make a forecast based on rainfall data have failed, owing mostly to the insufficient number of raingage stations in the river basin. (See also W75-05973) (Humphreys-ISWS)
W75-06008

EFFICIENT GATE OPERATION OF THE VAALDAM TO MINIMIZE DOWNSTREAM FLOOD DAMAGE,
Department of Water Affairs, Pretoria (South Africa).
S. M. Nicol.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 455-465. (1973) 3 fig, 4 ref.

Descriptors: *Flood forecasting, *Hydrographs, *Reservoir operation, Flood peak, Flood discharge, Floods, Reservoir releases, Discharge(Water), Operations, Flood control, Hydrology, Flow control.

Vaaldam is a water storage reservoir situated at the confluence of the Vaal and Wilge rivers in the Republic of South Africa. Nondimensional hydrographs were developed for Vaaldam and three upstream gaging stations. A method of predicting the flood volumes and peak inflow into the dam some days in advance was developed based on these hydrographs. A series of nomographs to determine the optimum dam discharge for a particular initial water level, peak inflow, and time before peak inflow were developed with the objective of optimizing the absorption factor of the dam for any large flood. With the aid of these nomographs, suitable dam discharge for gates is determined within established constraints for reservoir operation. The advantage of early flood peak prediction is that the level in the dam can be drawn down as far as required before the flood actually reaches the dam. Thus, the dam can be kept full at all times yet still retain a high flood absorption factor. (See also W75-05973) (Humphreys-ISWS)
W75-06009

MECHANISM OF BED LOAD TRANSPORT IN CHANNEL FLOWS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06010

APPLICATION OF STATISTICAL METHODS TO THE DISTRIBUTION OF FALL DIAMETER AND FLOW TURBIDITY,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06011

SEDIMENT DISCHARGE CONTROL BY MEANS OF SETTLING BASINS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06012

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06013

MODELLING OF ERODIBLE CHANNELS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06014

INSTITUTE FOR WATER RESOURCES (ARMY CORPS OF ENGINEERS), ANNUAL REPORT, 1972.
Institute for Water Resources (Army), Alexandria, Va.
For primary bibliographic entry see Field 6B.
W75-06018

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME II - DATA ACQUISITION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06042

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME III - CONTROL NETWORK ESTABLISHMENT.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06043

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME IV - COMPUTER PROGRAM DESCRIPTION AND USERS' GUIDE.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06044

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME V - INFORMATION CORRELATION AND INTERPRETATION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06045

DEVELOPMENT OF A FLOOD CONTROL AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA: SUMMARY OF TECHNICAL REPORTS.
Cook County Flood Control Coordinating Committee, Chicago, Ill.
For primary bibliographic entry see Field 8A.
W75-06047

FLOODWATER MANAGEMENT PLAN, NORTH BRANCH OF THE CHICAGO RIVER, LAKE AND COOK COUNTIES, ILLINOIS.
Chicago River Steering Committee, Chicago, Ill.
Metropolitan Sanitary District of Greater Chicago, October 1974. 108 p, 14 fig, 4 tab, 18 ref.

Descriptors: *Flood control, *Surface runoff, Flood stages, *River basin development, *Planning, Illinois, Streamflow forecasting, Hydrograph analysis, Urbanization, Detention reservoirs, Urban runoff, Non-structural alternatives.
Identifiers: *Chicago River, North Branch Chicago River.

A floodwater management plan was developed for the North Branch of the Chicago River watershed which covers 65,300 acres in Cook and Lake County, Illinois. The goals are to reduce flood damages, provide increased recreation and provide watershed protection and environmental enhancement. Planned structural measures consist of seven excavated floodwater retarding structures, modification of the Willow Road Dam to improve flood control and, contingent upon future need, a pumping plant and pipe line for the diversion of Lake Michigan water into the Skokie Lagoons and Skokie River. Estimated costs for these structural measures total $36,224,000. Planned non-structural measures consist of a flood plain management program to be accomplished by flood plain zoning regulations, a channel operation and maintenance program, a flood proofing program, and a land treatment program. These programs will be implemented prior to the installation of structural measures. The planned land treatment program is to be a continuous program throughout the life of the project. Average annual operation, maintenance, and replacement costs are estimated to be $71,850 for the planned structural measures. Total average annual benefits from the selected plan are estimated to be $3,758,000. Total average annual costs are estimated to be $2,657,450. (Poertner)
W75-06048

ANALYSIS OF THE EFFECTS OF STORAGE ON FLOOD MAGNITUDE AND STAGE IN THE NORTH BRANCH OF THE CHICAGO RIVER.
Hydrocomp, Inc., Palo Alto, Calif.
Northeastern Illinois Planning Commission, Chicago, August 1973. 71 p, 16 fig, 27 tab, 4 ref.

Descriptors: *Flood control, *Hydraulic similitude, *Storage, *Storm runoff, *Flood peak, *Computer models, Simulation analysis, Illinois, Urban runoff, Hydrology, River flow, River basins, Watersheds(Basins), Mathematical models, Streamflow, Stage-discharge relationships.
Identifiers: *Chicago River, North Branch of Chicago River.

The potential flood control benefits along the lower North Branch of the Chicago River in Cook County, Illinois were evaluated as a function of assumed reservoir location at ten different points in the watershed. Computer simulations were run previously to determine flow rates and river stages using runoff from the five largest rainstorms during the 46-year period 1925 to 1971. Runoff was adjusted to land use conditions anticipated in 1995. In the computer runs the benefits of each reservoir location were evaluated singly and in combination with others. Reservoirs located on the West Fork were shown to be much more effective in reducing flood peaks along the lower North Branch than for reservoirs on the Middle Fork or the Skokie River. The Willow Road site and the mile 24.5 site on the West Fork seemed potentially the most effective. A combination of two or more reservoirs on a tributory is not significantly more effective than the downstream reservoir alone. The effectiveness of reservoir storage in reducing downstream flood stage is directly related to the volume of natural flood plain storage in the watershed above the reservoir site. After the most cost-effective reservoir sites are identified, simulations should be run to determine the most effective operating procedures and final economic comparisons. (Poertner)
W75-06059

THE EFFECT ON PEAK FLOW FREQUENCY AT THE U.S.G.S. GAGE NO. 11-1627.2 ON COLMA CREEK FROM THE DEVELOPMENT OF 349 ACRES IN GUADALUPE CANYON.
Hydrocomp, Inc., Palo Alto, Calif.
Crocker Land Company, South San Francisco, California, April 1973. 45 p, 17 fig, 7 tab, 7 ref.

Descriptors: *Urban runoff, *Flood frequency, *Flood forecasting, *Computer models, *Peak discharge, California, Land development, Flood flow, Flood control, Flood profiles.
Identifiers: *South San Francisco(California), Colma Creek.

An assessment was made of the impact of the Visitacion Rancho Development proposed by the Crocker Land Company on the streamflow at the U.S.G.S. gage located on Colma Creek in South San Francisco. Increased urbanization over the last twenty years in the Colma Creek watershed in San Mateo County has increased the storm runoff and caused local flooding problems. The proposed development on the nothern edge of the watershed requires a quantitative estimate of the effect of development on storm-runoff magnitude and frequency to evaluate the impact upon the environment. The peak flow frequency relationship was established for Colma Creek under 1973 conditions based upon the environment. The peak flow frequency relationship was established for Colma Creek under 1973 conditions based upon continuous simulation of flow for the 1948-1973 historic period. The simulation was repeated assuming the proposed Crocker Land Development was completed and a second peak flow frequency relation obtained. The simulation of flows was performed with the Hydrocomp Simulation Program (HSP) which models the hydrologic process in detail. The HSP model was fitted to the Colma Creek data by calibration against the record of flow obtained by the U.S. Geological Survey for the period 1965-1972. The proposed 349 acre land development would increase peak discharges and flow volumes very slightly, in the range of 1 to 5 percent, at the U.S.G.S. gage on Colma Creek. Flood damages in past storms have occurred below the gage. The development would increase peak discharges and flow volumes by substantially larger amounts at points upstream in Colma Creek near the development site. These increases attenuate and become less significant as the flow moves downstream. (Poertner)
W75-06060

FLOOD PLAIN MANAGEMENT,
Army Engineer District, St. Paul, Minn.
R. E. Cox.
Paper presented at the 1972 American Public Works Association Public Works Congress and Equipment Show, Minneapolis, Minnesota, September 25, 1972. 7 p.

Descriptors: *Flood control, *Administration, *Flood plains, *Flood protection, *Federal government, Flood plain zoning, Flood plain insurance, Floodproofing, Governmental interrelations, Non-structural alternatives, Land use.
Identifiers: National Flood Insurance Program.

There are thousands of homes located in flood-prone areas which will experience or witness the terror, shock and frustration of flooding. The Corps of Engineers is gravely concerned with developments in flood plains, and since 1824 has been in the business of providing flood protection within the authorities and missions assigned by Congress. The Corps is supporting studies of the relationship between flood-proofing and building codes to fill a void in existing building codes and regulations. Flood proofing will allow essential uses of flood-prone areas without the disastrous results which have occurred recently. Flood control works, land use controls, and all relevant means and alternative approaches contributing to the appropriate use of flood plains must be considered and the best combination of all these means of reducing future disasters should be adopted. The Corps is working closely with the Department of Housing and Urban Development (HUD) in its planning and related implementation activities. HUD, through its Federal Insurance Administration, has called on the corps for a large share of the technical assistance in connection with the National Flood Insurance Program. A

community, in order to become eligible for flood insurance, must show evidence that they will adopt controls to prevent future unwise use of areas subject to floods. (Poertner)
W75-06063

HISTORY OF WATER SUPPLY OF THE MOBILE AREA, ALABAMA,
Geological Survey, University, Ala. Water Resources Div.
For primary bibliographic entry see Field 3D.
W75-06071

SURVEY AND ANALYSIS OF URBAN DRAINAGE ORDINANCES AND A RECOMMENDED MODEL ORDINANCE,
Georgia Inst. of Technology, Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06076

SUDDEN MORTALITY OF A MASSIVE PHYTOPLANKTON BLOOM,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
For primary bibliographic entry see Field 5C.
W75-06091

THE COLORADO: A WEARY RIVER,
R. A. Grant, Jr.
Cry California, Vol 10, No 1, p 31-34, Winter 1974/75. 5 fig.

Descriptors: Surface water availability, *Water conservation, Management, *Water supply development, *Salinity, *Irrigation water, Energy, *California, *Colorado River Basin, Water shortage, Water resources, Water resources development, Colorado River Compact.
Identifiers: Southern California.

The Colorado River provides California with much of its water supply, as well as water to Wyoming, Colorado, Utah and New Mexico. Increasing demand for water results from an increase in energy development. Since the 1922 Colorado River Compact, the water resources have been intercepted for agricultural and urban uses which has led to an increase in salinity and pollution. California water agencies, responding to a reduced water supply and an increased demand, suggest that the river water should be used for energy development in its upper basin. This would not only provide more energy for Southern California but also decrease the effluent by returning purer, treated water to the river. Although this claim contradicts previous reports on the use of the Colorado River for energy, the state water agencies also argue that upper basin lands are not suited for agriculture, and therefore, irrigation, which increases salinity and pollution, is unnecessary. Underlying this report is the premise that Southern California is the Colorado River Basin's first priority. This concept has yet to be proven. (Salzman-North Carolina)
W75-06100

A MOSAIC PATTERN OF BALANCED LAND-WATER PLANNING FOR COTTAGE DEVELOPMENT AND LAKE PLANNING,
Toronto Univ. (Ontario).
For primary bibliographic entry see Field 6B.
W75-06101

FLOOD PLAIN INFORMATION: FEMME OSAGE CREEK, ST. CHARLES COUNTY, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the County of St. Charles, Missouri, August, 1973, 33 p, 24 fig, 3 tab, 19 plates.

Descriptors: *Floods, *Flooding, *Flood protection, *Flood plains, *Flood profiles, Flood control, *Missouri.
Identifiers: *Femme Osage Creek(Mo.), St. Charles County(Mo.), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

The Femme Osage Creek, draining an area of 75 square miles, is lined with heavy timber on the fringe of an extremely wide and open farming valley. The channel slopes at 20 feet per mile and has an average width of 70 feet. The flood plain averages about 1000 feet in width and is free of encroachments except for a few roads and bridges. Four major tributaries increase the flood flow, St. Charles County has a comprehensive land use plan which calls for the flood plain to be used exclusively for agriculture, parks and open spaces. High intensity, short duration storms occurring mostly from April to September produce floods characterized by high peaks, high velocities, short duration and relatively small volumes of run-off. Back waters from the Missouri River induce flooding on the Creek's lower reaches. Light rains on frozen or saturated ground and warm rains on snow can also create floods. A channel change which relocated the extreme lower portion of the stream and accompanying levees provides some flood protection. Channel cleanouts and dikes are temporary measures. Past flood accounts are scarce although floods occur almost every year, often several times in one year. Most past floods have been relatively minor in magnitude, but the possibilities of an Intermediate Regional Flood and Standard Project Flood exist with estimated crests of 25.8 feet and 28.3 feet respectively above stream bed. Agricultural lands and residences would be flooded. Flood profiles detail water surface elevations and lateral extent of flooding that may be expected. (Salzman-North Carolina)
W75-06107

FLOOD PLAIN INFORMATION: HINKSON CREEK AND TRIBUTARIES AND BEAR CREEK, COLUMBIA, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Columbia, Missouri and the Missouri Water Resources Board, May, 1971. 31 p, 14 fig, 5 tab, 32 plates.

Descriptors: *Floods, Flooding, *Flood plains, *Flood protection, *Flood flow, *Flood profiles, Flood control, Flood discharge, *Missouri.
Identifiers: *Hinkson Creek(Mo.), Hominy Branch(Mo.), *Grindstone(Mo.), Columbia(Mo.), Intermediate Regional Flood, Standard Project Flood.

Hinkson Creek, flowing through Columbia, has a long narrow drainage area of 81 square miles. Its channel varies from 80 feet at the south end to 50 feet at the north with an average slope of 9 feet/mile. Flood plain width varies from 1500 feed to 1000 feet. Hominy Branch and Grindstone Creek, tributaries of Hinkson Creek with 6.7 square miles and 15.4 square miles of drainage area respectively, lie in the southeastern part of Hinkson Creek Basin. Bear Creek, northwest of Hinkson Creek, drains an area of 14.1 square miles and is approximately 7 miles long and 2 miles wide. Hinkson Creek flood plain development is sparse but is expected to expand rapidly. Several sewage treatment plants are in the area. Levees surrounding mobile and multifamily residential structures provide little protection. Floods are generally caused by short duration, high intensity thunderstorms, with flood flows having high peaks, high velocities, short duration and relatively small volumes of run-off. Flood damage prevention measures including levees, have been done by private interests. Manmade encroachments present the only obstruction to flood flows. A maximum flow was recorded on May 15, 1970, with a peak discharge of 9100 cubic feet per second (cfs) and cresting at 18.91 feet compared to a bankfull height of 15 feet. Past floods have been of minor magnitudes, but an Intermediate Regional Flood or a Standard Project Flood with a peak discharge of 35,000 cfs, would result in inundation of the flood plain. (Salzman-North Carolina)
W75-06108

FLOOD PLAIN INFORMATION: ROCK CREEK, INDEPENDENCE, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Independence, Missouri, April, 1972. 28 p, 15 fig, 5 tab, 14 plates.

Descriptors: *Floods, *Flooding, *Flood plains, *Flood profiles, Flood control, Flood protection, *Missouri.
Identifiers: *Rock Creek(Mo.), Independence(Mo.).

Rock Creek, with headwaters in southwest Independence, flows north into the Missouri River, draining an area of 9.2 square miles within the city limits. Average channel width is 30 feet with an average slope of 40 feet per mile. Flood plain has some residential development, a cemetery and two parks, and averages 400 feet wide. A stream gaging station established in 1967, newspaper files, historical documents and records provided information. Flood flows are usually caused by rapidly moving thunderstorms having high intensity rainfall and lasting from a few minutes to several hours. Flood flows, occuring during the months of March through October, have high peaks, high velocities, short duration and relatively small volumes of run-off. Bridges and culverts on the flood plain provide major obstructions to flood flow. A small channel improvement project will have little effect on a major flood. A maximum flow was recorded on June 26, 1969 cresting at 12.50 feet and having a peak discharge of 2100 cubic feet per second. The most recent flood occurred on September 22, 1970, cresting at 10.50 feet. Although past floods have been relatively minor in magnitude, the possibilities and characteristics of an Intermediate Regional Flood (IRF) or Standard Project Flood (SPF) are discussed. Flood profiles are detailed. Estimated peak discharges for an IRF and SPF are 7,000 cfs and 10,000 cfs respectively, based on records of nearby basins of similar characteristics. Over 150 buildings in the flood plain would be flooded and 11 bridges overtopped during an IRF with 100 additional bridges flooded during an SPF, with water above bankfull for about 7 hours. (Salzman-North Carolina)
W75-06109

FLOOD PLAIN INFORMATION: ONE HUNDRED AND TWO RIVER, ST. JOSEPH, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the City of St. Joseph, Missouri, June, 1973. 27 p, 17 fig, 2 tab, 19 plates.

Descriptors: *Floods, *Flooding, *Flood plains, *Flood protection, *Flood profiles, Flood control, Channel improvement, *Missouri.
Identifiers: *One Hundred and Two River (Mo.), *St. Joseph(Mo.).

One Hundred and Two River basin, 87 miles long and 21 miles wide, drains an area of 825 square mi. within Missouri and Iowa, where it originates. The River slopes at 4.7 ft./mi. along a very flat channel which becomes progressively steeper upstream. Because of the flatness of bottomlands the undeveloped agricultural flood plain is subject to widespread inundation. Most rainstorms move crosswise over the north-south flowing river. Between May and September violent rainstorms frequently cause multiple floods in a single year. Several miles of channel were straightened to reduce severity of flooding after the 1965 flood caused severe overbank flooding along roads and highways and total damage exceeding $702,000 was recorded. Because of expansion into the flood plain by St. Joseph, an important transportation center with food processing, meat packaging and other industries, population 72,691, five watershed projects are proposed for 45% of the drainage area. When completed these flood detention struc-

tures will provide protection only from minor floods in the upper basin with a negligible effect upon major flood flows in the study area. An Intermediate Regional Flood (IRF) could have deep water flowing at high velocity with a discharge of 37,000 cfs for the study area and possible flooding of the Faron Street Lagoon could result in pollution and create definite health hazards. In a Standard Project Flood extremely hazardous conditions would exist for about 108 hours with a discharge of 80,000 cfs throughout the study area. (Salzman-North Carolina)
W75-06110

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
J. S. Larson.
The Massachusetts Heritage, Vol 10, No 3, September 1973. 2 p, 3 ref.

Descriptors: *Massachusetts, *Wetlands, *Legislation, *Classification, *Adoption of practices, Administration, Bogs, Marshes, Freshwater marshes, Swamps, Aquatic environment, Freshwater, Wildlife conservation, Surface waters, Legal aspects, Water law, United States, Northeast U.S.

Massachusetts' failure to adopt statutory or regulatory definitions of a wetland has led to uncertainty among three hundred fifty-one local conservation commissions which administer the Wetlands Protective Act. The lack of a legal definition presents a serious hindrance to effective and reasonable administration of wetland legislation. Wetlands are areas of land where water is so abundant that it constitutes the major factor responsible for the nature of plant growth on the site. Relatively dry wetlands may have mature forests with ferns and springs on the forest floor. The most aquatic wetlands are the deep fresh marshes. One widely used system to classify and name wetlands is used by the United States Fish and Wildlife Service which recognizes twenty wetland classes. In the northeast, fresh meadows, shallow fresh marshes, deep fresh marshes, shrub swamps, wooded swamps, and bogs are the common freshwater classes. (Sperling-Florida)
W75-06161

CHIPPEWA RESERVOIR PROJECT NO 108, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Power Commission, Washington, D.C. Bureau of Power.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-WI-73-1295-F, $8.75 in paper copy, $2.25 in microfiche. August 3, 1973. 300 p, 8 fig, 18 tab.

Descriptors: *Environmental effects, *Reservoir operation, *Hydroelectric project licensing, *Federal government, *Wisconsin, Reservoirs, Administration, Governments, Water management(Applied), Water law, Administrative agencies, Permits, Electric power, Flood control, Hydroelectric power, Recreation, Low-flow augmentation, Federal Power Act, Multiple-purpose projects, Regulation, Legal aspects, Reservoir storage, Multiple-purpose reservoirs.
Identifiers: Environmental Impact Statements, Licenses, National Environmental Policy Act, Dam effects, *Chippewa Reservoir(Wis).

The Northern States Power Company, pursuant to the Federal Power Act, made application to the Commission for renewal of its license to operate the Chippewa Reservoir, Project No. 108, located on the Chippewa River in Wisconsin. Constructed in 1923, the project's primary purpose is to regulate streamflow for downstream hydroelectric power production, but it also provides flood control and recreational benefits, as well as low augmentation downstream. Continued operation of the project should not have any effect upon existing land and wildlife resources or water quality of the project. Dissolved oxygen depletions in isolated areas and the possibility of increased eutrophication due to further recreational development are recognized adverse effects of continued operation. Continuation of the present operation would maintain the productivity of project natural resources in their present state, which are consistent with existing land use patterns of the project. Alternatives considered include stabilization of the reservoir, modified stabilization, and federal takeover. None of the alternatives has any significant environmental benefits not present in the relicensing proposal. (Deckert-Florida)
W75-06167

DREDGING OF LEWIS AND CLARK CONNECTING CHANNEL, CLATSOP COUNTY, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Portland, Oreg.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-OR-73-1422-F, $5.25 in paper copy, $2.25 in microfiche. August 29, 1973. 110 p, 8 fig, 2 tab.

Descriptors: *Oregon, *Environmental effects, *Channel improvement, *Dredging, *Transportation, Ports, Rivers and Harbors Act, Harbors, Excavation, Federal government, Siltation, Aquatic environment, Turbidity, Spoil banks, Navigation, Benthos, Bottom sediments, Rivers, Economic impact, Columbia River, Channel flow, Maintenance, Wildlife conservation, Animal populations, Saline water intrusion, Saline water, Rivers, Conservation, Saline water-freshwater interfaces, Administration.
Identifiers: *Environmental Impact Statements, *Astoria(Ore), *National Environmental Policy Act, *Navigation obstructions.

The proposed action authorized under the Rivers and Harbors Act of 1965 consists of dredging a navigational channel in the lower 4.5 miles of the Lewis and Clark River in Oregon to connect with an existing channel at the mouth of the Columbia River, dredged material to be placed on three diked areas beside the river. The channel is needed for access to the nearby port of Astoria and to the Crown Zellerbach Corporation log mill. Environmental impacts include improved navigation on the lower river, disturbance of fifty-seven subaqueous acreas, temporary turbidity, and deposition of dredged material raising ground level. Adverse effects include disturbance of aquatic and upland environment, changes in species distribution associated with upstream intrusion of salt water, and the effects of periodic maintenance. Alternatives besides no action consist of finding other modes of transportation and different locations for spoilage disposal. These were eliminated because of expense and adverse environmental effects. Permanent and perhaps undesirable changes in aquatic species are likely to result from this project. Comments were received from numerous federal, state and local agencies and citizen groups. (Dillingham-Florida)
W75-06169

OPERATION AND MAINTENANCE PROGRAM, WISTER LAKE, POTEAU RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-OK-73-1750-F, $4.75 in paper copy, $2.25 in microfiche. November 5, 1973. 82 p, 1 map.

Descriptors: *Environmental effects, *Oklahoma, *Federal government, *Reservoir operation, *Multiple-purpose reservoirs, Administrative agencies, Conservation, Multiple-purpose projects, Dams, Flood control, Flood protection, Impounded waters, Lakes, Recreation, Recreation facilities, Water resources development, Water management(Applied), Regulation, Reservoirs, Water control, Post-impoundment, Water policy, Land management, Water resources, Soil conservation.
Identifiers: *Environmental Impact Statements, Ouachita National Forest(Okla), Dam effects.

This project involves the continuous operation and maintenance activities at Wister Lake, a multiple-purpose reservoir facility located in the Ouachita National Forest in Oklahoma. These activities include flood control and reservoir regulation, maintenance of related structures and facilities, land resources management, and recreational management. The overall impact of this project is that of environmental improvement through the protection and management of available resources in the best interest of the human environment. Adverse effects include soil erosion and compaction due to heavy recreational use, damage to vegetation due to pool flutuation, and alterations of the natural environment through recreational development. Specific impacts and alternatives are dealt with in separate discussions concerning each activity. This project enhances the long-term utilization of the area as a water-oriented recreation area. The flood control operations preserve and stabilize the downstream environment, thereby enhancing development of the flood plain. (Deckert-Florida)
W75-06170

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-KY-73-1393-F, $3.75 in paper copy, $2.25 in microfiche. August 21, 1973. 45 p, 4 map.

Descriptors: *Environmental effects, *Kentucky, *Channeling, *Watershed management, *Governmental interrelations, Channels, Watersheds(Basins), Excess water(Soils), Water management(Applied), Drainage engineering, Drainage systems, Canal construction, Channel improvement, Canals, Ditches, Agricultural watersheds, Flood protection, Flood control, Erosion control, Runoff, Soil water, Federal government, Local governments, Administrative agencies, Multiple-purpose projects.
Identifiers: *Environmental Impact Statements, *Narge Creek(Ky).

This project proposes installation of 4.6 miles of multiple-purpose channel, for flood prevention and agricultural water management, and 1.6 miles of single purpose agricultural water management channel. The project will affect 4,205 acres of predominatly agricultural land located northeast of Madisonville, Kentucky. The area is presently subject to excessive flooding and wet soil conditions. The project is expected to reduce average floodwater damage by 66%, provide 100-year flood protection to 116 acres, and reduce the frequency of flooding and wetness to permit more intensive use of 1400 acres. The primary adverse effects of this project will be the preclusion of agricultural, forest, and terrestial wildlife use on 12 acres and the temporary interruption of such use on an additional 28 acres. Other alternatives considered were floodwater retarding structures, retarding structures in combination with channel modification, and no action. The proposed action was deemed to be most feasible in terms of costs and minimal adverse environmental effects. Thirty acres of woodland wildlife habitat will be lost due to changed land use brought about by the project. There is no significant opposition to this proposal. (Deckert-Florida)
W75-06171

DEEP FORK LOG-JAM, DEEP FORK RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-OK-73-1557-F, $4.25 in paper copy, $2.25 in microfiche. September 28, 1973. 54 p, 1 map.

Descriptors: *Environmental effects, *Oklahoma, *Stream improvement, *Obstruction to flow, *Federal government, Floods, Flood control, Watershed management, Water management(Applied), Erosion control, Channel improvement, Administrative agencies, Flood protection, Bank stability, Channels, Streams, Rivers, Streamflow, Clogging, Bank stabilization, Water resources development, River flow.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, Navigation obstructions.

This project consists of removing a logjam from the Deep Fork of the Canadian River three miles northeast of Okfuskee, Oklahoma. The logjam has been a problem in this area for over 15 years. Its condition is such that the slightest increase in streamflow causes the river to leave its banks resulting in erosion and frequent flooding in the area surrounding the logjam. The project will reestablish drainage of bottomlands used for agriculture, and will reduce flooding, bank caving, and erosion. Clearing and log disposal operations will affect natural vegetation over the six acre project area and will cause a temporary increase in turbidity during the removal period. Realignment of the channel was considered unacceptable as an alternative due to its considerably greater cost and adverse environmental effects. By reducing flooding, the project will enhance the long-term productivity of the adjacent lands. The proposed action will require the commitment of men and materials only, and faces no significant opposition. (Deckert-Florida)
W75-06172

NORFOLK HARBOR, VIRGINIA (MAINTENANCE DREDGING) (FINAL ENVIRONMENT IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-VA-73-1861-F, $3.75 in paper copy, $2.25 in microfiche. November 28, 1973. 47 p, 4 map.

Descriptors: Environmental effects, *Chesapeake Bay, *Dredging, Federal government, *Channel improvement, *Virginia, Bays, Harbors, Rivers and Harbors Act, Estuaries, Sediment control, Shoals, Aquatic environment, Estuarine environment, Administrative agencies, Aquatic habitat, Aquatic life, Benthic flora, Benthic fauna.
Identifiers: *Environmental Impact Statements, Coastal waters, Spoil disposal, Coastal zone management, *Norfolk Harbor(Va).

Norfolk Harbor, Virginia, is part of the larger port of Hampton Roads Complex located at the southern end of Chesapeake Bay. This project involves the maintenance dredging of shoaled areas in three channels of Norfolk Harbor, requiring removal and disposal of 800,000 cubic yards of material. The dredging will restore the channels to authorized depths, and dredge spoil will be placed in the confined Craney Island Disposal Area. While maintaining the carrying capacity of the channel for navigation, this action will remove or disrupt some neritic and benthic organisms and will result in a temporary increase in turbidity near the dredge area. No dredging will take place during the spring and summer months, which are the spawning season for local fish. This will minimize the adverse effects on aquatic organisms. The alternative of no action was rejected due to its adverse effects upon national economic and defense interests. This project will not cause any change in either the short- or long-term productivity of the natural environment. There is no significant opposition to this action. (Deckert-Florida)
W75-06173

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 5G.
W75-06174

BUFFALO RIVER WATERSHED PROJECT, AMHERST COUNTY, VA. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06175

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 5G.
W75-06176

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
For primary bibliographic entry see Field 5G.
W75-06177

MAJOR DRAINAGE PROJECT, RIVERVIEW, VICINITY OF PASCO, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Walla Walla, Wash.
Available from National Technical Information Service, Dept. of Commerce, Springfield, Virginia 22161, as EIS-WA-73-1921-F, $4.25 in paper copy, $2.25 in microfiche. December 12, 1973. 47 p, 8 fig.

Descriptors: Environmental effects, *Excess water(Soils), *Subsurface drainage, *Washington, Federal government, *Piping systems(Mechanical), Water management(Applied), Watersheds(Divides), Drainage systems, Administrative agencies, Urbanization, Subsurface waters, Groundwater, Groundwater movement, Subsurface runoff, Percolation, Suburban areas, Governmental interrelations, Adoption of practices.
Identifiers: *Environmental Impact Statements, *Pasco(Wash).

The proposed action will consist of installation of drainage facilities near the existing levee system adjacent to Lake Wallula. It will include a pumphouse, an underwater collector drain and discharge line, with provision for future lateral drains. It will provide control of rising groundwater to a 70-acre area of agricultural and residential land. The location is an expanding residential area for the City of Pasco, Washington. The system will empty through submerged outlets into Lake Wallula. The project will prevent water damage to structures already in the area and will permit continued suburban development. Manhole access openings, observation wells, and a pumphouse will be visible above ground. Major temporary disturbances will occur during construction. Nine cottonwood trees will be removed, and ponded areas used by waterfowl will be dried up. Major alternatives considered were: no action, adapt the area to public open space, and eliminate the irrigation system which is the source of increased groundwater. Although this project will commit the area to residential development, there is no significant opposition. (Deckert-Florida)
W75-06178

BRICEVILLE FLOOD RELIEF PROJECT, TENNESSEE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Tennessee Valley Authority, Chattanooga.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-TN-73-0934-F, $4.75 in paper copy, $2.25 in microfiche. May 29, 1973. 98 p, 4 fig, 11 tab.

Descriptors: Environmental effects, *Stream improvement, *Tennessee Valley Authority, *Applachian Mountain Region, *Tennessee, Water management(Applied), Watersheds(Divides), Floods, Streams, Federal government, Flash floods, Channel improvement, Watershed management, Flood control, Turbidity, Flood protection, Stream erosion, Stream stabilization, Channeling, Stream flow, Wildlife management, Water resources development.
Identifiers: *Environmental Impact Statements, *Bricewell(Tenn), Lake City(Tenn).

The proposed project consists of 3.9 miles of stream improvement along Coal Creek to reduce the frequency and severity of flooding of developed areas between Bricewell and Lake City, Tennessee. The work primarily involves clearing, deepening, and widening various portions of the stream. The stream bottom and banks are presently littered with domestic rubbish and other manmade trash. Acid drainage from nearby coal mines has been a minor problem at times. Severe flash floods are often produced by summer storms. Adverse effects of the project include interference with aquatic life due to alteration of the habitat and a temporary increase in turbidity during construction. Clearing of trees and brush will result in alteration of 15 acres of low quality wildlife habitat. The following alternatives to the proposed action were considered: levees, dams and reservoirs, relocation of property, floodproofing, various channel improvement measures, and no action. Long-term productivity of the region will be enhanced. This project is supported by all interested groups. (Deckert-Florida)
W75-06180

WSP2-WATER SURFACE PROFILE PROGRAM, USER'S GUIDE,
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 7C.
W75-06186

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06194

THE EFFECTS OF PHYSIOGRAPHY AND CLIMATE ON UNIT HYDROGRAPHS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06196

PREDREDGING ANALYSIS OF LAKE LANSING, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 2H.
W75-06199

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 7C.
W75-06208

ANALYTICAL MODELLING OF SURFACE RUNOFF HYDROGRAPHS FOR MAJOR STREAMS IN NORTHEAST THAILAND,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2A.
W75-06269

WATER RESOURCES DEVELOPMENT IN CENTRAL AMERICA, 1970 TO 1980,
Economic Commission for Latin America (UN), Mexico City.
J. R. Jovel.
Hydrological Sciences Bulletin, Vol 19, No 4, p 401-422, December 1974. 1 fig, 15 tab, 9 ref.

Descriptors: Water resources, *Water resources development, Potable water, Groundwater, Surface waters, Water utilization, Legal aspects, River basins, Water yield, River flow, Economics, Water policy, Atlantic Ocean, Pacific Ocean, Available water, Planning, Hydroelectric power, *Estimating.
Identifiers: *Central America.

The evaluation and development of water resources in Central America was described, including the estimation of surface and groundwater availability and the examination of the legal, institutional, and economic-financial aspects of sectorial water utilization. A description of the sectorial development programs for the period 1971-1980 was given together with the identification of the problems that prevent the optimum development of existing resources. The basic concepts for a policy of water resource development and conservation to be adopted were briefly outlined. River basins that deserved priority by the governments as well as specific studies that needed to be carried out were identified. (Roberts-ISWS)
W75-06270

THE ANALYSIS OF INFLOW INTO SOME EXPERIMENTAL AGRICULTURAL DRAINS,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
B. D. Trafford.
Hydrological Sciences Bulletin, Vol 18, No 4, p 431-440, December 1973. 4 fig, 1 tab, 14 ref.

Descriptors: *Subsurface drains, *Tile drains, *Drainage engineering, *Pipe flow, *Drains, *Inflow, Equipment, Agriculture, Tile drainage, Tiles, Sinks, Europe, Groundwater movement, Seepage, Clay pipes, Drainage practices, Plastic pipes, Percolation, Drainage water, Subsurface drainage, Flow characteristics.
Identifiers: *Clayware drains, *Plastic drains.

Irrigation equipment was used to create strong flows in agricultural drains of clayware and plastic pipes, the latter in both smooth and corrugated conformations. The piezometric heads at 10 m intervals along the drains were analyzed to show that the inflow per unit length varied greatly. Both inflows and outflows were found; some drains had substantial inflows at the origin. For given conditions the flow rates were as much as 17% less than flow rates determined for similar conditions in the laboratory. (Sanderson-ISWS)
W75-06273

THE EFFECT OF PERMEABLE SURROUNDS ON THE PERFORMANCE OF CLAY FIELD DRAINAGE PIPES,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 8B.
W75-06283

THE EFFECT OF THE DEPTH OF AN IMPERMEABLE BARRIER ON WATER-TABLE HEIGHTS IN DRAINDED HOMOGENEOUS SOILS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 2G.
W75-06294

SIMULATION TECHNIQUES FOR WATER PROJECT ANALYSES,
Texas State Office of Information Services, Austin.
For primary bibliographic entry see Field 6A.
W75-06328

ESTABLISHING FOREST ON SURFACE-MINE LAND AS RELATED TO FERTILITY AND FERTILIZATION,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06337

4B. Groundwater Management

IRRIGATION SYSTEM,
For primary bibliographic entry see Field 3F.
W75-05887

A STUDY OF CONVECTIVE-DISPERSION EQUATION BY ISOPARAMETRIC FINITE ELEMENTS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
For primary bibliographic entry see Field 5B.
W75-06015

DEVELOPMENT OF A HYDROLOGIC CONCEPT FOR THE GREATER MOBILE METROPOLITAN-URBAN ENVIRONMENT,
Geological Survey, Univeristy, Ala. Water Resources Div.
J. F. Riccio, J. D. Hardin, G. M. Lamb, L. Scarbrough, and K. P. Hanby.
Available for $2.00 from Geological Survey of Ala., P.O. Drawer O, University, AL. Also, available from the National Technical Information Service, Springfield, Va 22161 as PB-240 850, $7.25 in paper copy, $2.25 in microfiche. Alabama Geological Survey Bulletin 106, 1973. 181 p, 61 fig, 10 plates, 17 tab, 76 ref. OWRT B-038-ALA(2), B-032-ALA(2). 14-31-0001-3553.

Descriptors: Management, *Urban hydrology, Environment, *Water consumption, *Water supply, *Alabama, *Cities, Water quality, Flooding, Hydrologic aspects, *Groundwater, Surface water, Flood plains, Water management(Applied), Potable water.
Identifiers: Hurricane-tide floods, Flood plain management, *Mobile(Ala).

The hydrologic environment of Baldwin, Escambia, and Mobile Counties governs practically all the natural streamflow characteristics of those streams that originate within the area. The average annual precipitation for the area is 63.17 inches; average annual runoff is 18 to 28 inches; and average annual evapotranspiration about 60 percent of the average yearly rainfall. Hydrologic characteristics of the different watersheds are evaluated on the basis of flow-duration data. The expectancy of low flows for many of the area streams may be determined from frequency data based on streamflow records. Flood expectancy for most streams in the area may be estimated from frequency graphs based on streamflow records. Highest water levels in Mobile Bay are caused by tides associated with tropical hurricanes rather than by floods on the Mobile River. Large quantities of potable ground water are available from geologic units ranging in age from Eocene to Holocene that underlie the area-as much as 1 mgd in Mobile County, 0.5 to more than 1 mgd in Baldwin County, and similarly high yeilds over most of Escambia County. Small to large quantities of ground water are obtainable from sand and gravel units in Pleistocene terrace deposits and Holocene alluvium adjacent to major streams and their tributaries in all three counties. Estimates of future water needs of the city of Mobile indicate that the presently planned municipal water system will probably become incapable of supplying the city's residential water some time between 1986 and 1998. Salt-water encroachment is not a major problem in the area at present.
W75-06072

A SYSTEM FOR GEOLOGIC EVALUATION OF POLLUTION POTENTIAL AT MOUNTAIN DWELLING SITES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 5B.
W75-06075

FINITE ELEMENT SOLUTIONS FOR THE EQUATIONS OF GROUNDWATER FLOW,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2F.
W75-06083

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-06104

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
April, 1974, 60 p. 11 fig, 2 tab.

Descriptors: *Regional development, *Water resources development, *Surface-groundwater relationships, *Environmental effects, *Geologic investigations, *Planning, Long-term planning, Groundwater resources, Aquifers, Soil, Physical properties, Soil investigations, Land use, Urbanization, Karst, Karst hydrology, *Florida.
Identifiers: *Tampa(Fla.), Hillsborough County(Fla.).

A geologic, hydrologic, and soil study of Hillsborough County, Florida, establishes guidelines for development based on natural carrying capacities. Since 1950 Hillsborough County, which includes metropolitan Tampa, has more than doubled in population to exceed half a million. Environmentally sensitive areas to be protected from urbanization include the interrelated wetlands: inland swamps, riverine systems, and the estuarine environment. Annual rainfall on this low flat area averages 51 inches, with 60% coming between June and September, causing periodic flooding of three major and many minor rivers. Pressure to develop a flood plains should be resisted to avoid flood damage. The underlying limestone aquifer strata have developed a Karst topography with many sinkholes, caves, and surface springs above dissolved cavities. Ample groundwater supplies are being depleted and are in danger of contamination from septic tank and other contaminants which flow down to the underlying aquifer. Natural recharge of the aquifer is aided substantially by the cypress sloughs which hold flood water and are connected in a slow drainage pattern. These should be retained, as well as the coastal salt marshes and mangrove stands which help protect the coast from tidal flooding. Maps show areas suitable for development and areas which should be maintained as greenbelt. (Herr-North Carolina)
W75-06105

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06138

ANALYSIS OF UNSTEADY FLOW TOWARD AN ARTESIAN WELL BY THREE-DIMENSIONAL FINITE ELEMENTS,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06140

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
For primary bibliographic entry see Field 5B.
W75-06164

GEOTHERMAL LEASING PROGRAM, VOLUME 1, PROMULGATION OF LEASING AND OPERATING REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-CA-73-1681-F-1, $13.60 in paper copy, $2.25 in microfiche. October 24, 1973. 519 p, 105 fig, 52 tab.

Descriptors: *Geothermal studies, *Wells, *Electric power, Drilling, Steam, Electric power demand, Watershed management, Byproducts, *California, Recreation, Terrain analysis, Grazing, Forestry, Waste water disposal, Fish, Wildlife, Wastes, Subsidence, Access routes, Waste disposal.
Identifiers: *Environmental Impact Statements, *Clear Lake-Geysers, Mono Lake-Long Valley and Imperial Valley(Cal), Environmental Protection Agency.

The project involves implementation of the Geothermal Steam Act of 1970, which privides for development of federally owned geothermal resources. Included in the proposed action are promulgation of leasing and operating regulations pursuant to which the program is to be administered and the leasing of federally-owned geothermal resources for development at Clear Lake-Geysers, Mono Lake-Long Valley, and Imperial Valley in California. The lands under consideration for geothermal leasing are presently subject to use for grazing, forestry, mining, fish and wildlife habitat, recreation and watersheds. The development of geothermal resources entails construction of access roads and well sites, drilling and testing of wells, conveyance of steam over short distances to electric power plants and by-product processing plants, construction and operation of electric power plants, by-product facilities, electrical transmission lines, and facilities for disposing of waste liquids. The project would result in the preemption or restriction of the present uses of the land and modification of the terrain. Additionally, noise and noxious gas emissions may pose problems during testing and production. Other possible adverse effects include land subsidence due to production of fluids and increased seismicity due to production and reinjection of fluid wastes into producing zones. Alternatives considered include utilization of other sources for electrical energy and alternative exploration and leasing programs. (Gagliardi-Florida)
W75-06166

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 7C.
W75-06208

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 261, $5.75 in paper copy, $2.25 in microfiche. February 1974. 129 p, 2 tab, 11 ref, 3 append.

Descriptors: *Groundwater, *Groundwater availability, *Groundwater resources, *Subsurface waters, Aquifers, Aquifer characteristics, Glacial aquifers, Water table, Specific capacity, Wells, Chemical analysis, Michigan, Water quality, Basic data collections, Well data.

Subsurface water data for the Upper Michigan Region were compiled and synthesized into drawings, tables, and text dealing with the subsurface water hydrology of the study area. Tabulations of selected well records, well yield data, and water quality data were presented. The amount of water that can be extracted by wells within the study area varies greatly. Moderate yields (a few tens of gallons per minute) are generally available from wells penetrating the Paleozoic sandstones and limestones at the southeast and northwest margins of the study area. Older Precambrian rocks underlying the central portion of the area yield very small amounts of water to wells. Glacial outwash sands and gravels along the major streams may yield several hundred gallons per minute. In contrast, a few gallons per minute for domestic supply is difficult to obtain where the glacial materials are thin and/or clayey. The quality of the groundwater throughout the area is generally good. The only minor problems frequently encountered are hardness and excessive iron concentrations, both of which can usually be alleviated by standard water treatment methods. (Gibb-ISWS)
W75-06236

STUDY TO DEFINE POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS IN LIMESTONE AQUIFERS,
Alabama Univ., Huntsville. Center for Environmental Studies.
For primary bibliographic entry see Field 5B.
W75-06251

DEVELOPMENT OF FRESH GROUND WATER NEAR SALT WATER IN WEST VIRGINIA,
Environmental Protection Agency, Wheeling, W. Va.
B. M. Wilmoth.
Ground Water, Vol 13, No 1, p 25-32, January-February 1975. 2 fig, 1 tab, 7 ref.

Descriptors: *Water supply, *Groundwater resources, *Aquifers, *Chlorides, *Encroachment, Fractures(Geologic), Permeability, Bedrock, Sandstones, Carbonate rocks, Alluvium, Connate water, Dissolved solids, Pollutants, Water wells, Waste disposal wells, *West Virginia.
Identifiers: Well yields, Waste brine injection, Connate brines, Pennsylvanian aquifers.

Salt-water migration into relatively shallow rocks in the western half of West Virginia is already rather far advanced. Because of the wide distribution of salty groundwater and connate brine at various depths, it is difficult to determine how much of the contamination is natural and how much is the result of subsurface industrial activities. Although some local salt-water problems are the result of oil and gas operations, much of the regional near-surface salt water is a natural condition unrelated to deep drilling or other industrial activities. Groundwater is usually more abundant from consolidated aquifers beneath the valleys than from beneath the ridges. However, the presence of shallow salt water beneath the valleys imposes limitations on the availability of fresh water from a single well. Because most well fields must be located along the populated valleys, the problem of interception of salt water is the most important factor limiting development of consolidated bedrock aquifers. By utilizing the history of development and operation of well fields, an estimate of the availability of fresh water can be made, and test drilling and new well field construction guided accordingly. (Schicht-ISWS)
W75-06258

BACTERIOLOGICAL CRITERIA FOR GROUND-WATER QUALITY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-06259

WATER RESOURCES DEVELOPMENT IN CENTRAL AMERICA, 1970 TO 1980,
Economic Commission for Latin America (UN), Mexico City.
For primary bibliographic entry see Field 4A.
W75-06270

THE PERMEABILITY AND STORAGE OF AN UNCONFINED CHALK AQUIFER,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 2F.
W75-06274

VERTICAL PERMEABILITY FROM LIMITED ENTRY FLOW TESTS IN THICK FORMATIONS,
Amoco Production Co., Tulsa, Okla.
R. Raghavan, and K. K. Clark.
Society of Petroleum Engineers Journal, Vol 15, No 1, p 65-73, February 1975. 7 fig, 2 tab, 23 ref.

Descriptors: *Permeability, *Penetration, *Aquifer testing, *Graphical analysis, *Anisotropy, Equations, Aquifers, Drawdown, Oil reservoirs, Pressure, Artesian aquifers, Flow, Transition flow, Porous media, Mathematical models.
Identifiers: *Vertical permeability, Spherical source, Dimensionless variables, Skin effect, Radial flow, Wellbore radius.

The applicability of spherical flow equations to a well open to a limited section of a thick anisotropic formation was examined. An examination of the dimensionless pressure-dimensionless time graph can provide useful information regarding the effect of the producing time and shut-in times required to apply the spherical flow equations. Once the proper straight line has been identified and permeability values calculated, time checks should verify the results. For a given location and size opening, the validity of spherical flow assumptions is a function of the anisotropy and flowing (or shut-in) time. Vertical permeability may be obtained from the slope of the pressure drawdown and/or buildup graphs if the horizontal permeability is known. This calculation is unaffected by the magnitude of the van Everdingen and Hurst skin effect. Horizontal permeability may be obtained if the skin effect is negligible or can be independently determined. The spherical wellbore radius approximation suggested by Rodriguez-Nieto and Carter is superior to that suggested by Culham. (Visocky-ISWS)
W75-06282

ON THE HYDROLOGY OF THE EDWARDS LIMESTONE, SOUTH CENTRAL TEXAS,
California State Univ., San Diego. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W75-06287

SIMULTANEOUS PUMPING OF FRESH AND SALT WATER FROM A COASTAL AQUIFER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Vandenberg.
Journal of Hydrology, Vol 24, No 1/2, p 37-43, January 1975. 4 fig, 1 tab, 2 ref.

Descriptors: *Saline water intrusion, *Mathematical models, *Water wells, Potentiometric level, Aquifers, Transmissivity, Pumping, Drawdown.
Identifiers: *Salt-water wells.

When fresh water is pumped from an aquifer which is open to a recharging salt-water body, care must be taken to avoid the encroachment of salt water into the well. A measure which sometimes may be taken when there is also a demand for filtered salt water is to supplement the fresh-water well by a salt-water well, located between the freshwater well and the coast, and to pump both wells at comparable rates. The idealized case was analyzed where the aquifer is confined, thin, homogeneous and isotropic, semi-infinite in areal extent, and bounded on one side by a straight recharge boundary; it was furthermore assumed that the nonpumping piezometric surface of the aquifer has a steady, uniform slope towards the boundary. As a result of the analysis, a relation was established between the distances from each of the wells to the boundary, the ratio between the pumping rates of the two wells, and the maximum pumping rate at which no salt water is induced into the fresh-water well; this relation can be used in the selection of the optimum location of the pair of wells. (Schicht-ISWS)
W75-06296

4C. Effects On Water Of Man's Non-Water Activities

PROCEEDINGS OF THE JOINT FAO/U.S.S.R. INTERNATIONAL SYMPOSIUM IN FOREST INFLUENCES AND WATERSHED MANAGEMENT, MOSCOW, U.S.S.R. 17 AUGUST-6 SEPTEMBER 1970.
For primary bibliographic entry see Field 4D.
W75-05912

FOREST AND METEOROLOGICAL INFLUENCES ON SNOW AND SNOWMELT WATER AND THEIR MANAGEMENT,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05913

MAN-CAUSED FLUCTUATIONS IN QUALITY OF WATER FROM FORESTED WATERSHEDS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05914

FOREST DRAINAGE IN NORTH CENTRAL UNITED STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05918

REGIMES OF STREAMFLOW AND THEIR MODIFICATION BY LOGGING,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
J. Rothacher.
In: Proceedings of a Symposium Forest Land Uses and Stream Environment, October 19-21, 1970, Oregon State University, Corvallis, p 40-54, August 1971. 9 fig, 14 ref. PNW-1602.

Descriptors: *Streamflow, *Evapotranspiration, *Precipitation(Atmospheric), *Lumbering, Burning, Demonstration watersheds, High flow, Peak discharge, Low flows.

Streamflow in the Pacific Northwest is most strongly influenced by the precipitation pattern, somewhat less by evapotranspiration losses. Evaporation and transpiration are strongly influenced by logging. Logging and burning old-growth Douglas-fir forests on an experimental watershed increased annual yields of streamwater by 18 inches or more. Most of the increase occurred in fall and winter months. Logging which removed transpiring vegetation increases lowest summer streamflow. Such increases may be short lived as vegetation rapidly invades the cutover areas. (Forest Service)
W75-05925

COMPARATIVE WATER QUALITY - NATURAL AND DISTURBED STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05927

THE FUTURE ROLE OF CHEMICALS IN FORESTRY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant, H. J. Gratkowski, and W. E. Waters.
General Technical Report PNW-6, May 1973. 10 p, 19 ref. Paper presented before Comm. I, 'The Silviculturists,' at the Seventh World Forestry Congress, Buenos Aires, Argentina, October 4-18, 1972. PNW-1602.

Descriptors: *Forest management, *Pesticides, *Agricultural chemicals, Pesticide residues, Ecology.

The more selective, less persistent chemicals will continue to play an important role in forest resource management, probably for several decades, while man readjusts his numbers and modes of life to the rapidly dwindling resources of the earth. However, chemical use must eventually be minimized, for it is simply a system of treating symptoms of unhealthy ecological conditions created by nature or man in the past. (Forest Service)
W75-05935

PIPELINES IN FORESTED WETLANDS: CROSS DRAINAGE NEEDED TO PREVENT TIMBER DAMAGE,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
D. H. Boelter, and G. E. Close.
Journal of Forestry, Vol 72, No 9, p 561-563, September 1974. 8 fig, 10 ref.

Descriptors: *Pipelines, *Wetlands, *Organic soils, *Water levels, *Ditches, Excess water, Flooding, Flood damage, Great Lakes Region, *Minnesota, Forests, *Drainage.
Identifiers: Wetland forests, Peatland, Timber damage, Wetland hydrology, Cross drainage, Chippewa National Forest(Minn).

Large natural gas and petroleum pipelines that cross forested wetlands block normal water flow, raising the water table on the upslope side, which significantly reduces growth or even kills the trees. Such damage has been prevented on the Chippewa National Forest in north-central Minnesota by excavating ditches during construction to provide the necessary cross drainage. (Forest Service)
W75-05939

HISTORY OF WATER SUPPLY OF THE MOBILE AREA, ALABAMA,
Geological Survey, University, Ala. Water Resources Div.
For primary bibliographic entry see Field 3D.
W75-06071

DEVELOPMENT OF A HYDROLOGIC CONCEPT FOR THE GREATER MOBILE METROPOLITAN-URBAN ENVIRONMENT,
Geological Survey, Univeristy, Ala. Water Resources Div.
For primary bibliographic entry see Field 4B.
W75-06072

NAMED INDIVIDUAL MEMBERS OF THE SAN ANTONIO CONSERVATION SOCIETY, ET AL. V. THE TEXAS HIGHWAY DEPARTMENT (ACTION TO ENJOIN HIGHWAY CONSTRUCTION THROUGH PROTECTED LAND).
For primary bibliographic entry see Field 6E.
W75-06150

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
For primary bibliographic entry see Field 8A.
W75-06168

DEEP FORK LOG-JAM, DEEP FORK RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06172

HERBICIDES AND WATER QUALITY IN AMERICAN FORESTRY,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5B.
W75-06333

CHEMICAL CHANGES IN STREAMFLOW FOLLOWING SURFACE MINING IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5B.
W75-06334

QUANTITY AND QUALITY OF STREAMFLOW AFTER UREA FERTILIZATION ON A FORESTED WATERSHED: FIRST-YEAR RESULTS,
No Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-06338

4D. Watershed Protection

METHODOLOGY FOR IN-STREAM REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05851

PROCEEDINGS OF THE JOINT FAO/U.S.S.R. INTERNATIONAL SYMPOSIUM IN FOREST INFLUENCES AND WATERSHED MANAGEMENT, MOSCOW, U.S.S.R. 17 AUGUST-6 SEPTEMBER 1970.
Food and Agricultural Organization, United Nations (Rome), 1972. 452 p.

Descriptors: *Watershed management, *Precipitation(Atmospheric), *Streamflow,

*Research facilities, *Evapotranspiration, *Water budget, *Soil water, *Hydrologic cycle, *Forests, Water quality, Wetlands, Erosion control, Flood control, Snow management, Forest management, Planning, Energy budget, Micrometeorology, Mesoclimate, Education.
Identifiers: *Forest influences, *Forest microclimate.

Objectives of the Symposium were to provide the opportunity for scientists of USSR, representative scientists of western nations, and fellows from developing nations engaged in forest hydrology research to meet, determine the state of knowledge, and to set the stage for future research. Two primary aims were to provide developing countries with current information on forest influences and methods of watershed management and to provide a forum for exchange of information among scientists engaged in forest hydrology research. Twenty-one fellows representing 16 developing countries attended the meeting and participated in the discussions. Scientific papers were presented by 28 scientists from USSR, United States, United Kingdom, the Federal Republic of Germany, Switzerland, and Japan. Papers and discussions are included in the proceedings. Forest resource and watershed management problems of the developing countries are described. The technical papers were organized under 11 major subjects--precipitation, vaporization, soil water, hydrologic processes, practical management implications, water and air quality, wet land management, erosion and flood control, multiple-use management, management planning, and organization of education and research. Research and research facilities underway at 8 western USSR laboratories are described, including the principal hydrologic laboratory at Valdai. An appendix includes a discussion of the organization of forest management and utilization of forest effects on environment in the USSR. (See W75-05913 thru W75-05915) (Anderson-Forest Service)
W75-05912

FOREST AND METEOROLOGICAL INFLUENCES ON SNOW AND SNOWMELT WATER AND THEIR MANAGEMENT,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of the Joint FAO/USSR International Symposium on Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970, Food and Agricultural Organization, United Nations, (Rome). p 41-54, 1972. 2 fig, 113 ref.

Descriptors: *Snow cover, *Snowmelt, *Snow management, *Evapotranspiration, *Mountain forests, Brush, Floods, *Lumbering, *Watershed management, Winds, Windbreaks, Regression.
Identifiers: Forest patterns, Forest canopy.

In many forest and mountain zones, snowmelt is an important source of water supply, of damaging flood water, or both. Hence, forest management may need to be guided by knowledge of the hydrologic processes of snow accumulation, snowmelt, and retention and delivery of snowmelt water. Research has shown that the harvest of forests in snow zones can influence the amount and timing of water yield, flood frequencies, and sedimentation. Similarly, the conversion of shrub-dominated land to forest can increase water yield while the conversion takes place, and eventually permanently affect snowmelt rates. Control of snow in mountain areas by mechanical fences or by planting of tree screens can benefit snow accumulation and result in prolonged water yield. Quantitative effects are reported for a few specific techniques in specific areas, concentrating on forest and meteorological aspects of snow. Additional references mostly U.S. papers, are given including summary reports, and specific references to studies of snow accumulation and melt, snowpack characteristics, snow evaporation, snow melt-water delivery and prediction, snow damages, and snow surveying, sampling and measurement. Some topics not summarized in any detail were--snow sampling and measurement, snow avalanche control, mechanical control of snowmelting, permanent snow fields, and glaciers, but some references to these topics have been included. (See also W75-05912) (Forest Service)
W75-05913

MODERN TECHNIQUES IN PLANNING THE MANAGEMENT OF WILDLAND RESOURCES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W75-05915

SEDIMENT DEPOSITION IN RESERVOIRS ASSOCIATED WITH RURAL ROADS, FOREST FIRES, AND CATCHMENT ATTRIBUTES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05916

PLANTING GRASS AND PINE FOR EROSION CONTROL,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
P. D. Duffy.
Tree Planters' Notes, Vol 25, No 1, p 10-13, February 1974. 2 fig, 2 tab, 3 ref.

Descriptors: *Erosion control, *Vegetation establishment, *Fertilization, Slope stabilization, *Loblolly pine trees, Control, Reforestation, Coastal Plain, *Mississippi, Competition.
Identifiers: *Lovegrass, *Fingergrass.

Establishing a closed pine stand is one of the surest ways to reduce erosion from bare, forestland sites, but since pines may require up to 10 years to produce sufficient litter to fully protect a site, interim protection is often desirable. Planting a fast growing grass with pine is one practical method if the two can be made compatible. On sandy soils in northern Mississippi, fast growing weeping lovegrass (Eragrostis curvula), fully fertilized shortly after planting, overwhelmed loblolly pine (Pinus taeda L.) and reduced first-year survival to 33 percent. Applying two-thirds of the fertilization in late July slowed grass growth and allowed adequate pine survival (73%) to eventually control erosion. Area covered by grass at the end of the first growing season was not significantly reduced by the delayed application. On loam soil, lovegrass reduced pine survival to 58 percent when fully fertilized at planting, but delayed fertilization still improved survival. Slower growing fingergrass (Digitaria eriantha) also allowed adequate survival, but provided less protection than lovegrass. Results demonstrate combined plantings are feasible for rapid and long-term site protection if competition between species is controlled. (Forest Service)
W75-05917

FOREST DRAINAGE IN NORTH CENTRAL UNITED STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
D. H. Boelter.
In: Proceedings of the International Symposium on Forest Drainage, September 2-6, 1974; Jyvaskyla and Oulu, Finland; p 201-206, (1974). 13 ref.

Descriptors: *Central US, *Wetlands, *Drainage, *Forest management, *Organic soils, *Excess water(Soils), Soil water, Reforestation, Silviculture, Watershed management, Saturated soils, Water table, Great Lakes Region, Physical properties, Minnesota, Wisconsin, Michigan.
Identifiers: Wetland forests, Peatlands, Forest drainage, Water level control.

Forest improvement on peatland forests in the north central United States is largely limited to regeneration of forests following the harvesting of mature stands. Drainage and fertilization, practices common in northern Europe, have not been used extensively because the available upland timber sites have provided ample timber so far. However, as demand for wood products and the use of more upland areas for wilderness and recreation increase, more intensive management will likely be considered for peatland areas. (Forest Service)
W75-05918

TRANSITION IN RESEARCH ON SMALL FORESTED WATERSHEDS IN WEST VIRGINIA,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2A.
W75-05919

THE EFFECT OF HERBACEOUS VEGETATION ON SURVIVAL AND GROWTH OF TREES PLANTED ON COAL-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. G. Vogel.
In: Research and Applied Technology Symposium on Mined-Land Reclamation. March 7-8, 1973, Bituminous Coal Research, Inc., Monroeville, Pennsylvania, p 197-207, (1973). 5 tab, 8 ref.

Descriptors: *Soil stability, *Strip mines, *Appalachian Mountain region, Trees, Plant growth, *Erosion control.

To obtain quick cover and strip-mine spoil stabilization, it is desirable to establish herbaceous and woody species in combination. However, herbaceous vegetation competes with tree species for light, moisture and nutrients. After three growing seasons, the herbaceous vegetation did not significantly affect the survival of trees but greatly suppressed their growth. By the fifth growing season, tree growth was suppressed by grass alone and was greatest in plots dominated by legumes. It appears competition from herbaceous vegetation can be lessened by encouraging legumes and avoiding strongly competitive grasses. (Forest Service)
W75-05920

CHANGED SPOIL DUMP SHAPE INCREASES STABILITY ON CONTOUR STRIP MINES,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5G.
W75-05921

RELATIVE CONTRIBUTION OF SEDIMENT FROM SOURCE AREAS AND TRANSPORT PROCESSES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05926

ROLE OF BEDROCK IN WATERSHED MANAGEMENT,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
W. F. Megahan.
In: Proceedings of the Irrigation and Drainage Division Specialty Conference, Fort Collins, Colorado, April 22-24, 1973, American Society of Civil Engineers, New York, p 449-470, (1973). 1 fig, 2 tab, 38 ref.

Descriptors: Bedrock, *Watershed management, Hydrology, *Hydraulic conductivity, *Porosity,

*Storage, Geology, Water yield, Flow hydrographs, Erosion, Landslides, Subsurface flow, Water quality, Base flow, Streamflow.
Identifiers: *Bedrock weathering, *Bedrock fracturing.

In recent years, watershed managers have begun to include depth to bedrock as an additional watershed parameter to be considered when evaluating effects of watershed management practices. However, the properties of the bedrock itself have been neglected for the most part. Evidence is presented to illustrate that basic bedrock properties including bedding, fracturing, weathering, and chemical composition are important characteristics that help regulate hydrologic performance. Thus bedrock may govern the kind and degree of watershed responses to land management practices. Effects of management practices on streamflow and erosion are considered at two levels--at the broad planning level and on specific project areas. (Forest Service)
W75-05932

IN-CHANNEL SEDIMENTATION BASINS--A POSSIBLE TOOL FOR TROUT HABITAT MANAGEMENT,
Forest Service (USDA), St. Paul, Minn., North Central Forest Experiment Station.
For primary bibliographic entry see Field 8I.
W75-05937

DIFFICULT ERODED PLANTING SITES IN NORTH MISSISSIPPI EVALUATED BY DISCRIMINANT ANALYSIS,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
P. D. Duffy, and D. C. McClurkin.
Soil Science Society of America Proceedings, Vol 38, No 4, p 676-678. July-August 1974. 1 fig, 2 tab, 11 ref.

Descriptors: *Vegetation establishment, *Soil density, *Soil physical properties, *Statistical methods, Erosion control, Loblolly pine, Soil chemical properties, Slope protection, Road banks, Reforestation, *Mississippi, Gulf coastal plain, *Bulk density.

A discriminant analysis of physical and chemical characteristics of the upper 23 cm of the soil was computed for 24 sites where bar-planted loblolly pines (Pinus taeda L.) had failed and at 15 successful plantations near the fail sites. Screening of 17 soil properties indicated that bulk density is the best predictive variable. A function based only on bulk density correctly classified 74% of the sites as fail or success, regardless of microrelief. On sites where bulk density equaled or exceeded 1.45 g/cu cm, plantings were predicted to fail. Information on a site's proximity to the rim or bottom of a deep gully improved accuracy of classification. Since other soil properties differed relatively little between success and fail sites, results suggest that high bulk density substantially contributed to pine mortality, either through physical impedance of root growth or poor aeration or by interference with proper planting. Bulk density measurements can determine the need for site preparation or alternate planting methods to help ensure success. Discriminant analysis appears to be a useful means for separating areas into two or more groups to aid land use or treatment decisions. (Forest Service)
W75-05938

RECENT RESEARCH IN RUNOFF ESTIMATES FROM SAMLL RURAL WATERSHEDS,
Federal Highway Administration, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-05980

FLOOD CONTROL IN THE PLAIN RIVERS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
J. A. Maza Alvarez, and M. A. F. Lira.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 303-314. (1973) 2 fig.

Descriptors: *Flood control, *Dredging, *Flood protection, *Mexico, Desilting, Channel improvement, Cutoffs, Diversion, Levees, Dikes, Sediment control.
Identifiers: Schoonmaker dredge, Panuco River, Tampaon River.

One of the procedures proposed to protect some river side zones of the Panuco and Tampaon Rivers was described. This method consists of augmenting the hydraulic capacity of the main river channel by cutting through meanders and by installing dredging stations immediately on the downstream side of each cut meander to impede the transport of a greater quantity of the solid material to the lower river sections where it would be deposited. The control of silting can be done by conventional methods if the river is navigable. However, if the river is not navigable, the solid material can be withdrawn from the bottom with a stationary dredge of the Schoonmaker type. Its employment was recommended only for river beds with sandy bottoms. The performance of the Schoonmaker dredge, which is economically operated and self sand cleansing, was described. (See also W75-05973) (Humphreys-ISWS)
W75-05996

HIGHLIGHTS OF FLOOD PROTECTION WORKS DONE ON RIVER NARMADA AT HOSHANGABAD IN MADHYA PRADESH STATE - INDIA,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
D. R. Sikka.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 329-339. (1973) 2 fig.

Descriptors: *Flood protection, *Bank stabilization, *Hydraulic structures, Bank protection, Aprons, Boulders, Erosion control, River training, Riprap, Rivers, Slope protection.
Identifiers: India(Narmada River), Ghats.

The channel control and stabilization method adopted for the left bank of the Narmada River (India) for protection of Hoshangabad Town was described. A flexible boulder apron was provided along the river bank slope, the toe of slopes, and the river bed. This flood protection scheme also included heavy stone stepped ghats at the top of the river bank. This type of protection works was economical and readily adaptable to construction techniques based on manual and semimechanical operations. Construction was completed in 1961 and was subjected to maximum flooding. The protection works stood well without any displacement or damage. (See also W75-05973) (Humphreys-ISWS)
W75-05998

SEDIMENT DISCHARGE CONTROL BY MEANS OF SETTLING BASINS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Y. A. Ibad-Zade, and C. G. Nuriev.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 491-498. (1973). 3 fig, 2 ref.

Descriptors: *Sediment control, *Settling basins, *Sediment discharge, Desilting, Rivers, Design, Settling velocity, Suspended load, Turbidity, Sedimentation rates, Deposition(Sediments), Irrigation canals.
Identifiers: *USSR.

The Caucasian and Central Asiatic Rivers carry large sediment loads which must be controlled to reduce deposition in irrigation canals. Horizontal-type sedimentation basins are widely used to reduce the amount of sediments entering the canals. Over a number of years, theoretical and experimental studies were performed for estimation of regularities of sediment load transport and sedimentation in basins in order to develop effective measures of their removal. The results of research allowed some regularities of sedimentation in basin length to be obtained, its dimensions to be estimated, and a calculation method for sediment removal to be recommended. The regularities obtained were confirmed by field data on prototype sedimentation basins. (See also W75-05973) (Humphreys-ISWS)
W75-06012

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
J. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 499-510, (1973). 3 fig, 1 tab, 4 ref.

Descriptors: *Flood control, *Sediment control, *Alluvial channels, Channel improvement, Running waters, Scour, Stream erosion, Levees, Flood protection, River regulation, Regime, Equations, Design, Cutoffs, Rivers.
Identifiers: *River mechanics.

Flood control measures discussed for increasing the capacity of existing channels were streamflow regulation, levees, river training, river bottom deepening, and bank protection. Theoretical and experimental results were presented which related water discharge and soil conditions for dynamically stable channels, designing bottom deepening cuts to prevent silt deposition, designing levees, and designing cutoffs for river training. (See also W75-05973) (Humphreys-ISWS)
W75-06013

EVALUATION OF AGRICULTURAL POLICY ALTERNATIVES TO CONTROL SEDIMENTATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
W. D. Seitz, G. F. Spitze, and M. B. Sands.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 830, $5.25 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 99, February 1975. 111 p, 28 tab, 10 fig, 57 ref. OWRT A-061-ILL(1). 14-31-0001-4013.

Descriptors: *Alternative costs, *Alternative water use, *Water policy, *Soil conservation, *Linear programming, Watersheds(Basins), *Cultivation, *Rotations, Erosion control, *Sediment control.
Identifiers: *Agricultural policy, Conservation tillage.

Alternative policies for reducing the level of erosion and sedimentation are evaluated with a linear programming analysis of farms in a selected watershed. Three conservation practices and three tillage practices are considered in combination with six crop rotations on approximations of nine

actual farms located in representative sections of the watershed. The impact of these practices on crop production costs and yields is considered, as is the impact on the off-site damages to the drainage system and the reservoir. Policies considered included subsidization of the cost of adopting conservation practices and subsidies to induce removing land from production, several forms of regulations and an effluent tax. Where appropriate the policies were analyzed assuming implementation at both the watershed and the farm level. This analysis indicates that soil conservation practices should be increased substantially in order to reduce the gross soil loss in the watershed from over 20 to approximately 6 tons per acre per year. This reduction is most effeciently accomplished by modifying conservation practices, tillage practices, and crop rotations. An important finding is the indication that several alternative policies can be applied at either the watershed or the farm level and without regard to the farms' proximity to the reservoir, with very little difference in results.
W75-06079

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 4A.
W75-06161

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
For primary bibliographic entry see Field 4A.
W75-06171

BRICEVILLE FLOOD RELIEF PROJECT, TENNESSEE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W75-06180

CITY OF FLORENCE, SOUTH CAROLINA EXTENSION OF WATER AND SEWER SERVICE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Economic Development Administration, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06181

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
Available from National Technical Information Service, U.S. Department of Commerce, Springfield, Va 22161, as EIS-OH-73-0963-F, $5.75 in paper copy, $2.25 in microfiche. June 1973. 140 p, 9 fig, 1 tab.

Descriptors: Environmental effects, *Ohio, *Wild River Act, *Environmental control, *Governmental interrelations, Rivers streams, Ecology, Environment, Legislation, Tributaries, Legal aspects, River systems, Water quality control, Non-structural alternatives, Federal government, Water pollution control, State governments, Water resources development, Comprehensive planning, Conservation, Water law, Water policy, Administrative agencies, River regulation, Water conservation, Wildlife conservation.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, Wilderness areas, State policy, *Little Miami River(Ohio).

This proposal calls for the inclusion of a 64 mile segment of the Little Miami River and a 2 mile segment of a tributary, Caesars Creek, in the national wild and scenic rivers system to be administered by the State of Ohio. Such inclusion would be contingent upon application by the state, which would include a development plan and a commitment by the state to protect the river in perpetuity. This action would have the overall beneficial effect of assisting in the preservation and improvement of the quality of the river and adjoining lands. The adverse effect would be that certain commercial and residential uses of the area which might otherwise occur would be precluded. Other alternatives considered were no action and inclusion of a larger segment of the river. The 64 mile segment was selected because it was the only portion of the river which met the minimum criteria for inclusion in the national system. This proposal would entail no irretrievable commitment of resources and faces no significant opposition. (Deckert-Florida)
W75-06182

WATERSHED BEHAVIOR UNDER CONTROLLED SIMULATED RAINFALL,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 2A.
W75-06192

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06194

THE EFFECTS OF PHYSIOGRAPHY AND CLIMATE ON UNIT HYDROGRAPHS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06196

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06201

BED MATERIAL SIZE CHANGES AND SEDIMENT TRANSPORT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2J.
W75-06281

A COMPACT WATERSHED MODEL SYSTEM,
Aston Univ., Birmingham (England).
For primary bibliographic entry see Field 2A.
W75-06286

THE WATER BALANCE OF AN EXCEPTIONALLY WET CATCHMENT AREA IN WEST AFRICA,
Edinburgh Univ. (Scotland). Dept. of Forestry and Natural Resources.
For primary bibliographic entry see Field 2A.
W75-06292

CHEMICAL SOIL STABILIZERS FOR SURFACE MINE RECLAMATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. T. Plass.
In: Highway Research Board Special Report 135, Soil Erosion: Clauses and Mechanisms; Prevention and Control, p 118-122. Proceedings of Conference Workshop, January 26, 1973, Washington, D.C. 1 fig, 2 tab.

Descriptors: *Strip mines, *Vegetation establishment, *Mulching, *Soil stabilization, Legumes, Grasses, Erosion control.
Identifiers: *Chemical soil stabilizers, *Mine reclamation.

Successful stabilization of surface mine spoils and other drastically disturbed areas depends on the establishment of a grass and legume cover. Mulches and soil stabilizers may be used on these sites to help establish vegetation and reduce erosion. The selection of an appropriate mulch or soil stabilizer is complicated by the number of products that are commercially available and by the scarcity of information on their effectiveness. Two cooperative demonstrations compared vegetation establishment and erosion loss following 30 treatments with 6 mulches and 12 soil stabilizers. There is no evidence that these materials are necessary for vegetation establishment; they are used primarily to control erosion. Mulch, soil stabilizers and soil stabilizers-mulch treatments were effective. (Vogel-Forest Service)
W75-06330

ALL-SEASON SEEDING OF HERBACEOUS VEGETATION FOR COVER ON APPALACHIAN STRIP-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. G. Vogel.
In: Second Research and Applied Technology Symposium on Mined-Land Reclamation, , 175-188, October 22-24, 1974, Louisville, Kentucky. National Coal Association, 1130 17th Street, NW, Washington, D.C., 2 fig, 5 tab.

Descriptors: *Strip mines, *Vegetation establishment, *Planting management, *Kentucky, Appalachian mountain region, Canopy, *Grasses.
Identifiers: *Herbaceous vegetation.

Mixtures of temporary (quick cover) and long-lived (permanent) herbaceous species were shown periodically throughout the year on strip-mine spoils in eastern Kentucky. Fair to excellent vegetative cover was established usually within 45 to 60 days after seeding from March 1 to October 15, although establishment was a little slower for some of the seedings made in July and August. Seedings in December and February were less successful than those in March and April. Initial cover was most rapidly provided by the temporary species, but the permanent species, Ky-31 fescue and sericea lespedeza, composed most of the ground cover after two to three growing seasons. Balbo rye and annual ryegrass provided quickest cover for early spring and fall seedings. The summer annuals, pearl millet and Sudangrass-sorghum hybrid provided quickest cover from mid-May to mid-July. Rainfall patterns in eastern Kentucky are such that, even in summer, seeding can be expected to succeed more often than fail. Vegetation was established quicker, and the cover was as much as eight times more dense on spoils that were roto-tilled before seeding than on spoils that were not tilled. Seedbed preparation is essential for successful establishment of seeded vegetation. (Forest Service)
W75-06331

SEDIMENT YIELD FROM STRIP-MINED WATERSHEDS IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Second Research and Applied Technology Symposium on Mined-Land Reclamation, October22-24, 1974, Louisville, Kentucky. National Coal Association, Washington, D.C., p 88-100, 7 fig, 6 tab, 7 ref.

Descriptors: *Strip mines, Sediments, *Vegetation establishment, Erosion control, *Kentucky, *Watersheds(Basins), Measurement, *Sediment yield, *Erosion rates.

Measurements of sediment accumulation in debris basins below surface-mined lands in eastern Ken-

tucky show highest sediment yield during the first six months after mining. The erosion rate diminishes to fairly low levels within three years. Methods of mining and handling spoil affect sediment yield, as does the speed with which vegetative cover is established. (Forest Service)
W75-06332

ESTABLISHING FOREST ON SURFACE-MINE LAND AS RELATED TO FERTILITY AND FERTILIZATION,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
M. M. Czapowskyj.
In: Forest Fertilization Symposium Proceedings, p 132-139. 1973 1 tab, 32 ref. General Technical Report NE-3.

Descriptors: *Strip mines, *Appalachian Mountain region, *Soil chemical properties, Fertility, Fertilization, Trees, Toxicity.

Planted and seeded forest trees respond strongly to application of N and P both singly and in combination. Certain spoils will respond to K application. Application of lime is generally effective in alleviating acidity and toxic concentrations of metals such as Mn, Fe, Zn, and Al. Most spoils can be reforested by proper treatment. (Curtis-Forest Service)
W75-06337

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

MAN-CAUSED FLUCTUATIONS IN QUALITY OF WATER FROM FORESTED WATERSHEDS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05914

NUTRIENT BUDGET OF A DOUGLAS-FIR FOREST ON AN EXPERIMENTAL WATERSHED IN WESTERN OREGON,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2K.
W75-05923

COMPARATIVE WATER QUALITY - NATURAL AND DISTURBED STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. L. Fredriksen.
In: Proceedings of a Symposium Forest Land Uses and Stream Environment, October 19-21, 1970, Oregon State Univ., Corvallis, p 125-137, August 1971. 6 fig, 4 tab, 19 ref.

Descriptors: *Water quality, *Nutrient removal, *Nitrogen, *Sediments, Wood wastes, Water quality standards, Cations, Nitrogen compounds, *Douglas fir trees.

The loss of nutrients from an old-growth Douglas-fir forest was measured in the streams of experimental watersheds. Following timber harvest and slash burning, loss of nutrients cations increased 1.6 to 3.0 times the loss from the undisturbed watershed. A surge of nutrients that followed broadcast burning contained concentrations of ammonia and manganese that exceeded Federal water quality standards for a period of 12 days. Annual nitrogen loss following burning averaged 4.6 pounds per acre; 53 percent of this was organic nitrogen contained in sediment. Inorganic nitrogen, dissolved in the stream, made up the remaining part. Annual loss of nitrogen from the undisturbed forest was very small -- .16 pound per acre. (Forest Service)
W75-05927

THE ENTRY AND FATE OF FOREST CHEMICALS IN STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05928

TOXICITY OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN AQUATIC ORGANISMS,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W75-05929

ARSENIC LEVELS IN URINE OF FOREST WORKERS APPLYING SILVICIDES,
Forest Service (USDA), Corvallis, Oreg. Forestry Sciences Lab.
R. F. Tarrant, and J. Allard.
Archives of Environmental Health, Vol 24, p 277-280, April 1972. 5 tab, 3 ref. PNW-1602.

Descriptors: *Herbicides, *Arsenicals(Pesticides), *Silviculture, *Public health, Application methods, *Urine, *Pollutant identification, *Pesticide residues.
Identifiers: Cacodylic acid, Arsenic excretion in urine.

Forest tree thinning workers absorb arsenic from silvicides. Much of the chemical appears to be excreted from the body in a short time. There appears to be no evidence of a continuing increase in arsenic levels over a period of more than two months. Persons using these materials should be trained to observe all necessary precautions to minimize their exposure. (Forest Service)
W75-05930

PROBLEMS AND TECHNIQUES IN SAMPLING WATER FOR ANALYSIS,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
G. M. Aubertin.
Presented at 1973 Proc. Symposium on the Use of Small Watersheds in Determining Effects of Forest Land Use on Water Quality. May 22-23, 1973. Univ. of Kentucky. 9 p, 3 ref.

Descriptors: *Water analysis, Water chemistry, *Water quality, *Sampling, Data collections, *Forest watersheds, *Monitoring, Pollutant identification, *Streamflow.

The various aspects of sampling streamflow from forested watersheds are reviewed. Sampling procedures are emphasized; and the need for accurate water quality data is stressed. (Forest Service)
W75-05931

DDT RESIDUES IN FOREST FLOOR AND SOIL AFTER AERIAL SPRAYING, OREGON--1965-68,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05936

THE INDICATOR ORGANISMS AND THEIR ECOLOGICAL VARIABILITY,
Water Economics Research Inst., Krakow (Poland). Dept. for Water Protection.
L. Turoboyski.
Acta Hydrobiol. Vol 15, No 3, p 259-274, 1973.

Descriptors: *Bioindicators, *Benthic organisms.

A number of indicator species of plant and animal organisms of the micro- and macro-benthos from various rivers were selected, their zonal association and resistance. It was possible to estimate the amount of bacteria in the production of the Barbillon pond (France) during some months of the year; if the quantity in April is taken as a mean value from April to Oct. (9.83 mgC/cu m/day) while disregarding production for the other months of the year, about 22 kg of carbon was the total for the pond and for the year, 18 kg/ha/yr, which represents 1.3% of the algal primary production.--Copyright 1974, Biological Abstracts, Inc.
W75-05970

NITRIC OXIDE, WATER VAPOR, AND OZONE IN THE ATMOSPHERE AS MEASURED IN SITU FROM AN AIRCRAFT,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
D. Briehl, B. A. Ridley, E. Hilsenrath, and H. I. Schiff.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TMX-3174, $3.25 in paper copy, $2.25 in microfiche. Technical Memorandum X-3174, January 1975. 10 p, 2 fig, 8 ref.

Descriptors: *Air pollution, *On-site investigations, *Instrumentation, Ozone, Water vapor, Pollutants, *Pollutant identification, Measurement, On-site data collections, Nitrogen compounds, Aircraft.
Identifiers: *Nitric oxide, Upper atmospheric air quality.

As part of the instrument evaluation plan for the NASA Global Atmospheric Sampling Program, prototype instruments were tested aboard the NASA Convair 990 during four flights in January and February of 1974. All the data were taken in maritime air between Hawaii and San Francisco and between Hawaii and 155 degrees W, 35 degrees N. A chemiluminescent instrument was used to measure nitric oxide. Readings ranged from less than or equal to 0.05 ppbv, the limit of detectability of the instrument, to 0.41 ppbv. Water vapor, which was measured by using an aluminum oxide hygrometer, ranged from 5.2 micrograms per gram to saturation. Ozone was measured by an instrument using the ultraviolet absorption technique and ranged up to 235 ppbv. Typical temporal plots of the concentrations of the three constituents are presented. All the constituents showed considerable spatial and day-to-day variation in concentration at each altitude flown. Measurements of the three constituents were made simultaneously at various altitudes between 7.6 and 12.5 km. (Sims-ISWS)
W75-06017

PROCEEDINGS OF SEMINAR ON METHODOLOGY FOR MONITORING THE MARINE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C., Office of Monitoring Systems.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $4.90. Seminar held at Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, October 1974. 425 p, 2 append.

Descriptors: *Estuarine environment, *Monitoring, *Analytical techniques, *Water quality, Pollutants, *Conferences, Management, Coasts, Estuaries, Aquatic environment, Water pollution, Measurement, Control, Control systems, Data collections, Mathematical models, Model studies, Assay, Algae, Aquatic life, Microorganisms, Bioassay, Laboratory tests, *Methodology, Saline water, Brackish water, Marine microorganisms, Sampling, *Pollutant identification, Pesticides.

The Seminar was organized to assist the Environmental Protection Agency in establishing a basis for common methodological techniques in marine and estuarine water quality management. Focus was on procedures for sampling and analyzing coastal waters involving the physical-chemical, biological, and microbiological disciplines. Objectives were: (1) to serve as a forum for presenting state-of-the-art technology in environmental quality monitoring of saline and brackish waters; (2) to present recent developments in sampling and analysis of these waters; and (3) to clarify and identify problem areas and desirable research goals. (See W75-06021 thru W75-06039) (Humphreys-ISWS)
W75-06020

MATHEMATICAL MODELING AS A FRAMEWORK FOR COASTAL MONITORING,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W75-06021

PROBLEMS IN MEASURING TURBIDITY AS A WATER QUALITY PARAMETER,
Scripps Institution of Oceanography, La Jolla, Calif.
R. W. Austin.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 23-54, October 1974. 13 fig, 1 tab, 11 ref.

Descriptors: *Turbidity, *Light penetration, *Instrumentation, Estuarine environment, Oceans, Coasts, Monitoring, Optical properties, Opacity, Water quality, Measurement.
Identifiers: *Light scattering, *Light absorption.

Water turbidity, although due primarily to the presence of suspended material with its concomitant scattering, is also affected by absorption. The measurement of turbidity by image extinction methods such as the candle turbidimeter recognizes the effects of scattering (particularly forward scattering) and absorption. Most of the presently used nephelometric techniques for assessing turbidity in water ignore the effect of absorption and make a turbidity determination proportional to the volume scattering function at some large angle (or range of angles) from the direction of propagation. For all optical measurements, the instruments should be calibrated in accepted, absolute physical units and careful attention should be given to the spectral range of the radiation involved. Both absorption and scattering are wavelength dependent and the results of the measurements and the conclusions drawn may depend upon the spectral response of the instruments used. Furthermore, a potentially significant characteristic for the study of water quality is neglected if the spectral dependence of these coefficients is not utilized. (See also W75-06020) (Sims-ISWS)
W75-06022

SURFACE SLICKS AND FILMS - A NEED FOR CONTROL,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
W. F. Rittall.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 55-71, October 1974. 2 fig, 16 ref.

Descriptors: *Air-water interfaces, *Pollutants, *Films, Water quality, Outfall sewers, Surfaces, Sampling, Methodology, Oceans, Sewerage, Sewage disposal, Coliforms, Water pollution control.
Identifiers: Surface slicks.

Experimental and field data available in the literature have shown that surface concentrations of films, slicks, and particulates are important factors in effective pollution control. Ocean outfalls have been shown to be possible sources and existing water quality regulations have been questioned as to their control effectiveness. Nonuniformity in sample collection and analyses was identified as one of the more critical areas needing attention, a need that should go hand-in-hand with the establishment of quantitative regulations. Candidate methods for the standardization of field collection procedures were presented for: surface slicks, surface bacteria, and micro and floating particulates. (See also W75-06020) (Sims-ISWS)
W75-06023

A SYSTEMS APPROACH TO MARINE POLLUTION MONITORING,
Washington Univ., Seattle. Dept. of Oceanography.
S. P. Pavlou, T. E. Whitledge, J. C. Kelley, and J. J. Walsh.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 72-107, October 1974. 27 fig.

Descriptors: *Monitoring, *Water pollution, *Sampling, *Data processing, Water pollution sources, Pollutants, Investigations, Chemical analysis, Bioindicators, Ammonia, Nitrates, Phosphates, Silicates, Wastes, Temperature, Salinity, Pollutant identification, Outfall sewers, Sewage disposal, Coasts, Ships, Measurement, Analytical techniques, Computers, Instrumentation, Equipment.

An integrated sampling, data acquisition, and data reduction system was described. This shipboard system provides for coordinated sampling of many physical, chemical, and biological parameters. Many of these measurements are automatically processed by a computer system on the ship. Some preliminary results were presented for the OUTFALL-II studies of the coastal waters off Los Angeles. The major objectives of these investigations were to evaluate the extent of the submerged sewage field, to assess the degree to which the dispersive field might influence the biological productivity of the area, and to determine whether the sewage field is affected by upwelling. Ammonium was a good tracer for the discharge effluent because of low natural background and high concentrations in the discharged effluent. Ammonium concentrations of five times the normal, twice the maximum oceanic values, were observed in areas where no discontinuities in the temperature, salinity, silicate, or phosphate fields were found. Data collected on OUTFALL-II also showed upwelling to be an important process involved in the performance of a sewage outfall. (See also W75-06020) (Sims-ISWS)
W75-06024

METHODS AND PROBLEMS IN ANALYSIS OF PESTICIDES IN THE ESTUARINE ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
A. J. Wilson, Jr., and J. Forester.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 108-125, October 1974. 1 fig, 6 tab, 17 ref.

Descriptors: *Pesticides, *Chemical analysis, *Chlorinated hydrocarbon pesticides, *Analytical techniques, Insecticides, Bioassay, Water quality, Estuarine environment, Quality control, Laboratory tests, Oceans, Pollutant identification, DDT, Chemistry, Mollusks.

The Gulf Breeze Environmental Research Laboratory has been conducting research on the effects of pesticides in the marine environment since 1958. From 1965 until 1972 over eight thousand samples were analyzed for the National Pesticide Monitoring Program. Described were analytical methods employed, some recent studies in water analysis, and the need for adequate analytical quality control in marine monitoring. (See also W75-06020) (Sims-ISWS)
W75-06025

BIOLOGICAL PROBLEMS IN ESTUARINE MONITORING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
P. A. Butler.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 126-138, October 1974. 2 tab, 20 ref.

Descriptors: *Bioassay, *Bioindicators, *Pollutant identification, *Monitoring, Aquatic animals, Sampling, Fish, Data processing, Silversides, Mollusks, Estuarine environment, DDT, Pollutants, Chemical analysis.
Identifiers: *Organochlorine.

Bivalve molluscs are efficient bioassay tools for identifying the ebb and flow of pollutants in surrounding waters. Monitoring data indicated the movement of relatively discrete masses of clean and polluted water through the estuary. Organochlorine residues in molluscs fluctuated from month to month in response to the sometimes transitory nature of the pollution, and contrasted sharply at times with residues observed in other elements of the associated biota. Successful monitoring of the estuarine environment for persistent organochlorine pollutants is dependent in large measure on the collection of appropriately biased samples. Statistically randomized sample collections are unsatisfactory for the simple reason that pollution patterns are not random. Sample collection protocols, as well as analytical procedures, must be sufficiently standardized to ensure the comparability of data. Monitoring data must be transmitted on a timely basis to action agencies. (See also W75-06020) (Sims-ISWS)
W75-06026

DETERMINATION OF METALS IN SEA WATER,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
D. H. Kampbell.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 139-155, October 1974. 4 tab, 33 ref.

Descriptors: *Metals, *Sea water, *Analytical techniques, Chemical analysis, Measurement, Physical properties, Absorption, Spectroscopy, Sampling, Methodology, Instrumentation, *Pollutant identification, X-ray spectroscopy, Electrochemistry, Laboratory tests, Oceans.

Analytical methods were described to determine As, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, V, and Zn in sea water. Analysis of all metals can be accomplished with various degrees

of convenience by atomic absorption. Direct analysis by flameless atomic absorption has many desirable attributes, but utilization cannot be maximized until the interfering action of sea water components is overcome. Anodic stripping voltammetry is becoming increasingly useful for sea water analysis. Direct measurements for Cd, Cu, Pb, and Zn have been made. Major ions in sea water do not interfere. Neutron activation analysis and spark source mass spectrometry have been utilized as analytical techniques. Gas chromatography has possible applications for sea water metal analysis. (See also W75-06020) (Sims-ISWS)
W75-06027

RECENT STUDIES ON BIOLOGICAL EFFECTS OF CRUDE OILS AND OIL-DISPERSANT MIXTURES TO RED SEA MACROFAUNA,
National Marine Water Quality Lab., West Kingston, R.I.
For primary bibliographic entry see Field 5C.
W75-06028

ADSORPTION OF ORTHOPHOSPHATE ON BOROSILICATE AND 'CITRATE OF MAGNESIA BOTTLES' POLYETHYLENE AND POLYVINYL SURFACES IN A DISTILLED WATER AND SEAWATER MATRIX,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
D. F. Krawczyk, and M. W. Allen.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 180-193, October 1974. 8 tab, 10 ref.

Descriptors: *Water sampling, *Oceanography, *Chemical analysis, Laboratory equipment, Adsorption, Sampling, Chemicals, Phosphorus compounds, Plastics, Sea water, Water analysis, Water pollution, *Pollutant identification.
Identifiers: Sample bottles, Sample storage, *Orthophosphates, Glass bottles, Plastic bottles.

Adsorption or loss of orthophosphate in glass bottles does not seem to be a problem at a low orthophosphate concentration in a distilled water matrix up through seven days. However, glass bottles must have proper acid treatment to be satisfactory containers for low phosphate water samples because of leaching of a constituent that provides a positive phosphate reaction. In seawater, losses of orthophosphate phosphorus were noted after a sixteen day period in polyethylene bottles. If mercuric chloride is added to seawater, polyethylene bottles can be used for holding samples for orthophosphate analysis without any pretreatment (e.g., acid washing, washing, and rinsing). Polyvinyl chloride bottles can be used as seawater sample storage containers as received from the supplier without any pretreatment. Borosilicate glass bottles must be acid washed and thoroughly rinsed before holding samples for orthophosphate analysis. (See also W75-06020) (Sims-ISWS)
W75-06029

DEVELOPMENT OF A STANDARD MARINE ALGAL ASSAY PROCEDURE FOR NUTRIENT ASSESSMENT,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
D. T. Specht, and W. E. Miller.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 194-230, October 1974. 19 fig, 4 tab, 42 ref.

Descriptors: *Pollutant identification, *Bioassay, *Algae, *Nutrients, *Laboratory tests, Testing, Analytical techniques, Water analysis, Aquatic life, Aquatic plants, Marine biology, Marine algae, Phosphorus compounds, Nitrogen compounds, Nutrient requirements, Estuarine environment, Testing procedures, Methodology.

The effort to design and evaluate a marine version of the 'Algal Assay Procedure: Bottle Test' has resulted in the establishment of the suitability of Dunaliella tertiolecta Butcher (DUN clone) as a highly versatile and consistent bioassay organism for nutrient assessment in marine, estuarine, and some freshwater situations. The response of this organism to salinity, temperature, light, and nutrients was evaluated in the laboratory. The procedures were then applied to samples taken from a variety of estuarine sites along the Oregon coast and from Albert Lake in southeastern Oregon. The results of these tests were reported. (See also W75-06020) (Sims-ISWS)
W75-06030

MONITORING SEAWATER FOR RADIONUCLIDES,
Environmental Protection Agency, Cincinnati, Ohio. Radiochemistry and Nuclear Engineering Branch.
B. Kahn, and D. M. Montgomery.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 231-241, October 1974. 1 tab, 33 ref.

Descriptors: *Radioactivity, *Monitoring, *Sea water, *Oceanography, Measurement, Fallout, Radioactive wastes, Analytical techniques, Pollutants, *Pollutant identification, Tracers, Methodology.

An acceptable radiological monitoring program can be prepared on the basis of extensive experience with both routine programs and research concerning radionuclide transport in the marine environment. Many difficulties must be considered: those common to most marine monitoring programs, those associated with the chemical state of the major radionuclides in effluents (including their extremely low concentration), and those related to measuring numerous radionuclides at very low levels. Participation in the program by appropriate specialists is a necessity, and use of only an oceanographer or a radiochemist when both are needed usually leads to initially unrecognized difficulties. (See also W75-06020) (Sims-ISWS)
W75-06031

METHODS FOR MONITORING RADIOACTIVITY IN AQUATIC BIOTA,
Washington Univ., Seattle. Coll. of Fisheries.
V. A. Nelson, W. R. Schell, and A. H. Seymour.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 242-258, October 1974. 2 fig, 28 ref.

Descriptors: *Radioactivity, *Monitoring, *Aquatic animals, Radioactive wastes, Fallout, Pollutants, *Pollutant identification, Analytical techniques, Oceanography, *Methodology, Measurement, Biota, Aquatic life, Fish, Laboratory tests.

Monitoring for radioactivity in aquatic biota was discussed and pertinent literature concerning monitoring radioactivity in the aquatic environment was reviewed. The critical pathway and specific activity approaches to sampling were discussed. Two monitoring programs, and sample collection, sample handling, chemical procedures, and radiometric equipment used in monitoring programs now in progress at the Laboratory of Radiation Ecology, University of Washington were outlined. (See also W75-06020) (Sims-ISWS)
W75-06032

THE PROPERTIES AND COMPOSITION OF SLUDGES,
National Environmental Research Center, Ohio. Advanced Waste Treatment Research Lab.
R. B. Dean, and J. E. Smith, Jr.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 259-274, October 1974. 1 fig, 6 tab, 30 ref.

Descriptors: *Pollutant identification, *Sludge, Waste treatment, *Sewage treatment, *Sewage effluents, Chemical properties, Statistical methods, Physical properties, Biological properties, Aeration, Aerobic treatment, Anaerobic digestion, Trickling filters, *Waste water treatment, Sewage lagoons, Municipal wastes.

The general characteristics of sludges produced at the various stages of waste treatment processes were discussed. The quantities of typical sludges as they are removed from clarifier tanks or thickeners were shown. The chemical and biological composition of sludges was reported, along with the physical characteristics of the sludge. The composition of sludges varies so much that meaningful data can only be obtained by applying appropriate statistical methods. The variance and the spread are as important as the average and the geometric mean, and conclusions based on a few spot analyses are likely to be misleading. Obtaining a representative set of samples is perhaps even more important than choosing the best method of analysis. (See also W75-06020) (Sims-ISWS)
W75-06033

MAKING ARTEMIA SLUDGE BIOASSAY MORE ECOLOGICALLY RELEVANT,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
R. J. Nadeau, and B. J. Pastalove.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 275-302, October 1974. 10 fig, 3 tab, 10 ref.

Descriptors: *Pollutant identification, *Bioassay, *Sludge, *Plankton, Methodology, Ecology, Zooplankton, Coasts, Oceans, Sewage disposal, Wastes, Sludge disposal, Aquatic microorganisms, Marine animals, Copepods.
Identifiers: *Artemia salina.

Comparative experiments using recommended bioassay procedures for Artemia nauplii and endemic microcrustacean zooplankton illustrated that endemic species have a greater sensitivity to municipal sewage sludge than have Artemia nauplii. It was also shown, based upon these results, that the allowable concentration may be too high to prevent impact upon the plankton in the mixing zone. In this case, the criteria may not be sufficient to prevent damage, both lethal and sublethal, to the organisms first exposed to the dumped materials, namely, the microcrustacean populations. To increase the value of the bioassay criteria for protecting the marine ecosystem from the impact of disposed materials, sensitivity factors must be determined for additional endemic species. These sensitivity factors could then be applied to the toxicity values derived from the Artemia bioassay to increase the use of these bioassays as a device for protecting the ecology of coastal waters. (See also W75-06020) (Sims-ISWS)

W75-06034

MONITORING DREDGE SPOILS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
L. S. Slotta, and K. J. Williamson.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 303-316, October 1974. 1 tab, 24 ref.

Descriptors: *Pollutant identification, *Dredging, *Environmental effects, *Monitoring, Spoil banks, Turbidity, Suspended solids, Waste disposal, Slurries, Nutrients, Estuaries, Estuarine environment.

An interdisciplinary team has been conducting research on the environmental effects of dredging in estuarine waters. The potential acute and chronic environmental impacts of dredging, examined as part of this study were reported. Present monitoring technology is available to measure many parameters in relation to dredging projects. More research is necessary to elucidate cause and effect relationships especially in relation to chronic impacts. Proposed guidelines to minimize the acute impacts and identification of research needs to effectively monitor dredging projects were also presented. (See also W75-06020) (Sims-ISWS)
W75-06035

COMPARISON OF SPECIES DIVERSITY AND FAUNAL HOMOGENEITY INDICES AS CRITERIA OF CHANGE IN BIOLOGICAL COMMUNITIES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
R. C. Swartz, W. A. DeBen, and A. J. McErlean.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 317-334, October 1974. 16 fig, 1 tab, 27 ref.

Descriptors: *Pollutant identification, *Estuarine environment, *Demersal fish, *Crustaceans, *Monitoring, Trawling, Coasts, Estuaries, Aquatic animals, Density, Varieties, Distribution patterns, Fish, Crabs, Shrimp, Temporal distribution, Sampling, Spatial distribution, Pollutants, Oregon.
Identifiers: Faunal density, Species richness, Affinity index.

The structure of marine communities is frequently used as an indication of the environmental consequences of pollution. Prevention of major ecosystem alterations necessitates monitoring programs that can detect subtle changes before irreversible damage has occurred. Data analysis procedures should therefore be sensitive to relatively minor differences in biological conditions. The objective of most marine monitoring programs conducted by regulatory agencies is to document changes in biological conditions that can be correlated with water quality or other pollution parameters. It was demonstrated that many characteristics of the biota should be examined. No single index is sufficient. Total faunal density, species richness, evenness, and an affinity index were helpful in describing closely related demersal communities. Differences in the spatial-temporal distribution of individual species populations provided the most obvious discrimination between collections. (See also W75-06020) (Sims-ISWS)
W75-06036

SAMPLING METHODS FOR MICROBIOLOGICAL ANALYSES,
Maryland Univ., College Park. Dept. of Microbiology.
R. R. Colwell.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 335-359, October 1974. 17 fig, 13 ref. NSF Grant GA-36235.

Descriptors: *Pollutant identification, *Microbiology, *Equipment, *Sampling, *Oceanography, Methodology, Marine biology, Marine microorganisms, Marine bacteria, Marine animals, Microbial degradation, Estuarine environment, Sediments, Cores, Bottom sampling, On-site data collections, Aquatic life, Aquatic microorganisms.

The equipment and facilities for collecting water, sediment, and biota for microbiological analyses were examined, described, and found to be relatively primitive. Sampling technology must be perfected and new methods developed. Environmental microbiological monitoring cannot yet be accomplished with the degree of sophistication required by the complex and complicated demands made of those charged with that task. (See also W75-06020) (Sims-ISWS)
W75-06037

MICROBIOLOGICAL METHODS FOR MONITORING MARINE WATERS FOR POSSIBLE HEALTH EFFECTS,
Environmental Protection Agency, Narragansett, R.I. Northeastern Water Supply Lab.
V. J. Cabelli, F. T. Brezenski, A. P. Dufour, and M. A. Levin.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 360-384, October 1974. 4 fig, 12 tab, 32 ref.

Descriptors: *Pollutant identification, *Microbiology, *Methodology, *Marine microorganisms, *Pathogenic bacteria, Sewage sludge, Industrial wastes, Coliforms, E. coli, Streptococeus, Salmonella, Microorganisms, Sewage bacteria, Shigella, Enteric bacteria, Laboratory tests, Water pollution, *Monitoring, Estuarine environment.

The sources of pathogenic microorganisms in the marine environment were discussed. The status of microbial methodology was examined. This methodology is in need of upgrading. The situation stems from several factors: (1) a paucity of epidemiological data relating health hazards to individuals associating with the marine environment to some indicator or indicators of the water quality; (2) insufficient evaluation of existing methodology when applied specifically to the enumeration of the organism in the marine environment; and (3) the willingness, in the past, to rely too heavily on coliforms, even fecal coliforms, as the sole indicators of water quality. (See also W75-06020) (Sims-ISWS)
W75-06038

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
J. D. Buck.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 385-406, October 1974. 144 ref.

Descriptors: *Pollutant identification *Reviews, *Bibliographies, *Microbiology, *Marine microorganisms, *Monitoring, Documentation, Microorganisms, Phytoplankton, Bacteria, Viruses, Marine bacteria, Methodology, Bioassay, Bioindicators, Measurement, Laboratory tests, Sewage effluents, Oil spills, Estuarine environment, Heavy metals, Oceanography, Ecology.

A review of existing methodology in the field of monitoring the marine microorganisms includes many subareas of interest. These include observations of biomagnification in bacteria, effects of oil spills and sewage effluents, use of microbiology to indicate pollutants, microbial diseases in fish and shell fish, and methods of testing and measuring. The importance of microorganisms as indicators of environmental alteration was stressed. (See also W75-06020) (Sims-ISWS)
W75-06039

GALVESTON HARBOR: FACTORS AFFECTING POLLUTION AND POLLUTION MONITORING,
Texas A and M Univ., College Station. Dept. of Oceanography.
N. L. Guinasso, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 650, $4.25 in paper copy, $2.25 in microfiche. Report No. CG-D-4-75, August 1974. 64 p, 11 fig, 8 tab, 32 ref. DOT-CG-24,224-A.

Descriptors: *Pollutant identification, *Harbors, *Water pollution, *Monitoring, Mathematical models, Model studies, Water circulation, Currents(Water), Estuaries, Salinity, Pollutants.
Identifiers: Galveston Harbor.

Available data on the hydrodynamics of Galveston Harbor do not provide a firm basis for the prediction of pollutant transport and dispersion in the harbor. Field measurements of the hydrodynamics of the harbor should be undertaken and should be designed to test the validity of existing mathematical and physical models of the harbor. Needed improvements of existing mathematical models of Galveston Harbor include an increase of the horizontal resolution and treatment of vertical density stratification. A pollution monitoring system should include regular surveillance, fixed monitoring stations, and cooperation with local agencies. (Sims-ISWS)
W75-06040

DEVELOPMENT OF A METHOD FOR MEASURING DISSOLVED COLOR IN WASTEWATERS AND RECEIVING STREAMS,
Dept. of Environmental Systems Engineering. Clemson Univ., S.C.
A. R. Abernathy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 857, $4.25 in paper copy, $2.25 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 52, February, 1975. 52 p, 5 fig, 12 tab, 43 ref, append. OWRT A-029-SC(2).

Descriptors: Spectroscopy, *Color, Measurement, Methodology, *Pollutant identification, *Photometry, *Analytical techniques, Waste water treatment, Monitoring, Industrial wastes, Water analysis.
Identifiers: Color measurement, Color standards.

A simple method for measuring dissolved color in water and wastewater was developed and tested. This method was compared to other methods and agree well with visual comparisons and tristimulus determinations. The method, which employs an abbreviated tristimulus filter photometer using only the green filter, could be useful in measuring color reductions by wastewater treatment, monitoring colored waste discharges, and in establishing allowable limits for color additions to surface waters.
W75-06086

HEAVY METAL DISTRIBUTION IN BOTTOM SEDIMENT AND WATER IN THE TENNESSEE RIVER-LOUDON LAKE RESERVOIR SYSTEM,
Tennessee University, Knoxville, Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-06088

MODIFICATION OF A COMMERCIAL INSTRUMENT FOR LOW TEMPERATURE ABSORPTION,
Auburn Univ., Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-06092

SPECTROANALYTICAL PARAMETERS OF FUNGAL METABOLITES. IV. MONILIFORMIN,
Auburn Univ., Ala. Dept. of Chemistry.
J. A. Lansden, R. J. Clarkson, W. C. Neely, R. J. Cole, and J. W. Kirksey.
Journal of the Association of Official Analytical Chemists, Vol 57, No 6, p 1392-1396, November 1974. 4 fig, 13 ref. OWRT A-035-ALA (4).

Descriptors: *Pollutant identification, Bioassay, *Water quality, Aqueous solutions, Fluorescence, Analytical techniques, Fungi, Spectrophotometry, Chromatography.
Identifiers: Southern corn blight, *Fungus metabolites, Emission spectra, Phosphorescence, Dimer, *Moniliformin.

The spectral data for a novel fungal metabolite, moniliformin (Potassium salt of 1-hydroxycyclobut-1-ene-3,4-dione), are reported. The corrected ambient temperature fluorescence excitation and emission spectra are given and the quantum efficiency is calculated to be 0.00532. The uncorrected low temperature phosphorescence emission spectrum and lifetime are also reported. Other physical data are given to support spectral evidence that the molecule exists as a dimer in aqueous solutions.
W75-06093

IMPROVED FIELD WATER ANALYSIS TESTS,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 2K.
W75-06122

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
W. R. McCluney.
Journal Water Pollution Control Federation, Vol 47, No 2, p 252-266, February 1975. 3 fig, 36 ref.

Descriptors: *Turbidity, *Optical properties, *Instrumentation, *Analytical techniques, Water properties, Absorption, Hydrology, Physical properties, Light penetration, Secchi disks, Water quality, Water analysis, Laboratory tests, On-site tests, Refractivity, Light intensity, Measurement, Suspended solids.
Identifiers: Turbidimeters, *Radiometry, Transparency, Scattering, Nephelometry.

An examination of a number of turbidity measurements reported in the literature revealed considerable variability in the definitions, units, and measurement techniques used. Many of these measurements differ radically in the optical quantity measured. The radiometric basis for each of the most common definitions of turbidity was examined. Several commercially available turbidimeters were described, and their principles of operation were evaluated radiometrically. It was recommended that the term turbidity be restricted to qualitative estimates of water clarity and that all turbidimeters be calibrated so that their measurements are made in terms of the fundamental absorption and scattering parameters of hydrologic optics. (Henley-ISWS)
W75-06128

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W75-06129

POLAROGRAPHIC OXYGEN SENSORS.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 2K.
W75-06136

MASS SPECTROMETRY AS USED TO DETERMINE TRACE ORGANIC CONSTITUENTS IN AQUATIC SYSTEMS,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
J. M. Pierce.
Available from the National Technical Information Service, Springfield, Va 22161, as ORO-4254-23. Spring 1974. 20 p, 10 fig, 10 tab, 12 ref.

Descriptors: *Pollutant identification, *Mass spectrometry, *Organic compounds, *Instrumentation, *Analytical techniques, *Spectrometers, Water analysis, Analysis, Spectroscopy, Water quality, Measurement, Chemical analysis, Chemical properties, Physical properties, Spectrophotometry, Aquatic environment, Oil wastes, Solvents.
Identifiers: Cleaning fluids, Structural analysis, Fragmentation patterns.

A simplified component approach to the way a mass spectrometer functions was presented. Mass spectrometry is capable of determining the molecular weight and often the complete structure of organic compounds. For this reason, mass spectrometry is evolving as a major research tool in water analysis for trace organic compounds. Compounds are identical if they have identical physical properties, such as melting point, boiling point, density, refractive index, etc. The greater the number of physical properties measured, the stronger the evidence. A single mass spectrum of an organic compound amounts to dozens of physical properties because it shows the relative abundances of dozens of different fragments. For this reason, mass spectral positive determinations are considered to be one of, if not the strongest, proof of identification. Several applications of mass spectrometry to the determination of organic constituents in water were reviewed. (Henley-ISWS)
W75-06188

DETERMINATION OF ORGANIC COMPOUNDS IN AQUATIC SYSTEMS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
J. Caplinger.
Available from the National Technical Information Service, Springfield, Va 22161, as ORO-4254-18, $4.00 in paper copy, $2.25 in microfiche. (1974). 16 p, 8 fig, 8 tab, 13 ref.

Descriptors: *Chromatography, *Organic compounds, *Analytical techniques, *Instrumentation, *Water quality, Chemical analysis, Mass spectrometry, Aquatic habitats, *Pollutant identification, Laboratory tests, Amino acids, Aromatic compounds, Organic acids, Chemicals, Organic wastes, Solvent extractions, Domestic wastes, Effluents, Freeze drying, Pesticide residues.
Identifiers: *High pressure liquid chromatography, *Trace contaminantes, Vacuum distillation.

High pressure liquid chromatography (HPLC) as a tool in water analysis was discussed. A wide variety of compounds with a wide variety of stationary and mobile phases can be analyzed by HPLC. The mobile phase can range from nonpolar to polar to from acidic to basic, while the stationary phase can range from polar to nonpolar or from cationic to anionic. Gradient elution increases the range of the liquid chromatograph. Multi-detection systems can enhance the versatility of the high pressure liquid chromatograph. Mass spectrometers can be directly coupled with the HPLC for direct identification of the eluted compounds. (Henley-ISWS)
W75-06189

ESTIMATE OF WATER POLLUTION POTENTIAL BASED ON CHARACTERISTICS OF DOMESTIC SEWAGE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-06202

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 7C.
W75-06208

ENVIRONMENTAL CONTROL LABORATORY DESIGNED FOR THE SPECIFIC NEEDS OF THE INTERN TRAINING CENTER, RED RIVER ARMY DEPOT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
N. H. Trier.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 504, $4.25 in paper copy, $2.25 in microfiche. USAMC Intern Training Center, Red River Army Depot, Texarkana, Texas, Report No. USAMC-ITC-02-08-73-112, March 1974. 48 p, 1 fig, 6 tab, 25 ref, append.

Descriptors: *Laboratories, *Laboratory equipment, *Pollutant identification, Air pollution, Water pollution, Equipment, Research facilities, Facilities, Testing.
Identifiers: Noise pollution.

The types of equipment necessary for establishing an environmental control laboratory at the Intern Training Center at Red River Army Depot, Texarkana, Texas, were researched. Recommended were the various types of equipment needed to sample, detect, and measure three types of pollution: air, water, and noise. This laboratory is needed to supplement course work by familiarizing the students with pollution monitoring equipment through experiments performed in the laboratory. This paper can be used as a basis for the design of such a laboratory. (Sims-ISWS)
W75-06210

WATER SURVEILLANCE PROGRAM, EGLIN AFB FL,
Environmental Health Lab., Kelly AFB, Tex.
E. E. LeFebvre.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD-787 211, $3.75 in paper copy, $2.25 in microfiche. Technical Report EHL(K) 74-23, September 1974. 22 p, 1 tab, 2 ref, append.

Descriptors: *Water quality control, *Sewage treatment, *Water sampling, *Waste disposal, Waste water treatment, Waste water disposal, Irrigation programs, Sprinkler irrigation, Water pollution, Water pollution control, *Florida.
Identifiers: *Eglin Air Force Base(Fla).

The water quality surveillance program at Eglin AFB FL was evaluated. Although the base has an excellent program, the entire military reservation is not included. A program for the surveillance of the test areas was suggested along with recommendations for increase in personnel authorizations to accomplish the task. An appendix gives the locations of sampling points and summaries of analyses of water samples and effluent wastewater samples. (Sims-ISWS)
W75-06216

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
For primary bibliographic entry see Field 4B.
W75-06236

CHARACTERIZATION OF WASTEWATERS FROM THE ETHICAL PHARMACEUTICAL INDUSTRY,
Gulf South Research Inst., Baton Rouge, La.
J. H. Mayes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 116, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-057, July 1974. 65 p, 20 tab, 34 ref, append. EPA Project R-801159.

Descriptors: *Water pollution sources, *Industrial wastes, *Waste water(Pollution), Waste water treatment, Waste water disposal, Chemical wastes, Water pollution control, Biological treatment, Effluents.
Identifiers: *Pharmaceuticals, Drugs.

A first attempt was presented to categorize the ethical pharmaceutical industry on the basis of manufacturing processes and resulting effluent characteristics. The available information allowed a breakdown into (1) pharmaceutical (formulation) plants, (2) pharmaceutical and chemical (synthesis) plants, and (3) all others (those using fermentation, biological preparation, extraction, and combinations). Analysis of the collected raw effluent data indicated that sanitary wastes were a major contributor in pharmaceutical plants. The wastes of the other categories were more dependent on specific operations and were, consequently, more variable. Fermentation wastes were, as expected, very high in biodegradable organics and usually were the predominant contributor in complex plants. Conventional biological treatment, both in-plant and at central facilities, is widely used and appears capable of achieving 90% removal of degradable organics. Advanced technology appears to be limited in application to specific wastes not amenable to biological treatment. (Sims-ISWS)
W75-06244

INVESTIGATION OF WATER QUALITY PARAMETERS AT SELECTED POINTS ON THE TENNESSEE RIVER,
Alabama A and M Univ., Normal. Dept. of Chemistry.
M. C. Manger.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-29712, $3.75 in paper copy, $2.25 in microfiche. March 1974. 41 p, 6 fig, 27 tab. NASA Grant NGR 01-001-018.

Descriptors: *Tennessee River, *Pollutant identification, *Water quality, *Monitoring, Temperature, Chemical properties, Physical properties, Biological properties, Rivers, Thermal pollution, Powerplants, Electric powerplants, *Alabama, Sampling, Testing, On-site data collections, *Path of pollutants.

Physical, chemical, and biological water quality parameters were investigated at the Widow's Creek Steam Plant on the Tennessee River. The water quality parameters and field site locations were selected so as to be compatable with the interests and needs of the Environmental Application Office at Marshall Space Flight Center. All sampling and testing was conducted as directed in the 13th Edition of 'Standard Methods of Analysis for Water and Waste Water' or as suggested by NASA'S Technical Officer. Data were presented in a form compatible with that presently being collected by other agencies. These data show a definite warming of the river water by the steam--generation plant. The effluent heat is dissipated quickly by a mixing action of the river. The chemical and biological effects are not definitive and warrent further and more complete analysis. (Sims-ISWS)
W75-06248

THE EFFECT OF DREDGING IN A POLLUTED ESTUARY ON THE PHYSIOLOGY OF LARVAL ZOOPLANKTON,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
For primary bibliographic entry see Field 5C.
W75-06255

BACTERIOLOGICAL CRITERIA FOR GROUND-WATER QUALITY,
National Environmental Research Center, Cincinnati, Ohio.
M. J. Allen, and E. E. Geldreich.
Ground Water, Vol 13, No 1, p 45-52, January-February 1975. 1 fig, 8 tab, 22 ref.

Descriptors: *Groundwater, *Water quality, *Coliforms, *Bioindicators, Water analysis, Ecosystems, Biological communities, Pathogenic bacteria, Bacteria, Water supply.

Although more than 60 million individuals rely upon the absence of microbial pathogens in their marginally-treated or untreated groundwater supplies, an analysis of reported waterborne disease outbreaks for the period 1946-1970 shows that contaminated groundwater supplies were responsible for over 50% of the outbreaks. Completed groundwater studies indicate: (1) coliforms and fecal coliforms are present in a significant percentage of improperly located or inadequately protected private supplies, and (2) the apparent absence of coliforms due to the insensitivity of currently available bacteriological methods does not preclude pathogen occurrences. Excessive bacterial populations, normally not encountered in finished water, can suppress coliform detection. For this reason, it is essential that improved bacterial detection methods be developed and other criteria for untreated groundwater be explored by comprehensive field investigations and laboratory analysis of groundwater supplies for a variety of bacterial parameters. (Gibb-ISWS)
W75-06259

LIMNOLOGY OF DUFFIN CREEK AND THE LOCATION OF CENTURY CITY,
Waterloo Univ. (Ontario). School of Urban and Regional Planning.
G. Mulamoottil, and R. S. Dorney.
Water Resources Bulletin, Vol 10, No 6, p 1270-1276, December 1974. 2 fig, 3 tab, 3 ref.

Descriptors: *Limnology, *Streams, *Water pollution, Chemical properties, Biological properties, Bacteria, Biochemical oxygen demand, Benthic fauna, Bloodworms, Sludgeworms, Tubificids, City planning, Effluents, Sewage effluents, Urban runoff, *Canada.
Identifiers: *Duffin Creek(Ontario).

Limnological study of Duffin Creek was carried out with the objective of evaluating the impact of the proposed location of Century City. The chemical, biological, and bacteriological parameters of one branch of the Creek, which received tertiary treated effluent, were found to be fairly high. Considering the flow conditions of the Creek in relation to the total discharge of the treated effluent from the proposed Century City, it was recommended that the effluent be piped 3-4 miles downstream. The plan for Century City has since been abandoned. (Sims-ISWS)
W75-06264

QUANTITATION OF ENVIRONMENTAL HYDROCARBONS BY THIN-LAYER CHROMATOGRAPHY, GRAVIMETRY/DENSITOMETRY COMPARISON,
California Univ., Berkeley. Biomedical Research Lab.
L. Hunter.
Environmental Science and Technology, Vol 9, No 3, p 241-246, March 1975. 6 fig, 6 tab, 15 ref.

Descriptors: *Chromatography, *Pollutant identification, *Instrumentation, *Oil pollution, *Analytical techniques, Evaluation, Chemical analysis, Organic wastes, Oil wastes, Investigations, Water pollution, Oil spills, Organic compounds, Aromatic compounds, Solvent extractions, Pollutants, Fuels, Mass spectrometry, Monitoring.
Identifiers: Hydrocarbons, Densitometric method, Infrared absorption, Gravimetric method.

The application of thin-layer chromatography to the detection and analysis of trace amounts of hydrocarbons was investigated. Samples can be separated into saturates (alkanes) and unsaturates (mainly aromatics) at sensitivities to 0.5 micrograms. Quantitations by a densitometric method and by gravimetric recovery of the spots were compared. Comparable accuracy is possible, provided authentic calibration samples are available. In the absence of these samples, quantitation by densitometry is considerably less accurate than gravimetry due to variable hydrocarbon response to the visualization method. (Henley-ISWS)
W75-06276

THE APPLICATION OF ELECTRODEPOSITION TECHNIQUES TO FLAMELESS ATOMIC ABSORBTION SPECTROMETRY PART II. DETERMINATION OF CADIUM IN SEA WATER,
Oslo Univ. (Norway). Dept. of Chemistry.
W. Lund, and B. V. Larsen.
Analytica Chimica Acta, Vol 72, No 2, p 57-62, September, 1974. 1 fig, 1 tab, 7 ref.

Descriptors: *Spectroscopy, *Analytical techniques, *Instrumentation, *Cadmium, Chemical analysis, Testing procedures, Chemical reactions, Metals, *Pollutant identification.
Identifiers: *Flameless photometry.

For the determination of trace metals in sea water by atomic absorption including flameless techniques, a separation procedure has been needed to eliminate interferences arising from light scattering by salt particles in the sample. The determination of cadmium in sea water is described; a technique is used where matrix interferences are eliminated by an electrodeposition step. The results of the analyses had a relative standard deviation of 10%, and the results agreed quite well with the value found by anodic stripping voltametric experiments. A deposition time of 5 min. was necessary to obtain satisfactory peak heights and the total time for a single analysis was about 7 min. Advantages of this method are: (1) avoid contamination of the sample by impurities from organic solvents or ion-exchange resins, (2) improvement of the detection limit over other flameless techniques, (3) no need for drying and ashing steps before atomization, and (4) cheaper equipment needed than that commercially available for flameless atomization. (See also W75-02085) (Pulliam-Vanderbilt)
W75-06301

MOLECULAR EMISSION CAVITY ANALYSIS (MECA) - A NEW FLAME ANALYTICAL TECHNIQUE, PART IV THE DETERMINATION OF ARSENIC AND ANTIMONY,
Birmingham Univ. (England). Dept. of Chemistry.
R. Belcher, S. L. Bogdanski, S. A. Ghonaim, and A. Townshend.
Analytica Chimica Acta, Vol 72, No 1, p 183-187, September, 1974. 4 fig, 13 ref.

Descriptors: *Analytical techniques, *Flame photometry, *Arsenic compounds, *Metals, Testing procedures, Laboratory tests, Chemical analysis, Spectrophotometry, *Pollutant identification.
Identifiers: *Antimony, Molecular emission cavity analysis.

In molecular emission cavity analysis (MECA), the sample is placed within a small cavity at the end of a rod, which is then positioned in a hydrogen-nitrogen flame, so the flame-gas flows almost vertically past the cavity entrance. The sample in the cavity is vaporized and emits band emissions characteristic of the elements in the sample. As or Sb aspirated as the chloride into a hydrogen diffusion flame produced a faint bluish-white emission. Introduction of oxygen into the cavity gave an intense emission restricted within the cavity. To decrease the number of interferences, a volatilization system was applied. As and Sb were reduced by sodium borohydride to arsine and stibine, and the gases were swept into the MECA cavity, placed in a hydrogen-nitrogen diffusion flame, by a slow stream of nitorgen. The intensity of the resulting band emission was recorded as a function of time, and the maximal emission intensity was measured at the appropriate wavelengths. The optimal conditions for As or Sb in aqueous solutions. (Pulliam-Vanderbilt)
W75-06302

AN ANALYTICALLY USEFUL COULOMETRIC GENERATION OF MICRO AMOUNTS OF METAL IONS, PART II. ELECTROGENERATION OF LEAD (II),
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
T. J. M. Pouw, G. DenBoef, and U. Hannema.
Analytica Chimica Acta, Vol 68, No 1, p 243-246, January, 1974. 2 fig, 1 tab, 1 ref.

Descriptors: *Analytical techniques, *Lead, *Volumetric analysis, *Electrochemistry, Oxidation, Laboratory tests, Testing procedures, *Pollutant identification.

The coulometric preparation of lead (II) ions from liquid lead amalgam was described. The major problem encountered in the preparation was the spontaneous oxidation of lead amalgam during interruptions of the generation current. This spontaneous oxidation was suppressed by a potential of -1.2 V vs. S.C.E. The current efficiency was determined by measuring, at a given generation current, the time needed to convert an accurately known amount of EDTA into the metal complex by means of spectrophotometric indication of the equivalence point. The lead-EDTA complex displayed an absorbance maximum at 242 nm with a molar absorptivity of the order of 9000. The amount of EDTA titrated corresponded to a concentration of the order of 0.000001 M. (Jernigan-Vanderbilt)
W75-06304

CHELATION OF BETA-DICARBONYL COMPOUNDS AND THEIR DERIVATIVES: PART 34 THE USE OF THIOBENZOYLMETHANE FOR THE EXTRACTION AND PHOTOMETRIC DETERMINATION OF TRACES OF THALLIUM AND MERCURY, (IN GERMAN),
Pedagogische Hochschule, Potsdam (East Germany). Sektion Chemie/Biologie.
E. Uhlemann, and B. Schuknecht.
Analytica Chimica Acta, Vol 69, No 1, p 79-84, March, 1974. 5 fig, 2 tab, 12 ref. English summary.

Descriptors: *Separation techniques, *Mercury, *Heavy metals, *Trace elements, *Spectroscopy, Analytical techniques, Lead, Tin, Zinc, Gold, Copper, Nickel, Cobalt, Iron, Manganese, Chromium, Alkali metals, Alkaline earth metals, Fluorides, Chlorides, *Pollutant identification.

Thiodibenzoylmethane is a very suitable ligand for the extraction and spectrophotometric determination of traces of mercury (0.05-0.5 micromol) and thallium (0.1-1.0 micrmol). Both methods are rapid and can be made highly selective by means of masking reagents. The influence of numerous metals, e.g. Ga, In, Pb, Sn, As, Sb, Bi, Cd, Zn, Pd, Ag, Cu, Ni, Co, Fe, Mn, Cr, alkali and alkaline earth metals, and also of anions as fluoride, chloride, bromide, iodide, thiocyanate, sulphide, sulphate, nitrate, EDTA and thioglycolic acid was examined. (Jernigan-Vanderbilt)
W75-06305

CHELATION OF BETA-DICARBONYL COMPOUNDS AND THEIR DERIVATIVES PART 36. THE EXTRACTION AND PHOTOMETRIC DETERMINATION OF CADMIUM WITH THIODIBENZOLYMETHANE IN COMPARISON WITH OTHER SPECIAL REAGENTS, (IN GERMAN),
Paedagogische Hochschule, Potsdam (East Germany). Sektion Chemie/Biologie.
B. Schuknecht, G. Robisch, and E. Uhlemann.
Analytica Chimica Acta, Vol 69, No 2, p 329-334, April, 1974. 2 fig, 2 tab, 21 ref.

Descriptors: *Chelation, *Separation techniques, *Cadmium, *Photometry, Trace elements, Alkaline earth metals, Aluminum, Manganese, Iron, Chromium, Tin, Lead, Copper, Cobalt, Nickel, Gold, Mercury, Zinc, *Pollutant identification.
Identifiers: Thiodibenzoylmethane.

Thiodibenzoylemethane was a suitable reagent for the extraction and photometric determination of traces and cadmium. There was no interference from 10000-fold amounts of alkaline and alkaline earth metals, B, Al, Ga, In, Mn, Fe, Cr, and from 1000-fold amounts of As, Sb, Sn, Pb, Bi, Cu, Co, Ni, or Pd, Ag, Hg, Tl, and Zn were tolerated up to a 100-fold excess. The proposed method was compared with various other possibilities for cadmium determinations. (Jernigan-Vanderbilt)
W75-06306

A STUDY OF THE OPTIMAL CONDITIONS FOR FLAMELESS ATOMIC ADSORPTION SPECTROMETRY OF IRIDUM, PLATINUM AND RHODIUM,
Ghent Rijksuniversiteit (Belgium). Lab. of Analytical Chemistry.
E. Adriaenssens, and P. Knoop.
Analytica Chimica Acta, Vol 68, No 1, p 37-48, January, 1974. 6 tab, 8 fig, 6 ref.

Descriptors: *Metals, *Analytical techniques, Spectroscopy, Reliability, Quality control, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy, *Iridium, *Platinum, *Rhodium.

The optimal working conditions under which iridium, Platinum and rhodium can be determined with the aid of flameless atomic absorption spectrometry with a Massmann Furnace were examined. The limits of detection were in the range 10 to the minus 9th power - 10 to the minus 10th power g. The influence of acids and mutual interferences was checked. The effect of the sample volume on the atomic absorption signals was related to temperature differences in the graphite tube. Factors affecting reproducibility were discussed. (Jernigan-Vanderbilt)
W75-06307

SOLVENT EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF NICKEL (II) WITH THIOTHENOYLTRIFLUOROACETONE,
Indian Inst. of Tech., Bombay. Dept. of Chemistry.
R. R. Mulye, and S. M. Khopkar.
Separation Science, Vol 7, No 5, p 605-610, 1972. 2 fig, 2 tab, 7 ref.

Descriptors: *Nickel, *Solvent extraction, *Analytical techniques, *Colorimetry, Separation techniques, Spectroscopy, Testing procedures, Laboratory tests, Instrumentation, *Pollutant identification.

Nickel was quantitatively extracted with 0.001M thiothenoyltrifluoroacetone (STTA) in carbon tetrachloride at pH 6.5. An aliquot of the solution containing 20 micrograms of nickel was taken. The volume of the aqueous phase was made up to 25 ml. The solution was then transferred to a spearatory funnel and 10 ml of 0.001 M STTA in carbon tetrachloride was added. The mixture was shaken on a wrist action flask shaker for about 10 minutes, and the layers were allowed to settle and separate. The aqueous layer was withdrawn and the yellow-orange colored nickel complex was transferred into a volumetric flask and its absorbance was measured at 480 nm against the reagent blank. The amount of nickel was computed from the calibration curve. The system conforms to Beer's Law in the concentration range of 0.5 - 5 micrograms/ml of nickel. The complex is stable for 96 hours. Nickel can be separated from several cations and anions. (Jernigan-Vanderbilt)
W75-06308

THE SEPARATION OF ZINC AND COPPER FROM SEAWATER BY ADSORPTION COLLOID FLOTATION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
Y. S. Kim, and H. Zeitlin.
Separation Science, Vol 7, No 1, p 1-12, 1972. 4 fig, 5 tab, 15 ref.

Descriptors: *Zinc, *Copper, *Cations, *Sepatation techniques, *Sea water, Adsorption, Inorganic compounds, Ions, Instrumentation, Spectroscopy, Analytical techniques, Colloids, Flotation, *Pollutant identification.

Procedures were described whereby zinc and copper present as cations in seawater were brought to the surface in less than 5 min by an adsorption colloid flotation process which utilizes a negatively charged ferric hydroxide collector, a cationic surfactant, dodecylamine and air. Statistical studies on test series showed a mean recovery of 94.0% with a relative standard deviation of 6.1% for zinc and a mean recovery of 95.0% with a relative standard deviation of 6.1% for copper. (Jenigan-Vanderbilt)
W75-06309

ION EXCHANGE BEHAVIOR OF MERCURY (II) IN MIXED SOLVENTS: SEPARATION FROM ZINC (II), CADMIUM (II), GOLD (III), AND THALLIUM (III),
Roorkee Univ. (India). Chemical Lab.
C. B. Gupta, and S. N. Tandon.
Separation Science, Vol 7, No 5, p 513-525, 1972. 17 tab, 4 fig, 16 ref.

Descriptors: *Ion exchange, *Mercury, *Separation techniques, *Solvents, Zinc, Cadmium, Gold, Thallium radioisotopes, Cation exchange, Anion exchange, Acids, Laboratory tests, *Pollutant identification.

The cation-and anion-exchange behavior of Zn (II), Cd (II), Au (III), Tl (I), and Tl (III) in a mixture of HCl or HNO3 and methanol, acetone, or tetrahydrofuran at constant 0.6M acid strength was investigated. The coefficients of those elements between cation- and anion-exchangers Amberlit IR-120 and Amberlite IR-400, and aqueous solutions containing nitric or hydrochloric acid

and organic solvents were determined. The separation of Hg (II) from Zn (II), Cd (II), Au (III), and Tl (III) was proposed in mixed solvents with high separation factors. Some of these separations were actually performed using the column methods. (Jernigan-Vanderbilt)
W75-06310

ASSOCIATION OF METHIONINE REQUIREMENT WITH METHYL MERCURY RESISTANT MUTANTS OF YEAST,
Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
A. Singh, and F. Sherman.
Nature, Vol 247, No 5438, p 227-229, January, 1974. 2 fig, 8 ref.

Descriptors: *Mercury, *Microorganisms, *Metabolism, Organic compounds, Laboratory tests, Testing procedures, Cultures, Yeasts, Isolation, Pollutant identification.
Identifiers: *Methylmercury, *Methionine.

A method of isolation and characterization of methyl mercury resistant mutants of Saccharomyces cerevisiae is described. The study was undertaken with the view that the examination of physiological changes associated with genetically defined resistant mutants will be useful in studying the mechanisms of cellular detoxification of organic mercurials. When the colonies selected for methyl mercury resistance were analyzed, most of them would not grow on minimal medium with or without methyl mercury and with the supplements necessary to satisfy the nutritional requirement of the parent strain. Further tests revealed that these mutants had become auxotrophic for methionine; the authors hypothesized that a compound involved directly or indirectly in the biosynthesis of methionine can cause detoxification either by the formation of a complex with methyl mercury or by conversion of it to a volatile product. (Jernigan-Vanderbilt)
W75-06311

TRACE METALS IN OYSTER SHELLS,
Louisiana State Univ., Baton Rouge. Dept. of Geology.
R. E. Ferrell, T. E. Carville, and J. D. Martinez.
Environmental Letters, Vol 4, No 4, p 311-316, 1973. 1 tab, 5 ref.

Descriptors: *Trace elements, *Oysters, *Metals, *Distribution, Marine animals, On-site data collections, Analytical techniques, Spectroscopy, Laboratory tests, Lead, Mercury, Cadmium, Zinc, Copper, Chromium, *Pollutant identification.
Identifiers: Atomic absorption spectrometry.

Measurements using atomic absorption spectrometry established the presence of Pb, Hg, Zn, Cu, and Cr in shells of the oyster Crassostrea virginica in amounts considerably higher than their concentration in sea water. The degree of concentration was more than a thousand-fold for all elements. Lead exhibited the greatest concentration, mercury the least. Preliminary comparisons of trace elements in shells from widely separated areas did not suggest large differences. It is concluded that the relatively high values obtained for Pb, Cu, and Cd suggest these analyses have a good potential for assessment of man's contribution to global pollution. Comparison of these data with trace element contents of ancient shells may be useful in evaluating the importance of pollution-induced changes in coastal waters. (Jernigan-Vanderbilt)
W75-06312

ATMOSPHERIC CONCENTRATIONS AND SOURCES OF TRACE METALS AT THE SOUTH POLE,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-06315

MINERAL SLEUTH WILL SCAN OCEAN FLOORS.
For primary bibliographic entry see Field 7B.
W75-06316

AGRICULTURAL USE OF SEWAGE TREATMENT PLANT SLUDGES: A POTENTIAL SOURCE OF MERCURY CONTAMINATION,
Toronto Univ. (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-06323

TRACE ELEMENT EQUILIBRIUM STUDIES,
Naval Oceanographic Office, Washington, D.C.
J. D. Gassaway.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-776 124, $3.25 in paper copy, $2.25 in microfiche. December, 1973, 11 p, 4 fig, 1 tab, 8 ref.

Descriptors: *Trace elements, *Equilibrium, *Seawater, *Ion exchange, *Resins, Water analysis, Diffusion, Laboratory tests, Metals, Ion transport, Water quality control, Ions, *Pollutant identification, Chemical reactions.

The equilibrium distribution coefficients of trace elements in seawater on ion-exchange resins were investigated. These resins contained various organic complexing and precipitating agents known to react with the elements under study. The resins used were either commercially prepared or synthetic modifications of commercial resins. The equilibrium distribution coefficient (log D) of 65Zn with respect to Chelex 100 and toluenesulfonamide increased with increasing pH, obtaining a maximum value (log D greater than 4) at a pH of 8.3. For the same resins, log D of 60 Co(II) decreased with increasing pH for Chelex 100, but increased with increasing pH for toluenesulfonamide. Log D for 60 Co(II) with respect to Chelex 100 was always higher than the values observed for toluenesulfonamide as a function of increasing pH. Log D's were determined for 51 Cr (III) with respect to Chelex 100, toluenesulfonamide, ammonium pyrrolidinedithiocarbamate (APDC) and 2- amino cyclohexenedithiocarboxylic acid (ACDC). Toluenesulfonamide had the maximum log D (about 3) for 51 Cr(III) at pH 8.5. The equilibrium distribution coefficients for 203 Hg(II) were determined only with respect to Chelex 100. Log D varied from approximately two at pH 2 to one pH 8. Since Chelex 100 acts as an anion' exchange resin below pH 4, apparently Hg C14(2-) is being exchanged. (Pulliam-Vanderbilt)
W75-06326

PERSISTENCE OF SOME CHEMICALS IN PACIFIC NORTHWEST FORESTS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-06335

QUANTITY AND QUALITY OF STREAMFLOW AFTER UREA FERTILIZATION ON A FORESTED WATERSHED: FIRST-YEAR RESULTS,
No Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
G. M. Aubertin, D. W. Smith, and J. H. Patric.
In: Forest Fertilization Symposium Proc., p 88-100, 1973. 4 fig, 5 tab, (Forest Service General Technical Report NE-3).

Descriptors: *Forest management, *Fertilization, *Water quality, Water chemistry, *Streamflow, Forest watersheds, *Ureas, Water analysis, Pollutant identification.

Streamflow was analyzed to determine the effects on the quantity and quality of water flowing from a 74-acre calibrated watershed that had been fertilized with 500 pounds of urea per acre. During the first year after fertilization, no change was detected in the quantity of streamflow. Water quality, as determined from analysis of 829 samples, remained high. Comparison of nitrogen discharge data for the year before and after fertilization revealed approximately 18 percent greater nitrogen discharge after fertilization. Loss of nitrogen was accompanied by increased loss of certain metallic cations. (Forest Service)
W75-06338

MICROBIOLOGY-DETECTION OF BACTERIAL PATHOGENS AND THEIR OCCURRENCE, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio.
D. J. Reasoner.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1395-1408, June, 1974. 19 ref.

Descriptors: *Microbiology, *Salmonella, *Water pollution, *Disease, *Reviews, *Bibliographies, Pollutant identification, E. coli.
Identifiers: *Gastrointestinal disturbances, Enteropathogenic e coli.

Enteropathogenic Escherichia coli, is a most serious in young animals and children. Chlorination of water prevented contamination of water that had led to the poisoning of laboratory animals. Ewin developed the three species concept to avoid confusion in the study of Salmonella. All Salmonella, excepting the S. cholera-suis and S. typhi, are considered serotypes or biserotypes of S. enteritidis, numbering 1,500 or more. According to the U.S. Department of Agriculture, the frequency of salmonellae isolations from different nonhuman source categories were: animal feeds (32.6 percent), domestic animals and their environment (26.7 percent), human food products; eggs, poultry, red meat, etc. (14.5 percent), fish, reptiles and environment (10.1 percent), and wild animals and birds (4.4 percent). It was determined that the salmonellae in feed were not the salmonellae which produced salmonellosis in animals. (Leibowitz-FIRL)
W75-06342

5B. Sources Of Pollution

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK. EXECUTIVE SUMMARY.
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W75-05858

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK, FINAL REPORT (REVISED).
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W75-05870

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
C. D. Haynes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 660, $3.75 in paper copy, $2.25 in microfiche. Alabama Natural Resources Center, University, Alabama, September 1974. 42 p, 11 fig, 1 tab, 13 ref, append. OWRT A-037-ALA(1).

Descriptors: *Waste disposal wells, *Permeability, *Industrial wastes, *Underground reservoirs, Underground waste disposal, *Pressure fracturing, Costs, *Computer programs, Design.

Identifiers: Disposal costs, *Hydraulic fracture gradient.

The effect of the hydraulic fracture gradient on deep-well liquid waste disposal has been studied by computer. A program used for calculating design and cost information for subsurface disposal was modified to calculate hydraulic pressure gradient and pressure buildup. Pressure buildup calculations were made for three conditions of decreasing permeability throughout the life of a disposal well. By stipulating the hydraulic fracture pressure to be a never-exceed value, the computer was instructed to drill additional wells if the injection pressure increased to this limiting value. These studies show that unit costs for deep-well disposal increase as the permeability diminishes, as would be expected, but several inflection points in this analysis indicated that optimum design criteria exist. Unit costs also increase with increasing values of original reservoir pressure, but decrease as injection volume is increased. The unit costs converge, however, as the permeability is impaired. This program should offer a quick design and cost estimate for practically any deep-well disposal project. The addition of pressure buildup and hydraulic fracture gradient in the computations should present a more realistic approach to deep-well disposal system design than has been previously available.
W75-05911

MAN-CAUSED FLUCTUATIONS IN QUALITY OF WATER FROM FORESTED WATERSHEDS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant.
In: Proceedings of the Joint FAO/U.S.S.R. International Symposium on Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August - 6 September 1970, Food and Agricultural Organization, United Nations (Rome), p 209-218, 1972. PNW-1602.

Descriptors: *Water pollution sources, *Chemicals, *Pesticides, *Sedimentation, *Nutrients, Temperature, Land management, *Forest watersheds, Path of pollutants, Water quality.

Water quality is a relative term, the meaning of which varies with intended use of the water. In the absence of well-defined standards of quality for waters flowing from forested watersheds, water quality can only be related to the broad concept of pollution levels of the various parameters of water quality. For this purpose, water pollution is defined as any impairment of water properties that adversely affects man directly as a living organism or indirectly through reducing the value of his physical objects or possessions or his opportunity for recreation and appreciation of nature. The changes in energy patterns, chemical or physical constitution, or abundance of organisms in forest waters that do constitute pollution are most often the result of man's activity. Results of research indicate that it is possible for man to enjoy the economic and aesthetic values afforded by forested areas and yet maintain an unpolluted supply of water. The key to producing multiple benefits from the forest, including high quality water, is the amount of care that the forest watershed manager can and will exert in all his activities. (See also W75-05912) (Forest Service)
W75-05914

CHEMICAL BRUSH CONTROL: ASSESSING THE HAZARD,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
L. A. Norris.
Journal of Forestry, Vol 69, No 10, p 715-720, October 1971. 1 fig, 4 tab, 23 ref. PNW-1602.

Descriptors: *Water pollution sources, *2-4-5-T, *2-4-D, *Aminotriazole, *Toxicity, Forestry, Persistence, Food chains, Herbicides.

Identifiers: Picloram, *Chemical brush control.

An adequate evaluation of the hazard associated with the use of any chemical agent requires consideration of both the toxicity of the material and the potential for exposure of nontarget organisms. The hazard can be high only if both the toxicity of the chemical and the potential for exposure to a significant dose are high. The relatively large doses of 2,4-D, amitrole, 2,4,5-T, and picloram required to produce acutely toxic responses in most nontarget organisms are not likely to occur from normal chemical brush control operations on forest lands. The short persistence, lack of biomagnification in food chains, and the rapid excretion of these herbicides by animals preclude chronic exposure and, therefore, chronic toxicity. A long history of field use and research shows common brush control chemicals can be used with minimum hazard to the quality of the environment. (Forest Service)
W75-05922

RELATIVE CONTRIBUTION OF SEDIMENT FROM SOURCE AREAS AND TRANSPORT PROCESSES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05926

COMPARATIVE WATER QUALITY - NATURAL AND DISTURBED STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05927

THE ENTRY AND FATE OF FOREST CHEMICALS IN STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
L. A. Norris, and D. G. Moore.
In: Proceedings of a Symposium on Forest Land Uses and Stream Environment, Oct. 19-21, 1970. Oregon State University, Corvallis, p 138-158, August 1971. 4 tab, 9 fig, 82 ref. PNW-1602.

Descriptors: *Water quality, *Water pollution sources, *Herbicides, Insecticides, Fertilizers, Chlorinated hydrocarbon pesticides, Carbamate pesticides, Adsorption, Distribution patterns, Persistence, *Path of pollutants.

Initial distribution of aerially applied forest chemicals, mechanisms of their entry into, and their fate in the aquatic environment are considered. Research findings and long history of use have established that most forest chemicals offer minimum potential for pollution of the aquatic environment when they are used properly. (Forest Service)
W75-05928

THE FUTURE ROLE OF CHEMICALS IN FORESTRY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05935

DDT RESIDUES IN FOREST FLOOR AND SOIL AFTER AERIAL SPRAYING, OREGON--1965-68,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant, D. G. Moore, W. B. Bollen, and B. R. Loper.
Pesticides Monitoring Journal, Vol 6, No 1, p 65-72, June 1972. 2 fig, 7 tab, 44 ref. PNW 1602.

Descriptors: *DDT, *DDD, *DDE, Forest soils, Vegetation, Streams, Persistence, Leaching, *Oregon, *Pesticide residues, Water pollution sources, *Path of pollutants.

One month after aerial application of DDT (12 oz/acre) to an eastern Oregon forest, 3 oz/acre of DDT residues (DDT, its isomers and metabolites-DDD,DDE, p,p'-DDT, and o,p'-DDT) were detected in the forest floor; 3 years later, the DDT content had decreased by more than 50%, and had not leached into the surface mineral soil. At the time of spraying, water from two streams draining the sprayed area had a total DDT content of about 0.3 ppb. This low concentration decreased rapidly to levels below limits of analytical detection. No effect of the spraying was noted on soil microbial populations, nitrification rate, or amount of nitrate nitrogen in the soil. Of the 12 oz of DDT applied per acre, about 26% reached the ground surface initially; and over 36 months, about 6% more was brought to the ground in litter-fall. Thus, approximately one-third of the sprayed chemical reached the forest floor. The need for more efficient aerial methods of chemical application is evident. (Forest Service)
W75-05936

STATISTICAL ANALYSIS OF WATER TEMPERATURE RESIDUALS,
Missouri Univ., Rolla. Dept. of Computer Science.
For primary bibliographic entry see Field 2E.
W75-05958

ON THERMAL STRATIFICATION IN LARGE BODIES OF WATER,
Moncton Univ. (New Brunswick). Dept. of Engineering.
For primary bibliographic entry see Field 2H.
W75-05959

MEASUREMENTS OF SEDIMENT OXYGEN DEMAND CHARACTERISTICS OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
T. A. Butts.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 992. $3.75 in paper copy, $2.25 in microfiche. Report of Investigation 76, 1974. 32 p, 15 fig, 8 tab, 14 ref, 4 append.

Descriptors: *On-site investigations, *Dissolved oxygen, *Bottom sediments, *Water pollution, *Oxygen demand, Data collections, On-site data collections, Rivers, *Illinois, Sediments, Clays, Sands, Silts, Gravels, Sampling, Instrumentation, Analysis, Organic matter, Water pollution sources, Waste assimilative capacity, Surface waters.
Identifiers: Upper Illinois Waterway.

Oxygen demand characteristics of bottom sediments for a 113-mile reach of the Upper Illinois Waterway were measured in situ at 22 locations in order to assess the effects of such demand on the dissolved oxygen resources of the overlaying water. For these measurements of sediment oxygen demand (SOD), a bottom sampler was specially designed to entrap and seal a quantity of water at the river bottom. Changes in dissolved oxygen (DO) concentrations within the entrapped water were recorded by a DO probe fastened in the sampler. SOD values for 20 undisturbed bottom locations ranged from 0.56 to 5.00 grams per square meter per day (g/sq m/day), and SOD values at 2 disturbed (equatable to barge passages) bottom locations were 6.45 and 8.08 g/sq m/day. Sand and gravel bottoms had an average SOD value of 1.39 g/sq m/day and silt-clay bottoms had an average value of 3.02 g/sq m/day. The oxygen demands of sediments in many parts of the waterway are sufficiently high to impose a significant demand on the DO content of the overlying water. In addition to SOD measurements, 172 bottom samples were collected, described in detail, an

analyzed for percent organic and dried solids content. Expressions for the relationship between these percentages and the SOD rates were developed for silt-clay and sand-gravel sediments, and these expressions were used to estimate probable SOD values at the various sampling sites. Charts of the river bed depict the ranges of SOD values useful in engineering analyses of dissolved oxygen demand relationships for the Upper Illinois Waterway. (Humphreys-ISWS)
W75-05972

A STUDY OF CONVECTIVE-DISPERSION EQUATION BY ISOPARAMETRIC FINITE ELEMENTS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
M-S. Wang, and R. T-S. Cheng.
Journal of Hydrology, Vol 24, No 1/2, p 45-56, January 1975. 9 fig, 20 ref. OWRT C-4026(No 9006)(3). OWRR 14-31-0001-9006.

Descriptors: *Dispersion, *Aquifers, *Water pollution, *Groundwater movement, *Mathematical studies, Finite element analysis, *Path of pollutants, Boundary processes, Water pollution control, Model studies, Numerical analysis.
Identifiers: Convective-dispersion equation, Isoparametric finite elements, Irregular node distribution.

The transport of pollutants in groundwater aquifers was studied by means of a mathematical model. The governing equation for the movement of impurities took the form of a convective-dispersion equation which was solved numerically by using a isoparametric, quadrilateral finite element method. The mixed boundary conditions and irregular distribution of the nodes were handled easily by the finite element technique. The calculations showed that the numerical model can be used effectively to predict the distribution of contaminant for purposes of groundwater pollution control. (Singh-ISWS)
W75-06015

PROCEEDINGS OF SEMINAR ON METHODOLOGY FOR MONITORING THE MARINE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C., Office of Monitoring Systems.
For primary bibliographic entry see Field 5A.
W75-06020

MATHEMATICAL MODELING AS A FRAMEWORK FOR COASTAL MONITORING,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
R. J. Callaway.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 6-22, October 1974. 4 fig, 1 tab, 22 ref.

Descriptors: *Mathematical models, *Monitoring, *Pollutant identification, Coasts, Model studies, Water pollution sources, Water pollution, Mathematics, Theoretical analysis.

Equations were given for mathematical modeling of coastal pollution of varying time and space scales. Monitoring was discussed in relation to a world model. Depending on the goals of the investigator, pollution problems can be viewed from space scales ranging from microcosmic to world. Time scales span the range from seconds to centuries. A monitoring program should seek to minimize equipment requirements, sampling frequency, and number of sampling locations. This will be determined by the type of waste input and by the physical, chemical, and biological processes affecting the concentration and distribution of the pollution. (See also W75-06020) (Sims-ISWS)
W75-06021

GALVESTON HARBOR: FACTORS AFFECTING POLLUTION AND POLLUTION MONITORING,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-06040

A TIME-DEPENDENT, TWO-DIMENSIONAL MATHEMATICAL MODEL FOR SIMULATING THE HYDRAULIC, THERMAL, AND WATER QUALITY CHARACTERISTICS IN SHALLOW WATER BODIES,
Oak Ridge National Lab., Tenn.
M. Siman-Tov.
Available from the National Technical Information Service, Springfield, Va 22161 as ORNL-TM-4626, $25.75 in paper copy, $2.25 in microfiche. ORNL-TM-4626, August 1974. 422 p, 75 fig, 11 tab, 107 ref, 2 append. Contract W-7405-eng-26.

Descriptors: *Mathematical models, *Model studies, *Water quality, *Simulation analysis, Water temperature, Computer models, Synthesis, Analytical techniques, Theoretical analysis, Heated water, Thermal powerplants, Numerical analysis, Equations, Rivers, Estuaries, Shallow water, Open channels, Firite element analysis, Flow characteristics, Velocity, Hydraulics, Temporal distribution, Time, Computer programs, Discharge(Water), Dispersion, Diffusion, Entrainment, Forecasting, Estimating.
Identifiers: *Far-field model, Near-field model.

The model for vertically mixed shallow water bodies was based on a time-dependent discrete element formulation of the basic conservation equations for total mass, momentum, energy, and mass concentration of soluble constituents. Equations were directly formulated in an integral form over each discrete element, reduced to a set of initial-value ordinary differential equations with respect to time, and numerically integrated by the multistep explicit solution of the Runge-Kutta-Gill method. Stability of the time step to be used was evaluated. Effects of bottom shear stresses, wind stresses, heat exchange with the atmosphere, Coriolis forces, seepage, evaporation, rain, tributaries, powerplant intake and discharge, and other possible contributions were included. Internal normal and shear stresses, hydrostatic pressure, turbulent diffusion, and the longitudinal dispersion caused by vertical variations were taken into account. Density and other physical properties can be expressed as functions of temperature and constituent mass concentrations. Although basically a far-field model, it can be used for approximate simulation of the near field. Mutual effects of a number of powerplants sharing the same water body and recirculation of discharge water back into the intake structure can be simulated. Appendixes contain tabulations of input and output for two sample problems and a computer program. (Humphreys-ISWS)
W75-06046

WATER QUALITY DECISION MAKING IN ATLANTA, GEORGIA, THREE RIVERS STUDY,
Black, Crow and Eidsness, Inc., Atlanta, Ga., and Atlanta Public Works Dept., Ga.
For primary bibliographic entry see Field 5D.
W75-06058

OBSERVATION ON THE RATE OF PHOSPHORUS INPUT INTO LAKE GEORGE AND IT'S RELATIONSHIP TO THE LAKE'S TROPHIC STATE,
New York State Department of Environmental Conservation, Albany.
L. J. Hetling.
Technical Paper No 36, August 1974. 20 p, 1 fig, 7 tab, 21 ref.

Descriptors: *Phosphorus, *Eutrophication, *Lake morphology, *Water pollution sources, *On-site data collections, Nutrients, Water quality, Water pollution, Phosphorus compounds, Oligotrophy, Trophic level, Mesotrophy, New York, Water analysis, Water chemistry, Water pollution control.
Identifiers: *Lake George(New York).

There is general agreement that an excessive addition of phosphorus to Lake George will accelerate the cultural eutrophication process, eventually changing the present quality of the lake and reducing its value for recreation and water supply. Due to readily apparent natural differences in north and south portions of the lake, separate phosphorus balances for each portion seemed appropriate. Comments on the limnological implications of the phosphorus input rate are presented. Detailed examination of the watershed indicates that potential phosphorus sources to the lake are: precipitation, land runoff from forested areas, land runoff from urbanized areas, Lake George Sewage Treatment Plant, Bolton Sewage Treatment Plant, and individual septic tank effluents in unsewered areas. Estimated phosphorus loadings for Lake George can be plotted against mean depth as proposed by R. A. Vollenweider (Report No DAS/CSI/68.27, Organization for Economic Cooperation and Development). The results indicate that both the north and south portions of the lake are in the range typical for oligotrophic lakes. The agreement between phosphorus input data and the lake's trophic state indicates that uncontrolled increases in phosphorus loading to the lake will cause a change toward eutrophic conditions. An analysis of data from other geographical areas indicates that developed land may contribute up to five times as much phosphorus per hectare as forested land. If significant development of land surrounding Lake George takes place without definite programs to control phosphorus input, the lake may gradually change from oligotrophic to mesotrophic, and possibly eutrophic. (Poertner)
W75-06064

AN ANALYSIS OF PAST, PRESENT AND FUTURE HUDSON RIVER WASTEWATER LOADINGS,
New York State Dept. of Environmental Conservation, Albany.
L. J. Hetling.
August 1974. 35 p, 3 fig, 8 tab, 8 ref.

Descriptors: *Hudson River, Water pollution control, *Waste water disposal, *River basin development, Municipal wastes, Sewage effluents, Water quality control, New York, Field investigations, Waste water disposal, Rivers, River basins, Analysis, Urbanization.
Identifiers: *Waste water loadings.

In order to make a rational assessment of water quality in the Hudson River, a study and inventory was made of historical, present, and future waste loadings to the Hudson River Basin. The basin was divided into four physiographic areas in order to facilitate data collection. Past and future trends in wastewater loadings were confined to the lower Hudson area due to its significant water volume and the importance of adjacent land use. Because historic data for the metropolitan area was extremely complex, the analysis was limited to municipal wastewater discharges (which are surprisingly low). About 5% of the municipal sewage receives little or no treatment; however, most of the above discharge will be brought to a secondary treatment level within 5 years if the planned construction program is carried out. Due to general population increases, both sewered population and municipal wastewater flow increased dramatically between 1952 and 1965. In 1965, the New York State Pure Waters Program provided significant State funding for construction and operation of

wastewater treatment facilities. Assuming a direct relationship between pollutional wastewater discharge and river quality, significant improvement in water quality should have occurred in the Hudson River since 1964. If presently planned facilities are constructed, such improvements should continue through 1980. (Poertner)
W75-06065

BIOCHROME ANALYSIS AS A METHOD FOR ASSESSING PHYTOPLANKTON DYNAMICS, PHASE 1,
Arkansas Univ., Fayetteville. Dept. of Botany and Bacteriology.
R. L. Meyer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 816, $4.25 in paper copy, $2.25 in microfiche. Arkansas Water Resources Research Center, Fayetteville, Publication No. 27, December 1974. 62 p, 12 fig, 1 tab, 18 ref, 2 append. OWRT B-029-ARK(1). 14-31-0001-3860.

Descriptors: Bioindicators, *Distribution patterns, Agricultural runoff, *Phytoplankton, Reservoirs, Man-made Lakes, *Arkansas, Algae, Chlorophyll, Effluents, Eutrophication, Ammonia, Nitrates, Phosphates, Missouri, Silicates, Nitrogen, Phosphorus, Temporal distribution, Spatial distribution, Oxygen, Water temperature, Path of pollutants, Land use, Water pollution effects, Sewage.
Identifiers: *Biochrome analysis, *Beaver Lake(Ark-Mo), White River(Ark-Mo), Orthophosphates.

Selected chemical, physical and biological parameters were determined for a man-made lake, Beaver Lake, on the White River of Arkansas and Missouri. The qualitative and quantitative aspects of the temporal and spatial distribution of the algal subcommunities were determined. The epipelic, epilithic, epizooic and metaphytic subcommunities had little influence on the euplanktonic subcommunity. The relationship between the qualitative and quantitative analysis of the biochromes chlorophyll-a, -b, and -c and the phytoplankton species clustered into biochrome sets is discussed. The temporal and spatial distributional patterns of temperature, oxygen, ammonia-N, ortho phosphate-P and silicates are described in parallel with the biological parameters. These data are related to land use practices on the two major feeder streams. One source is influenced by agricultural runoff and the other by suburbanization plus a sewage outfall from a small city. The effects of the transition from riverine to lentic conditions are also considered.
W75-06073

A SYSTEM FOR GEOLOGIC EVALUATION OF POLLUTION POTENTIAL AT MOUNTAIN DWELLING SITES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
J. P. Waltz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 810, $4.25 in paper copy, $2.25 in microfiche. Colorado Environmental Resources Center, Fort Collins, Completion Research Series No. 59, January 1975. 56 p, 12 fig, 2 tab, 40 ref, append. OWRT B-023-COLO(4).

Descriptors: Water pollution, Evaluation, Mountains, *Waste disposal, *Geologic investigations, *Colorado, *Rocky mountain region, Water wells, Septic tanks, *Path of pollutants.

Development of mountain homesites is accelerating in the Rocky Mountains of central Colorado. These homesites often require individual water wells and sewage disposal systems. Unfortunately, the widely used septic tank-leach field system generally is not suited for use in the mountainous terrain where soils are thin or missing. Although current federal regulations call for six feet or more of soil at the leach field site, many of the individual sewage disposal systems now in operation in the Rocky Mountain Region of Colorado fail to meet this requirement. Sewage effleunt at these sites may directly enter bedrock fractures and travel large distances without being purified. As a consequence, contamination of streams, lakes, and ground water from these malfunctioning leach fields has become a problem of increasing magnitude. Investigations of geologic, topographic conditions at over 100 homesites in the Rocky Mountains of north-central Colorado have resulted in the development of objective criteria for evaluating pollution potential at mountain homesites. In addition, the results indicate that contamination of water wells may be decreased significantly where geologic conditions are considered in the selection of sites for leach fields and wells. Although the results should be considered preliminary, they do tend to confirm that the orientation of jointing surfaces in the bedrock significantly affects the travel path of contaminants.
W75-06075

A MODEL FOR PHYSICAL AND BIOTIC REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Entomology.
M. A. Brusven, F. J. Watts, R. Leudtke, and T. I. Kelley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 820, $5.25 in paper copy, $2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, September 1974. 96 p, 36 fig, 6 tab, 22 ref. OWRT A-032-IDA(2).

Descriptors: *Rehabilitation, Streams, *Aquatic insects, *Sediments, Dredging, Mining, Hydrology, Permeability, Flow model studies, Water pollution, *Idaho, Ecology, Design, Methodology, *Silts, Pervious silts, Sediment load, Sediment transport.
Identifiers: *Emerald Creek(Idaho).

A methodology was developed for rehabilitating a silt-polluted stream and the biological impact of rehabilitation on the insect community was measured. Field work was conducted in the East Fork and main stream of Emerald Creek in northern Idaho. The study involved natural field conditions and laboratory simulation. Six control sites were selected based on similarity of flow, substrate type and channel geometry. Sediment samples were tagged and monitored, hydraulic structures were constructed for modification, and changes in the aquatic insect community were studied in conjunction with physical changes in the streambed. Instream alterations were effective for increasing sediment transport, thus improving insect and fish habitat. Other improved conditions included increased pool-riffle ratios and higher values of percent cobble. Due to its hydrological cycle, Emerald Creek can flush large amounts of fine sediments per year. But until the source of pollution sediments is eliminated, excessive loading will continue.
W75-06077

THE DEVELOPMENT OF TOXICITY INDICES FOR ASSESSING THE QUALITY OF THE ILLINOIS RIVER,
Western Illinois Univ., Macomb. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-06080

STUDY OF STRATIFIED OVERFLOWS AND UNDERFLOWS,
Illinois Univ., Urbana. Water Resources Center.
W. H. C. Maxwell, E. R. Holley, C-Y Lin, and S. Tekeli.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 854, $5.25 in paper copy, $2.25 in microfiche. Research Report No. 98, February 1975. 104 p, 13 fig, 38 ref, 2 append. OWRT B-071-ILL(1). 14-31-0001-3880.

Descriptors: *Overflow, *Underflow, *Stratified flow, Fluid mechanics, *Heated water, Hydraulic engineering, Rivers, *Thermal pollution, *Thermal stratification, *Water temperature, Reynolds number.

A general analysis is presented of two-layered stratified flows taking into account effects of sidewall friction and variation of density with horizontal distance. The analysis is applied to the study of arrested thermal wedges and arrested cold water intrusions. Laboratory data were collected and analyzed and it was determined that bed roughness has a significant effect on the interfacial friction factor for arrested thermal wedges but not for arrested cold water intrusions. Friction factors were found to vary significantly along the wedges indicating that use of average values is perhaps undesirable. Local values of friction factor were found to increase with values of a local interfacial Reynolds number.
W75-06081

A STUDY OF NATURAL WATER SYSTEMS IN WESTERN MONTANA,
Utah Univ., Salt Lake City. Dept. of Biology.
A. L. Gaufin.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 852, $4.75 in paper copy, $2.25 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Completion Report, November 1974. 84 p, 6 fig, 25 tab, 40 ref, append. OWRT A-017 MONT(1). 14-01-0001-1846.

Descriptors: *Impaired water quality, *Public health, *Recreation, *Montana, Coliforms, Birds, *Sewage bacteria, Drainage, Water pollution sources, Path of pollutants, Plankton, Productivity.
Identifiers: Flathead Lake(Mont), Glacier National Park(Mont).

A three-phase study, conducted between 1966 and 1970, has as its objective the determination of the water quality of aquatic systems west of the continental divide in Montana. Those parameters which constitute criteria for the quality of water in a particular system were studied to provide criteria as to the quality of water and degree of pollution in various drainage systems throughout the region. Phase 1--investigations of a series of five lakes in the Many Glacier area of Glacier National Park--found that the drainage has not been subjected to extensive organic enrichment. Phase 2--effects of man's activities on the sanitary quality of water in the Grinell Lake-Swiftcurrent Lake Drainage in Glacier National Park--found dangerously high levels of wastes particularly in Swiftcurrent Lake toward the end of the tourist season. Wastes from warm-blooded animals in the park other than man may have contributed to the coliform count. Phase 3--study of plankton productivity throughout Flathead Lake in western Montana--found pockets of coliform pollution near human establishments and campgrounds, and levels of DDT in Kokanee salmon high enough to possibly effect eagles in the area that feed on the spawning salmon. (Williams-Montana State University).
W75-06082

HEAVY METAL DISTRIBUTION IN BOTTOM SEDIMENT AND WATER IN THE TENNESSEE RIVER-LOUDON LAKE RESERVOIR SYSTEM,
Tennessee University, Knoxville, Dept. of Geology.
R. M. Perhac.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 832, $3.75 in paper copy, $2.25 in microfiche. Tennessee Water Resources Research Center, Knoxville, Research Report No. 40, December 1974. 22 p, 1 fig, 9 tab, 12 ref. OWRT A-032-TENN(1).

Descriptors: *Heavy metals, *Bottom sediments, Water quality, *Lake sediments, *Zinc, *Cadmium, *Tennessee, Reservoirs, Water analysis, Mineralogy, Carbonates, Dissolved solids, Clays.
Identifiers: *Tennessee River(Tenn), Loudon Lake(Tenn).

The Tennessee River flows through Knoxville and is dammed about 80 km below the city. Water and bottom sediment were collected over this 80-km course. The sediment was size fractionated and analyzed mineralogically and chemically. Waters were analyzed for particulate content and for Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, and Zn. The mineralogy of the bottom sediment does not reflect the underlying bedrock geology. It reflects the industrialization and effects of damming. Near Knoxville the sediment is mostly coarse dolomite and quartz. The high carbonate content is derived mainly from a zinc milling operation farther upstream. Near the dam the sediment is finer and more clayey, representing a settling effect behind the dam. The trace metal content of the water decreases from Knoxville downstream. The high values upstream, notably Zn and Cd, reflect the high metal content of the carbonates. The metal content in the sediment does not decrease appreciably even though clayey sediment in East Tennessee typically has less heavy metal than the carbonates which comprise the bottom sediment near Knoxville. Apparently heavy metals are being dissolved from the carbonates, transported in solution downstream to be incorporated in the clayey sediment behind the dam. The dammed area is thus serving as a site of accumulation for sediment and for heavy metals. Extraction experiments suggest that the metals are not sorbed on clay surfaces, hence are probably not in forms which are readily available to biota.
W75-06088

SPOKANE RIVER, COOPERATIVE WATER QUALITY STUDY,
Washington State Dept. of Ecology, Olympia. State Water Program.
R. A. Bishop, and R. A. Lee.
Report No 72-001, 1972. 72 p, 16 fig, 30 tab, 10 ref, 2 append.

Descriptors: *Water quality, *Water quality standards, *Water pollution, *Phytoplankton, Coliforms, Oxygen demand, Phosphorus, Nitrogen, Nitrates, *Washington, Dissolved oxygen, Reservoirs, Water pollution sources, Water pollution effects.
Identifiers: *Spokane River(Wash.), Spokane(Wash.), Roosevelt Lake(Wash.), *Long Lake(Wash.).

Eighteen stations were established on the river to monitor water quality and compare it to the Class A standards in the study conducted in 1970 and 1971. Development is minimal and the 32 mile reach is used primarily for recreation. A primary objective was to determine the effects of water quality conditions in Long Lake Reservoir formed in 1915 by construction of Long Lake Dam by the Washington Water Power Company during summer stratification and fall turnover upon water quality of the lower Spokane River. Conditions of increasing eutrophication were noted and phytoplankton was evident in Long Lake and the Lower river. In addition, low dissolved oxygen concentrations were found along with high coliform counts and increased nutrient concentrations in Long Lake, exceeding Class A standards. Although similar conditions were found on the lower river they remained within the standards. The greatest problem is the high nutrient inflow primarily due to domestic sewage requiring additional wastewater treatment along the river. (Park-North Carolina)
W75-06103

REVERSED LONGITUDINAL SALINITY PROFILE OF A MAJOR RIVER IN THE SOUTH-WEST OF WESTERN AUSTRALIA,
Western Australian Dept. of Fisheries and Fauna, Perth. Marine Research Labs.
N. M. Morrissy.
Australian Journal of Marine and Freshwater Research, Vol 25, No 3, p 327-335, December 1974. 4 fig, 1 tab, 12 ref, append.

Descriptors: *Salinity, *River systems, *Australia, Valleys, Geomorphology, Land clearing, Watershed management, Surface waters, Groundwater, Rainfall disposition, River gradients, Conductivity, Seasonal, Fluctuations, Vegetation effects.
Identifiers: Blackwood River(W.A.).

A study is reported of the pattern of salinity in the Blackwood River system of southwest Western Australia, carried out as part of a general investigation of environmental effects on the distribution of a freshwater crayfish. Two series of water samples taken in spring and summer were tested for conductivity values (K2O), and the results show a positive correlation with distance upstream from the estuary. The slopes of the spring and summer regressions were not significantly different, though the load of total dissolved salts passing a gauging station was much greater in spring. The factors contributing to the occurrence of the atypical profile of salinity are discussed. They include a reversed sequence of valley forms, with the younger form nearer to the coast, and the associated tendency to more intense clearing inland; decreasing annual rainfall inland; and the release of cyclic salts from accumulations in groundwater following clearing. Available data from various sources indicate that the pattern of salinity in the Blackwood River is typical of major streams in the area. (Levick-CSIRO Aust)
W75-06112

THE HYDRAULICS OF THE SOUTH AUSTRALIAN GULF SYSTEM. I. CIRCULATION,
Flinders Univ., Bedford Park (Australia).
K. Tronson.
Australian Journal of Marine and Freshwater Research, Vol 25, No 3, p 413-426, December 1974. 10 fig, 4 ref.

Descriptors: *Ocean currents, *Water circulation, *Gulfs, *Australia, Wind pressure, Equations, *Path of pollutants, Coasts, Mathematical models, Hydrodynamics.
Identifiers: Spencer Gulf(S.A.), St. Vincent Gulf(S.A.).

Because of the limited access to the open ocean, discussion of the problems of coastal pollution of waters in the Spencer and St Vincent Gulf system requires an understanding of the circulation within the total area. A study is reported in which it is shown that the steady state circulation equations are a valid first approximation of the circulation in the Gulf area. The equations are solved using two different methods - a hydrodynamical numerical model, and a 'circulation' model - to emphasize different features of the circulation, which seems to be driven mainly by wind stresses. A tentative estimate is made of the time required for water to be replaced in the northern half of Spencer Gulf. (Levick-CSIRO Aust)
W75-06115

THEORETICAL ANALYSIS OF CONDITIONS IN A SALT WEDGE,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W75-06117

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W75-06129

CLINICAL CHARACTERISTICS OF TYPHOID FEVER IN CHILDREN IN EPIDEMIC WATER-BORNE INFECTION,
For primary bibliographic entry see Field 5C.
W75-06130

THE MATHEMATICAL MODELLING OF RIVERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-06132

MASS AND SALT TRANSFERS AND HALOCLINE DEPTHS IN AN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science; and Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
For primary bibliographic entry see Field 2L.
W75-06133

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
S. D. Rees.
Florida Bar Journal, Vol 48, No 5, p 364-367, May 1974. 52 ref.

Descriptors: *Waste disposal wells, *Environmental effects, *Waste water disposal, *Florida, *Water management(Applied), Subsurface waters, Injection wells, Drainage wells, Waste water(Pollution), Well permits, Legal aspects, Legislation, Regulation, Well regulations, Wells, Administrative agencies, state governments, Subsurface investigations, Deep wells, Deep-well pumping, Hydrologic cycle, Ultimate disposal, Underground waste disposal, Waste disposal, Monitoring.
Identifiers: *Administrative regulations.

With increasingly stringent environmental laws and regulations restricting the disposal of sewage and industrial wastes into surface waters, subsurface disposal has received greater recognition as an alternative means of disposal. The history of the use of subsurface disposal in Florida is summarized, and the major areas of concern regarding its feasibility in the state are discussed. The Florida Air and Water Pollution Control Act delegates to the Department of Pollution Control (DPC) the responsibility for enforcing all requirements of state and local pollution control programs. DPC has established strict restrictions upon subsurface waste disposal. Permits are required for both construction and operation of subsurface wells. Efficient waste disposal by means of deep wells depends upon many variables. The lack of knowledge about many of the geologic and hydrologic conditions of the subsurface environment compels the exercise of extreme caution in operating subsurface disposal facilities until means are developed to assess their effect upon the subsurface environment. (Deckert-Florida)
W75-06164

WIND DRIFT SURFACE CURRENTS AND SPREAD OF CONTAMINANTS IN SHELF WATERS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
A. L. Gordon, and R. D. Gerard.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-786

610, $4.25 in paper copy, $2.25 in microfiche. Report No CG-D-5-75, August 1973. 58 p, 12 fig, 3 tab, 13 ref. DOT-CG-23,339-A.

Descriptors: *Oil spills, *Dye releases, *Oil pollution, *Path of pollutants, *Oceans, Currents(Water), Water circulation, Winds, Tracking techniques, Dye dispersion, Dye concentrations, Pollutants, Waste disposal, Aerial photography, New York.
Identifiers: *New York Bight.

The velocity field in the upper few meters of the water column and its dependence on local environmental factors were investigated. The experiments consisted of aerial photography of a pattern of dyed water, free drifters, dye plumes from anchored generators, drogues set at 1, 3, and 5 meters, and floating computer cards. Also photographed were the acid-iron discolored water patterns farther off the coast which enabled a large-scale study to be made. The basic aim was to better understand the fate and behavior of oil contamination. The results indicated the presence of strong vertical and lateral shear within the upper few meters of the water. The upper few centimeters, the layer which would contain the oil contamination, often move at velocities quite different from average 'surface drift.' The convergent zones detected by the dye also accumulate the oil and move it windward at accelerated rates. The oil and dye were frequently transferred to long discontinuity lines in the velocity field, often running north-south in the New York Bight. Oil spilled on the ocean does not spread laterally in a uniform way, but responds to the basic velocity field of the upper few meters and may, in turn, influence the velocity field directly. (Sims-ISWS)
W75-06187

ESTIMATE OF WATER POLLUTION POTENTIAL BASED ON CHARACTERISTICS OF DOMESTIC SEWAGE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
N-H. Tang.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 885, $3.25 in paper copy, $2.25 in microfiche. University of Puerto Rico, Water Resources Research Institute, Mayaguez, Completion Report, January 1975. 41 p, 8 fig, 15 tab, 11 ref, 2 append. OWRR A-043-PR(1).

Descriptors: *Sewage, *Nutrients, *Puerto Rico, *Biochemical oxygen demand, *Chemical oxygen demand, Solid wastes, Measurement, Estimating, *Domestic wastes, Nitrogen, Phosphorus, Water pollution sources.

Accurate measurements of BOD, COD, solids and nutrients in sewage are very important for water pollution control. Many of these per capita values used by engineers today were established decades ago. Re-evaluation of these values is necessary. The sewage from a typical residential area with a population of 1,203 was sampled and measured. Sixteen 24-hour composite samples were collected and analyzed. The average per capita sewage flow was 57.4 gal/day and the average BOD loading was 0.088 lb/day/capita. Both are lower than the established values. Higher concentration of suspended solids (0.126 lb/day/capita) may have been caused by the fact that all houses in the survey area have garbage grinders. Both nitrogen and phosphorus nutrients per capita loading values in the sewage were higher than results of recent Milwaukee study. The need for more washing and cleaning in the tropical climate and the large consumption of high protein foodstuff such as beans in Puerto Rico may be the causes of the difference.
W75-06202

COMPARISON OF OBSERVED ESTUARINE TIDE DATA WITH HYDRAULIC MODEL DATA BY USE OF CROSS-SPECTRAL DENSITY FUNCTIONS,
New York City-Rand Inst., N.Y.
For primary bibliographic entry see Field 2L.
W75-06209

THE INFLUENCE OF ARTIFICIAL RAINFALL AND DI-1-P-MENTHENE ON KARBUTILATE MOVEMENT IN GREENHOUSE SOIL,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
R. M. See, and W. Hurtt.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 607, $3.25 in paper copy, $2.25 in microfiche. Edgewood Arsenal Technical Report EC-SP-74014, September 1974. 9 p, 3 fig, 2 tab, 12 ref.

Descriptors: *Herbicides, *Evaporation control, *Runoff, Bioassay, Greenhouses, Soils, Erosion, Pollutants, Water pollution, Oats, Beans, Simulated rainfall, *Path of pollutants, Water pollution sources.

Simulated rainfall was applied to flats of oats growing in greenhouse soil which had previously been treated with combinations of karbutilate and di-l-p-menthene (Vapor Gard). Aliquots of the runoff from each treatment were applied to the roots of bean plants grown in solution culture as a bioassay for the presence of the herbicide. The growth of the bean plants treated with runoff water from the karbutilate plus Vapor Gard treatment was significantly less than the growth of the plants receiving runoff aliquots from the karbutilate treatment. The dry weight of oats clipped from flats treated with karbutilate was significantly less than the values obtained for the karbutilate plus Vapor Gard treatment. These data suggest that Vapor Gard increased rather than decreased the amount of karbutilate in the surface runoff. (Sims-ISWS)
W75-06214

SURVIVAL OF VIRUSES AND BACTERIA IN A SIMULATED SANITARY LANDFILL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
R. S. Engelbrecht.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 589, $4.25 in paper copy, $2.25 in microfiche. Report No. Tissue-API-73-1, December 1973. 51 p, 8 fig, 8 tab, 11 ref.

Descriptors: *Landfills, *Bacteria, *Viruses, *Lysimeters, Simulation analysis, Waste disposal, Solid wastes, Pathogenic bacteria, Leachate, Water pollution sources, Path of pollutants.
Identifiers: Disposable diapers.

The problem of pathogens in sanitary landfills was studied. A large-scale lysimeter was operated to simulate a sanitary landfill. Lysimeter was filled with residential solid waste and seeded with specific amounts of viruses. Leachate generated by landfill was analyzed for viruses and bacteria. Under the conditions of lysimeter operation and considering the virus detection method used, no viruses were found in the leachate. The bacterial content of the leachate, as measured by total plate count, total coliforms, fecal coliforms, and fecal streptococci, was found to decrease with time of lysimeter operation. (Sims-ISWS)
W75-06231

SUBSURFACE BIOLOGICAL ACTIVITY IN RELATION TO GROUND-WATER POLLUTION,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
J. F. McNabb, and W. J. Dunlap.
Ground Water, Vol 13, No 1, p 33-44, January-February 1975. 62 ref.

Descriptors: *Groundwater, *Water quality, *Water pollution sources, Biological communities, Ecosystems, Habitats, Heat resistance, Sulfur bacteria, Methane bacteria, Soil microorganisms.

Biological activity occurring in subsurface regions below the soil zone may be of considerable importance in determining the fate and effect of pollutants in groundwater, but this possibility has received little previous attention. A discussion was given of subsurface biological activity in regard to groundwater pollution as reflected by available literature references. The subsurface environment was discussed in terms of factors likely to be of greatest significance in regard to the development of biological systems, and previous investigations of subsurface microbial activity were reviewed. Available information indicates the presence in the upper continental crust of the earth of numerous regions, particularly those of sedimentary origin, which are probably suitable habitats for many microbial species. Previous investigations of subsurface microbial activity clearly show the presence of diverse microbial populations in many subsurface regions below the soil zone. Hence, microbial activity appears both possible and probable in most subsurface regions of importance in regard to groundwater. Further elucidation of the extent and nature of microbial activity in subsurface regions is needed in developing methods for predicting the impact on groundwater quality of pollutants released into the earth's crust. (Gibb-ISWS)
W75-06238

A STUDY OF SOIL MATRIC POTENTIAL AND TEMPERATURE IN HANFORD SOILS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resource Dept.
For primary bibliographic entry see Field 2G.
W75-06240

A LIMNOLOGICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN THE NAVASOTA RIVER, TEXAS, AND A SELECTED FLOODPLAIN,
Texas A and M Univ., College Station. Dept. of Biology.
W. B. Gallaher.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-783 461, PhD Dissertation, May 1974. 179 p, 38 fig, 10 tab, 48 ref, 6 append.

Descriptors: *Water pollution sources, *Texas, *Rivers, *Flooding, *Ecology, *Flood plains, *Limnology, Physicochemical properties, Biological properties, Surface waters, Ponds, Zooplankton, Benthic fauna, Nitrates, Nitrites, Sulfates, Phosphorus compounds, Organic compounds, On-site investigations, Nutrients.
Identifiers: *Navasota River(Tex).

A limnological investigation was conducted between January 1971 and September 1971 in the Navasota River and an adjacent floodplain in Grimes County, south-central Texas. The study centered upon the physico-chemical and biological dynamics associated with a sudden spring flood. Analyses were made of water samples taken from the river and floodplain, including two small ponds. The early stages of the rise on the river were found to have higher concentrations of organic materials, as well as other chemical constituents, then did stages which followed. This was attributed to the flushing action of those early stages, followed by the dilution of subsequent runoff water. Rainfall runoff was shown to carry rather large quantities of nitrate and phosphate into floodplain ponds. Phosphorus uptake by pond organisms was rapid. Analyses of soil core samples taken before and after flooding along transects across a ponded area on the floodplain and across the high-water line on the floodplain showed no statistically significant variation in the concentrations of constituents measured. (Sims-ISWS)
W75-06242

CHARACTERIZATION OF WASTEWATERS FROM THE ETHICAL PHARMACEUTICAL INDUSTRY,
Gulf South Research Inst., Baton Rouge, La.
For primary bibliographic entry see Field 5A.
W75-06244

INVESTIGATION OF WATER QUALITY PARAMETERS AT SELECTED POINTS ON THE TENNESSEE RIVER,
Alabama A and M Univ., Normal. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06248

WATERBORNE WASTES OF THE PAINT AND INORGANIC PIGMENTS INDUSTRIES,
Southern Research Inst., Birmingham, Ala.
W. J. Barrett, G. A. Morneau, and J. J. Roden, III.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 019, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-030, March 1974. 75 p, 7 fig, 24 tab, 36 ref, 1 append. EPA Project R-800602.

Descriptors: *Paints, *Pigments, *Industrial wastes, *Waste treatment, Waste water(Pollution), Waste water treatment, Titanium, Water pollution sources, Chemical wastes, Heavy metals, Water pollution control, Waste water disposal.
Identifiers: Inorganic pigments, Titanium dioxide.

The wastewater management practices in the paint and inorganic pigments industries were studied. Information was obtained from 153 plants manufacturing paints, 10 titanium dioxide plants, and 10 plants that produce other inorganic pigments. The data were analyzed to identify the sources and characteristics of wastewater from the manufacturing processes of these plants, to determine the practices for wastewater control and treatment that are presently employed, and to identify deficiencies in technology that may require research and development to improve control and treatment methods. The major findings of the study indicate that although the paint industry uses approximately 300 million liters (80 million gallons) of water per day, only a small portion of this, less than 5%, is necessarily contaminated by virtue of its use. Suspended solids, consisting of pigments and resin particles, are the major wastewater contaminants of the paint industry. The wastewaters from plants that produce titanium dioxide or other inorganic pigments generally contain a high level of dissolved solids and acids for which no entirely satisfactory control and treatment methods exist. (Sims-ISWS)
W75-06249

STUDY TO DEFINE POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS IN LIMESTONE AQUIFERS,
Alabama Univ., Huntsville. Center for Environmental Studies.
F. L. Doyle.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-31811, $3.25 in paper copy, $2.25 in microfiche. November 21, 1973. 9 p, 2 fig. NASA Contract NAS8-30216.

Descriptors: *Remote sensing, *Hydrogeology, *Fractures(Geologic), Groundwater resources, Aquifers, Groundwater, Groundwater recharge, *Path of pollutants, Water pollution sources, Satellites(Artificial), Data collections, *Alabama.
Identifiers: *ERTS-1 imagery.

Knowledge of the locations at which contaminants could enter the aquifer is an important consideration in water quality management. Remotely sensed data may help in defining possible points of entry of potential contaminants into the limestone aquifer in Madison County. The target area of investigation was the western two-thirds of Madison County, Alabama, along with parts of adjoining counties. Visual examination of the imagery (both prints and transparencies) for natural lineations was the primary method of study. The color densitometer converted shades of gray into combinations of 32 colors plus black. By selecting the most advantageous color combinations, this density slicing enhanced the imagery and allowed lineations to be recognized more readily. Imagery from satellites and high-altitude airborne platforms are effective materials for interpretation of natural lineations. If these lineations are assumed to be caused by fractures in the bedrock, then the location of fractures is possible from these materials. Location of fractures is helpful in establishing potential points of entry of contaminants. (Sims-ISWS)
W75-06251

DEVELOPMENT OF FRESH GROUND WATER NEAR SALT WATER IN WEST VIRGINIA,
Environmental Protection Agency, Wheeling, W. Va.
For primary bibliographic entry see Field 4B.
W75-06258

BACTERIOLOGICAL CRITERIA FOR GROUND-WATER QUALITY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-06259

LIMNOLOGY OF DUFFIN CREEK AND THE LOCATION OF CENTURY CITY,
Waterloo Univ. (Ontario). School of Urban and Regional Planning.
For primary bibliographic entry see Field 5A.
W75-06264

THE FATE OF SPILLED OIL IN THE SOIL,
Institute TND for Environmental Hygiene, Delft (Netherlands).
J. A. Somers.
Hydrological Sciences Bulletin, Vol 19, No 4, p 501-521, December 1974. 13 fig, 15 ref.

Descriptors: *Oil spills, *Soil contamination, *Groundwater, *Path of pollutants, Mathematical models, Pollutants, Oily water, Soil physical properties, Soil water movement, Groundwater movement, Subsurface flow, Soils, Subsoil, Topsoil, Oil pollution, Biodegradation, Darcys law, Capillary conductivity.

The behavior of spilled oil within the soil and subsoil was described in terms of the known models for its movement and biochemical transformation. In the case of multiple phase flow, the exactness of the existing models must be doubted; besides, when an oil spill occurs, little will be known about the magnitudes of the physical parameters of the model. One can obtain a rough estimate of the expected extent of contamination, which, in practice, often suffices to decide on the line of action. When a single phase flow (hydrocarbons dissolved in groundwater) is concerned, Darcy's law can be used to arrive at quantitative conclusions. However, little is known about the solubility of hydrocarbons in practical situations. With respect to biological transformations, the model of hydrogen transfer is useful. However, a peroxidation for which molecular oxygen is necessary takes place during the first stage of oxidation; an aerobic environment is essential. In the underground, free oxygen will therefore act as a limiting factor. The transformation velocities are highly dependent on the structure of the compound; account should be taken of the solubility of the transformation products which exceeds the solubility of the original hydrocarbons. (Sims-ISWS)
W75-06266

ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER - AN ECOSYSTEM APPROACH, VOL. 2,
Virginia Inst. for Scientific Research, Richmond.
For primary bibliographic entry see Field 5C.
W75-06298

A PROPOSED STRUCTURE OF AN ALUMINUM-PHOSPHATE SPECIES OF IMPORTANCE IN WASTEWATER TREATMENT,
Towill (R. M.) Corp., Honolulu, Hawaii.
For primary bibliographic entry see Field 5D.
W75-06300

LEAD ORTHOPHOSPHATES - IV, FORMATION AND STABILITY IN THE ENVIRONMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
J. O. Nriagu.
Geochimica et Cosmochimica Acta, Vol 38, No 6, p 887-898, June, 1974, 5 fig, 1 tab, 36 ref.

Descriptors: *Lead, *Phosphates, *Environment, *Solubility, Chemical reactions, Oxidation, Inorganic compounds, Ions, Waste water(Pollution), Soils, Phase diagrams, Distribution, Chemical precipitation, *Path of pollutants.

Experimental and predicted thermochemical constants were used to assess the formation and stability of lead phosphates in soil and sedimentary environments. For the chemical conditions likely to be encountered in oxidizing environments, the stability fields of pyromophites and plumbogummite predominated strongly over those of the other secondary lead minerals. The theoretical phase relationships together with several field observations were used as the basis for suggesting that the interaction of lead and phosphorus (to form pyromorphites and plumbogummite in particular) is an important buffer mechanism controlling the migration and fixation of lead in the environment. Calculations using the concentrations of lead and phosphate ions in the serum indicated that the solubility of lead phosphates may be the limiting factor with regard to lead ion concentration in the human body. The removal of lead from wastewater by precipitation as lead chloropyromorphite was considered a spin-off of possible industrial interest. (Jernigan-Vanderbilt)
W75-06303

BIOLOGICAL CYCLES FOR TOXIC ELEMENTS IN THE ENVIRONMENT,
Illinois Univ., Urbana. School of Chemical Sciences.
J. M. Wood.
Science, Vol 183, No 4129, p 1049-1052, March, 1974. PHS(AM 12599)NSF(GB26593X).

Descriptors: *Cycles, *Toxicity, *Trace elements, *Microorganisms, *Biochemistry, Environment, Oxidation, Inorganic compounds, Cadmium, Cobalt, Mercury, Arsenic compounds, *Path of pollutants, Water pollution effects.

Some of the chemical and biochemical transformations of toxic elements in the environment were described with special emphasis on the role played by microorganisms. By means of oxidative and reductive reactions catalyzed by enzymes, microorganisms can convert inorganic compounds into mixtures of compounds. With mercury as an example, cycles for the biological synthesis and degradation of toxic compounds are shown. Methods of predicting which elements could be of environmental concern are discussed. When a metal is introduced into a microbial ecosystem, each formal valence state of that metal is available for chemical or biochemical reactions. With the evolution of a dynamic system of biological cycles for the toxic elements, small disturbances in these cycles will affect the natural equilibriums which will in turn affect the concentrations of toxic intermediates. (Jernigan-Vanderbilt)

W75-06314

ATMOSPHERIC CONCENTRATIONS AND SOURCES OF TRACE METALS AT THE SOUTH POLE,
Maryland Univ., College Park. Dept. of Chemistry.
W. H. Zoller, E. S. Gladney, and R. A. Duce.
Science, Vol 183, No 4121, p 198-200, January, 1974. 2 tab, 14 ref. NSF(GA-20010)(GV33335)+(TX-33777)EPA(AP01214-1)NASA(NSG 398).

Descriptors: *Trace elements, *On-site data collections, *Air pollution, *Water pollution, *Antarctic, Sampling, Analytical techniques, Aluminum, Manganese, Iron, Cobalt, Chromium, Magnesium, Calcium, Zinc, Copper, Lead, Toxicity, Pollutant identification, Path of pollutants.

The results of sampling of the atmosphere at the South Pole for concentrations and sources of trace metals were discussed. This site was chosen because it offers one of the best locations on earth for studying the composition of the background aerosol since it is isolated, both geographically and meteorologically from the major sources of anthropogenic emissions in both the Northern and the Southern Hemisphere. The chemical composition of atmospheric particulate material collected at the geographic South Pole indicated that Al, Sc, Th, Sm, V, Mn, Eu, Fe, La, Ce, Co, Cr, Na, K, Mg, and Ca are derived from either crustal weathering or the ocean. The relatively volatile elements Zn, Cu, Sb, Se, Pb, and Br were apparently derived from other sources. Because of their volatility, vapor-phase condensation or a high temperature dispersion source was suspected for these elements or their compounds. (Jernigan-Vanderbilt)
W75-06315

INTERACTION OF MERCURIALS WITH SALMON SERUM LIPOPROTEINS,
National Oceanic and Atmospheric Administration, Seattle, Wash. Northwest Fisheries Center.
W. L. Reichert, and D. C. Malins.
Nature, Vol 247, No 5442, p 569-570, February, 1974, 2 tab, 1 fig, 19 ref.

Descriptors: *Mercury, *Sockeye salmon, *Distribution, *Absorption, Animal physiology, Toxicity, Proteins, Lipids, Laboratory tests, Analytical techniques, Chromatography, *Path of pollutants.

The transport mechanisms involved in the distribution of mercury and its derivatives throughout the body are discussed. It was demonstrated that inorganic mercury and organic mercury compounds readily bind with the major classes of serum lipoproteins of the sockeye salmon (oncorhynchus nerka). The role played by lipids in those interactions was discussed in reference to data obtained with CHC13:H20 model system. Evidence was presented to show mercuric and methylmercuric ions are sequestered by the lipoproteins of fish serum under physiological conditions. (Jernigan-Vanderbilt)
W75-06321

AGRICULTURAL USE OF SEWAGE TREATMENT PLANT SLUDGES: A POTENTIAL SOURCE OF MERCURY CONTAMINATION,
Toronto Univ. (Ontario). Dept. of Geology.
J. C. Van Loon.
Environmental Letters, Vol 4, No 4, p 259-265, 1973. 2 tab, 14 ref.

Descriptors: *Mercury, *Sewage sludge, *Fertilizers, Agriculture, *Canada, Sewage treatment, Rural areas, Cities, Soils, Public health, Laboratory tests, Samples, Analytical techniques, Instrumentation, *Path of pollutants, Pollutant identification.
Identifiers: Ontario.

The mercury contents of a selection of sewage sludges and fertilizers used for agricultural purposes were determined. Sludges from sewage treatment plants in Southern Ontario were chosen to represent a range of sewage input compositional patterns. These ranged from rural town to heavy density urban types. The results were compared with unsludged soils (rural and urban) in the same local area. The results demonstrated that mercury values in sludges from most localities were many time higher than the levels in soils on which they may be used. (Jernigan-Vanderbilt)
W75-06323

NON-CONSERVATION OF HEAVY METALS IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. School of Oceanography.
N. Cutshall, R. Holton, and L. C. Small.
Available from the National Technical Information Service, Springfield, Va 22161. Report No. RLO 2227 T 1241, (1974). 11p, 4 fig, 1 tab, 11 ref.

Descriptors: *Heavy metals, *Estuaries, *Columbia River, *Saline water-freshwater interfaces, Mixing, Zinc, Copper, Manganese, Spectrophotmetry, Suspended solids, *Path of pollutants.

Manganese, copper, and zinc in filtered waters are reported to not be conserved during mixing of Columbia River water with seawater. These metals' concentrations were higher at mid salinities than would be expected from linear mixing of seawater and river water. The Mn concentration at about 7% salinity was roughly six times higher than would be predicted from linear mixing; the Zn concentration was about 1.4 times higher. The authors suggested that the excess metals are derived from riverborne suspended matter. Two alternative hypotheses were also presented. Reprecipitation of the metals seemed to occur at about 20% salinity. (Pulliam-Vanderbilt)
W75-06325

TRACE ELEMENT EQUILIBRIUM STUDIES,
Naval Oceanographic Office, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-06326

USE OF A NERITIC TROPHODYNAMIC CHAIN WITH MOLLUSKS TO STUDY THE TRANSFERS OF METALLIC POLLUTANTS (UTILIZATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d' Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, R. Bittel, F. Laumond, M. Romeo, and B. Donnier.
Available from the National Technical Information Service, Springfield, Va 22161 as CONF-7309103-1. In: 6th Symposium International d'Oceanographie Medicale, September 26-30, 1973, Portoroz, Yugoslavia, N.T.I.S. No. Conf. 7309103-1, 26 p, 7 tab, 36 ref.

Descriptors: *Heavy metals, *Food chains, *Neritic, *Mollusks, *Path of pollutants, Industrial wastes, Toxicity, Copper, Zinc, Chromium, Lead, Mercury, Water pollution effects.

Industrial metallic by-products are disposed into the marine environment and can thus lead to phenomena of concentration in oceanic organisms and further on to phenomena of toxicity for the final consumer of the biological chains. This paper presented the results of laboratory experiments concerning the transfer of metallic pollutants within a neritic chain with mollusks. Five metals were considered: copper, zinc, chromium, lead, and mercury, in an ionic form or associated with organic compounds found in effluents and in oceanic environments. The results were discussed to assess the hazards of pollution presented by activation and chemical products. (Pulliam-Vanderbilt)
W75-06327

LEAD: ASPECTS OF ITS ECOLOGY AND ENVIRONMENTAL TOXICITY,
Hawaii Univ., Honolulu. Dept. of Botany.
S. M. Siegel.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-22959, $4.25 in paper copy, $2.25 in microfiche. Hawaii Botanical Science Paper No. 32, May, 1973. 62 p, 11 fig, 15 tab, 22 ref.

Descriptors: *Lead, *Toxicity, *Environmental effects, *Ecology, *Path of pollutants, *Hawaii, Soil contamination, Industrial wastes, Water pollution sources, Sediments, Fungi, Plant physiology, Absorption, Air pollution effects, Public health, Water pollution effects.
Identifiers: Aspergillus clavatus Desm.

The major conclusion of the study was that lead enters the Hawaiian environment as an industrial contaminant resulting from the combustion of leaded gasoline. The first section of the report discussed lead contamination in urban Hawaii, which found Pb levels of 20-1050 micrograms/g in roadside plants and 30-4300 micrograms/g in soils from various locations in Honolulu. The second section on lead and other metals in the Ala Wai Canal found that the distribution pattern for lead in the sediments of this canal and the Honolulu Yacht Harbor suggested either a complication circulation pattern within the canal or the existence of more than one source of lead. The third section discussed the extent of lead consumption on Oahu, which was attributed to only 2 major industries. There was little widespread loss of Pb from the pineapple canning industry; however, over 400 tons as gasoline additives were consumed annually, of which 80% is released directly to the environment following combustion. The final section described the study of lead uptake by the fungus Aspergillus clavatus Desm, which absorb appreciable amounts of Pb from nutrient broths containing either PbO or Pb(NO3)2. It was suggested that fungi may form important links in a natural lead cycle. (Pulliam-Vanderbilt)
W75-06329

HERBICIDES AND WATER QUALITY IN AMERICAN FORESTRY,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. H. Patric.
In: Proceedings of the Northeastern Weed Sci. Soc., Vol 25, New York City, Jan. 6-8, 1971. p 365-375. 54 ref.

Descriptors: *Water quality, *Herbicides, Pollution, *Forest vegetation, *Phenolic pesticides, 2,4,5-T, Water pollution, Water pollution control, Water pollution effects, Water pollution sources, Forests, *Reviews, *Pesticide residues.

Scientific literature was reviewed to evaluate effects of forest herbicide use on water quality. No report suggested that proper herbicide use has limited the usefulness of water in forest streams. The long-term effects of herbicide use on water quality are unknown. Some rules are suggested for minimizing water pollution by herbicides applied in forests. (Forest Service)
W75-06333

CHEMICAL CHANGES IN STREAMFLOW FOLLOWING SURFACE MINING IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Proceedings Fourth Symposium on Coal Mine Drainage Research, Mellon Institute, Pittsburgh

Pennsylvania, April 26-27 1972. p 19-31, (1972) 12 fig, 2 tab, 3 ref.

Descriptors: *Strip mines, *Appalachian mountain region, *Streamflow, *Water quality , Weathering, Water chemistry, Kentucky.

Surface mining exposes rock strata to weathering and erosion, and as a result some chemicals may reach streams and adversely affect water resources. A four-year study of the chemical quality of water in six small watersheds in Kentucky indicated surface mining for coal may result in chemical pollution of streams even in areas where acid is no problem. Greatest increases were in sulfate, calcium, and magnesium. Some elements continue to increase at least two years after mining; others peak quickly after land disturbance and soon return to pre-mining levels. (Forest Service)
W75-06334

PERSISTENCE OF SOME CHEMICALS IN PACIFIC NORTHWEST FORESTS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant.
In: Proc. 1971 Short Course for Pesticide Applicators, p 133-141. 1 fig, 5 tab, 13 ref. OSU, J. Capizzi and J. Witt, eds. PNW-1602.

Descriptors: *Persistence, Herbicides, *Pesticide residues, *DDT, 2,4-D, 2,4,5-T, Aminotriazole, Chlorinated hydrocarbon pesticides, Forests, Pacific Northwest US, *Path of pollutants.
Identifiers: Phorate, Picloram.

In an eastern Oregon forest, more than half of the DDT originally reaching the forest floor after aerial spraying had disappeared at the end of the first 3 years after spraying. None of the applied DDT was present in the mineral soil at the end of 3 years. Under western Oregon conditions, residues of the highly toxic systemic organophosphate insecticide phorate degraded quite rapidly when application rate was either 1 or 10 pounds per acre. However, at an application rate of 100 pounds per acre, about 98 percent of the chemical was still present in the forest floor and soil after 6 months. At the 100-pound-per-acre rate, a total residue of 4.50 pounds per acre was still present after 18 months. Findings from this study under forest conditions are entirely at variance with those for the same chemical used on agricultural crops in a warmer climate. Of four herbicides studies, 2,4-D degrades most rapidly. Amitrole also degrades rapidly, but 2,4,5-T and picloram are of somewhat longer persistence. Studies of streamwater following first rains after application of these chemicals indicate, however, that 2,4-D, 2,4,5-T, and amitrole residues are not available for transport to streamwater after having weathered over one summer. (Forest Service)
W75-06335

RED BACTERIAL GROWTH (CORYNEBACTERIUM RUBRUM N. SPEC.) IN TAP-WATER SYSTEMS. (IN GERMAN),
For primary bibliographic entry see Field 5C.
W75-06340

THE PROBLEM OF MERCURY CONTAMINATION OF THE BIOLOGICAL ENVIRONMENT AND DOMESTIC ANIMALS,
Army Foreign Science and Technology Center, Charlottesville, Va.
For primary bibliographic entry see Field 5C.
W75-06343

CATTLE FEEDLOT HYDROLOGY,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker.
Presented at Oklahoma Section, American Society of Agricultural Engineers, Oklahoma State University, Stillwater, October 20, 1972, 25 p, 7 fig, 10 tab, 14 ref.

Descriptors: *Feed lots, *Cattle, *Hydrology, *Farm wastes, *Runoff, Precipitation(Atmospheric), Design, Great Plains, Pollutants, Nitrogen, Phosphorus, Chemical oxygen demand.
Identifiers: Runoff control, Cattle density, Total solids.

Many characteristics affect runoff from feedlots, and knowledge of feedlot hydrology is necessary to design runoff control facilities for feedlots. Runoff is variable from feedlot to feedlot, but certain trends are evident in feedlot hydrology. Evidence was gathered from research that was conducted in the southern Great Plains area. Approximately the first one-half inch of rainfall is stored on the feedlot surface with the rest as potential runoff. The annual runoff of most feedlots is forty to fifty percent of the annual rainfall. Also pollutional characteristics and solid transport characteristics of feedlot runoff were determined. Much more research is necessary for the complete picture of runoff, but the present available information should be useful in the design of runoff control facilities and the management of disposal areas. (Russell-East Central)
W75-06345

5C. Effects Of Pollution

CHEMICAL BRUSH CONTROL: ASSESSING THE HAZARD,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05922

TOXICITY OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN AQUATIC ORGANISMS,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
R. A. Miller, L. A. Norris, and C. L. Hawkes.
Environmental Health Perspectives, Experimental Issue No. 5, p 177-186, September 1973. 10 fig, 4 tab, 12 ref. PNW-1602.

Descriptors: *Aquatic life, *Toxicity, *Water pollution effects, Organic compounds, *Salmon, Pesticide residues.
Identifiers: TCDD, *Dioxin.

TCDD in water or food is toxic to fish. The effects of exposure for 24-96 hr of young salmon to TCDD in water at levels greater than 23 ng/g is irreversible, and death results in 10-80 days. Duration of exposure is less important than level of exposure except as threshold response levels are approached. The critical exposure period may be somewhat less than 24 hrs in static water toxicity tests in which TCDD concentration may change markedly with time. Small fish are sensitive than large fish on an equivalent exposure level basis. TCDD in food at 2.3 ppm markedly reduced growth of young rainbow trout (10/aquaria) exposed to 6.3 micro g TCDD per tank per week for 4 weeks. TCDD at 0.2 ppb had no effect on pupation of mosquito larvae, but reduced the reproductive success of a pulmonate snail and an Oligochaete worm. Research has established some important toxicity characteristics of TCDD in fish, but considerable work remains to be done. Establishment of minimum threshold response levels during long- and short-term exposure is important. The impact of previous and current TCDD exposure on long-term growth and reproduction of fish needs attention. Information on the movement, persistence, and fate of TCDD in aquatic systems will be required to adequately assess the impact of TCDD in streams. Serious attempts to determine TCDD residues in various parts of the natural aquatic ecosystem are badly needed. The most sensitive analytical techniques will be necessary. (Forest Service)
W75-05929

VARIATION WITH CHAIN LENGTH IN ACUTE TOXICITY OF ALKYLHYDROXAMIC ACIDS TO SALMON (SALMO SALAR) FRY.
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
R. F. Addison, and R. P. Cote.
Lipids. Vol 8 No 9, p 493-497 1973. Illus.

Descriptors: *Salmon, *Fry, Toxicity.
Identifiers: Alkylhydroxamic Acid.

The acute toxicity of saturated n-alkylhydroxamic acids to salmon (S. salar) fry was determined. Within the series n-C6H13CONHOH to n-C10H21CONHOH, acute toxicity (indicated by death) increased with chain length. Shorter and longer chain compounds were not toxic under similar conditions. Factors governing the variation in toxicity with chain length and possible mechanisms of action are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-05975

RECENT STUDIES ON BIOLOGICAL EFFECTS OF CRUDE OILS AND OIL-DISPERSANT MIXTURES TO RED SEA MACROFAUNA,
National Marine Water Quality Lab., West Kingston, R.I.
E. Eisler, G. W. Kissill, and Y. Cohen.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 156-179, October 1974. 6 fig, 7 tab, 11 ref.

Descriptors: *Bioassay, *Oil pollution, *Water pollution effects, *Oil spills, Oil, Toxicity, Laboratory tests, Sea water, Aquatic animals, Marine biology, Marine animals, Bioindicators, Biology.
Identifiers: *Red Sea, Israel.

Because virtually nothing was known regarding the influence of crude oil or chemical oil counteractants on local coral reef ecosystems, in 1972 the Hebrew University initiated a continuing series of investigations in this subject area. Progress during the first year of laboratory studies was summarized. Specifically acute toxicity to representative species of marine macrofauna of two common grades of crude oils, a chemical oil dispersant used extensively in northern Israel and mixtures of oil and dispersant at realistic application levels, was reported. Bioassays were conducted under static as well as continuous flow conditions. Depth-toxicity interactions were evaluated by using deep (2.0 m) tanks. Sublethal and latent effects of crudes and oil-dispersant mixtures on physiology, metabolism, and behavior were investigated as were short-term degradation and bioaccumulation of oil. (See also W75-06020) (Sims-ISWS)
W75-06028

METHODS FOR MONITORING RADIOACTIVITY IN AQUATIC BIOTA,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 5A.
W75-06032

MAKING ARTEMIA SLUDGE BIOASSAY MORE ECOLOGICALLY RELEVANT,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W75-06034

COMPARISON OF SPECIES DIVERSITY AND FAUNAL HOMOGENEITY INDICES AS CRITERIA OF CHANGE IN BIOLOGICAL COMMUNITIES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06036

MICROBIOLOGICAL METHODS FOR MONITORING MARINE WATERS FOR POSSIBLE HEALTH EFFECTS,
Environmental Protection Agency, Narragansett, R.I. Northeastern Water Supply Lab.
For primary bibliographic entry see Field 5A.
W75-06038

IMPACT OF TURBIDITY AND LAKE SEDIMENTATION,
Kansas State Univ., Manhattan.
For primary bibliographic entry see Field 2H.
W75-06053

EFFECTS OF SEDIMENT ON WATER RESOURCE PLANNING,
Corps of Engineers, Omaha, Neb. Missouri River Div.
W. A. Stuft.
Preprint No. 1545, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 10 p, 1 ref.

Descriptors: *Water pollution control, *Erosion control, *Planning, *Reservoir silting, *Sediment control, *Low-flow augmentation, Reservoir construction, Dead storage, Damsites, Reservoir design, River basin development, Sedimentation, Effects, Sediment load, Sediment transport, Channel erosion.

Sediment is a perfect example of the definition which describes a waste as being a resource out of place. Sediment has a double effect. It depletes the land resource from which it is delivered and deteriorates the quality of the water resource in which it is contained. Sediment is the largest single pollutant of water. The sediment burden in streams may come from many different sources through the erosion process. Sediment also helps to transport other pollutants. Planners must take measures to reduce the amount of sediment in streams. One way is to increase low flows brought about through construction of major reservoirs. Low flows in many streams may be less than one-tenth the average annual discharge. Plans must also include a sediment pool or dead storage in any reservoir and proper land conservation to reduce soil erosion. Another large factor in sediment production is streambank erosion. Therefore, various types of channel stabilization works should be utilized. In addition to maintaining the soil resource for food production, the above measures are necessary to preserve the storage capacity in reservoirs; to protect the beauty and utility of recreational areas, particularly those that are water-based; to reduce highway maintenance costs; and to lessen the damage inflicted during urban and industrial expansion. (Poertner)
W75-06056

BIOCHROME ANALYSIS AS A METHOD FOR ASSESSING PHYTOPLANKTON DYNAMICS, PHASE 1,
Arkansas Univ., Fayetteville. Dept. of Botany and Bacteriology.
For primary bibliographic entry see Field 5B.
W75-06073

A MODEL FOR PHYSICAL AND BIOTIC REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Entomology.
For primary bibliographic entry see Field 5B.
W75-06077

THE DEVELOPMENT OF TOXICITY INDICES FOR ASSESSING THE QUALITY OF THE ILLINOIS RIVER,
Western Illinois Univ., Macomb. Dept. of Biological Sciences.
K. S. Lubinski, R. E. Sparks, and L. A. Jahn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 855, $3.75 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 96, December 1974. 46 p, 11 tab, 9 fig, 25 ref. OWRT A-067-ILL(1). 14-31-0001-4013.

Descriptors: *Toxicity, *Bioindicators, Water pollution effects, Water quality, *Illinois, *Sunfishes, Lethal limit, Toxins, Bioassay, Effluents, Water pollution sources, Ammonia, Linear alkylate sulfonates.
Identifiers: *Illinois River(Ill).

Individual toxicant concentrations in the Illinois River were expressed as fractions of their 96-hr LC50 values to bluegills, yielding their component toxicities in bluegill toxic units (BGTU's). A solution having a toxicity of 1.0 BGTU was defined as being lethal to 50 percent of the bluegills exposed to it for 96 hr. River toxicants included aldrin, undissociated ammonia (ammonia(u)), arsenic, cadmium, hexavalent and trivalent chromium, copper, cyanide, fluoride, linear alkylate sulfonate (LAS), lead, mercury, phenols, and zinc. Component toxicities at different locations on the river were summed to produce the toxicity index, or total toxicity, of the river. Preliminary mean toxicity indices developed from previously published data during 1972 and 1973 ranged from 0.045 to 0.168 BGTU's, on the Illinois and Des Plaines rivers. However, maximum component toxicities of ammonia(u) and cyanide during this period reached 0.063 and 0.467 BGTU's, respectively. LAS, copper, fluoride, and zinc also contributed to the preliminary river toxicity indices. Mean toxicity indices developed during field tests, in which bluegills were exposed directly to river water, and the lack of mortality at these tests, indicated that the Illinois River is not normally acutely toxic to fish. The 96-hr LC50 values of ammonia(u) and LAS to bluegills were found to be 1.65 and 6.5 mg/liter, respectively, using continuous-flow bioassays with dilution water similar in hardness, alkalinity and pH to Illinois River water.
W75-06080

ADAPTATION OF GAME FISH TO HIGHLY ALKALINE DESERT LAKES,
Nevada Univ., Reno. College of Agriculture.
For primary bibliographic entry see Field 2H.
W75-06084

AVAILABILITY OF SEDIMENT PHOSPHORUS TO MICROORGANISMS,
Wisconsin Univ., Madison. Dept. of Soil Science.
A. Sagher, R. F. Harris, and D. E. Armstrong.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 822, $4.25 in paper copy, $2.25 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, February 1975. 57 p, 22 tab, 15 ref. OWRT A-040-WIS(3). 14-31-0001-3550, 14-31-0001-3850.

Descriptors: *Aquatic microorganisms, *Soil bacteria, *Phosphates, *Lakes, Soils, *Wisconsin, Scenedesmus, Lake sediments, Phosphorus, Nutrients, Algae, Incubation, Biomass, Water pollution effects, Eutrophication, Microbiology.
Identifiers: *Selenastrum, Sediment phosphorus.

The microbial availability of phosphorus (P) in surficial sediments from diverse Wisconsin lakes was evaluated using Selenastrum and Scenedesmus and indigenous sediment populations as test organisms. Phosphorus-deficient algal cells were inoculated into nonsterile sediment-water systems amended with all growth nutrients, except phosphorus so that the sediment was the sole source of phosphorus (0.6 milligrams phosphorus per liter). The inoculated systems were incubated with intermittent shaking under standard light conditions until microbial biomass increases ceased (3 to 4 weeks), with periodic analysis for: (1) algal cell counts and ATP to provide data on microbial growth responses; (2) levels of dissolved ortho-inorganic phosphate (Pi), sodium hydroxide-extractable Pi, and hydrochloric acid-extractable Pi to provide information on the utilization of different sediment Pi forms. Appropriate controls were included to establish phosphorus deficiency in the test system and assess sediment organic phosphorus mineralization. All sediments supplied sufficient phosphorus to increase microbial biomass to about two orders of magnitude. Between 51 and 80% of the sediment Pi was available to the microorganisms. Between 55 and 100% of the non-occluded iron-bound fraction extracted with sodium hydroxide, but essentially none of the hydrochloric acid-extractable calcium-bound Pi fraction was available. Mineralization of sediment organic phosphorus was minimal.
W75-06090

SUDDEN MORTALITY OF A MASSIVE PHYTOPLANKTON BLOOM,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
C. E. Boyd, E. E. Prather, and R. W. Parks.
Weed Science, Vol. 23, Issue 1, p 61-67, January 1975. 4 fig, 5 tab, 19 ref. OWRT A-042-ALA (1).

Descriptors: Algae, *Phytoplankton, *Fish ponds, Nitrogen, Phosphorus, *Cyanophyta, Eutrophication, Anabaena, Channel catfish, Dissolved oxygen, Carbon dioxide, Ammonia, Light penetration, Oxygenation, Decomposing organic matter.
Identifiers: *Anabaena variabilis.

A dense bloom of the blue-green alga, Anabaena variabilis Kuetzing suddenly died in a pond heavily stocked with channel catfish (Ictalurus punctatus L.). Low light intensity caused the formation of gas vacuoles in A. variabilis. The buoyant filaments accumulated at the surface in large numbers during a period of calm, warm weather. Light injury to cells in the surface scum apparently triggered the mass mortality of phytoplankton. Decomposition of dead algae quickly resulted in depletion of dissolved oxygen. Concentrations of CO2 and ammonia increased to high levels and the pH declined following the phytoplankton die-off. A period of 7 days was required for re-establishment of a phytoplankton community and little improvement in water quality occurred until high densities of healthy phytoplankters were present. Massive mortality of fish was prevented by pumping oxygenated water into the pond at two sites and by mechanically agitating surface water in a limited area.
W75-06091

SPOKANE RIVER, COOPERATIVE WATER QUALITY STUDY,
Washington State Dept. of Ecology, Olympia. State Water Program.
For primary bibliographic entry see Field 5B.
W75-06103

STRATIFICATION AND BIOGENIC MEROMIXIS IN TASMANIAN RESERVOIRS,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
P. A. Tyler, and R. T. Buckney.
Australian Journal of Marine and Freshwater Research, Vol 25, No 3, p 299-313, December 1974. 11 fig, 2 tab, 32 ref.

Descriptors: *Meromixis, *Reservoirs, *Stratification, *Australia, Lakes, Lake morphometry, Mixing, Hypolimnion, Seasonal, Hydroelectric plants, Water chemistry, Water quality.
Identifiers: Mersey-Forth Hydroelectric Scheme, Lake Rowallan(Tas), Lake Barrington(Tas).

Lakes Rowallan and Barrington, in the Mersey-Forth hydroelectric scheme, Tasmania, Australia, are formed by dams constructed in narrow, steep-sided gorges. They may be classified as warm monomictic reservoirs, and show familiar seasonal cycles of stratification and holomixis, stratification being more severe in Lake Barrington. Both reservoirs developed anoxic hypolimnia. Lake Barrington was almost filled within six months of the closure of the dam, and equally rapidly developed a monimolimnetic pool, largely attributable to its morphometry and the flooding of dense vegetation. The monimolimnetic pool was restored soon after its destruction by severe flooding, and seems likely to persist in normal inflow conditions. Attendant chemical phenomena of prolonged anoxia pose alleviable problems in the use of the water for domestic, industrial and power generation purposes. (Levick-CSIRO Aust)
W75-06116

CLINICAL CHARACTERISTICS OF TYPHOID FEVER IN CHILDREN IN EPIDEMIC WATER-BORNE INFECTION,
A. G. Gul'Muradov, B. G. Gel'Dyev, S. G. Ba Babadzhanova, and A. V. Vasil'Eva.
Zdravookhr Turkm. Vol 15, No 9, p 43-44, 1971.

Descriptors: *Human diseases, *Infection, Public health, Water pollution effects, Diseases, *Epidemics, Mortality.
Identifiers: Therapy, *Typhoid, Water-borne infection, Antibacterial treatment.

Analysis of case histories of hospitalized children showed that treatment with antibacterial preparations shortens the febrile stage, lessens complications, and prevents death.--Copyright 1974, Biological Abstracts, Inc.
W75-06130

DISSOLVED SILICA IN LAUREL LAKE: INFLUX, UPTAKE, AND DIFFERENTIAL ACCUMULATION DURING SUMMER STRATIFICATION,
Massachusetts Univ., Amherst.
M. Soukup.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-240 876, $4.75 in paper copy, $2.25 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No 39, June 1974. 66 p, 6 fig, 13 tab, 52 ref. OWRT-A-052-MASS(2), 14-31-0001-3821.

Descriptors: *Massachusetts, Diatoms, Lake sediments, *Silica, Small watersheds, *Dissolved solids, Absorption, Algae, Stratification, Hypolimniun.
Identifiers: *Laurel Lake(Mass), Dimictic lakes, Anoxic conditions, Myriophyllum, *Dissolved silica, Photic zones, Synedra radians radians.

Laurel Lake is a small (67 ha) dimictic lake in Berkshire County, Mass. In summer, the hypolimnion becomes anoxic and dense Myriophyllum beds dominate shallow areas of the lake. Dissolved silica influx from the watershed (726 ha), diatom uptake, and sediment releases within the lake were determined during summer stratification, April-September 1972. These estimates provide a model of silica flux from photic to aphotic zones. During the diatom maximum more than 97% of the dissolved silica inflow and storage down to 6 m was extracted, mainly by Synedra radians radians. Apparent silica limitation followed but green and blue-green algae did not produce large populations. Photic sediment releases (ca. 0.1 g m-2 day-1), normally 'masked' by uptake, could be seen from mass-balance and diatom frustule budgets. In the aphotic, sediment releases of 0.047 and 0.028 g m-2 day-1 occurred in the clinolimnion and bathylimnion, respectively, roughly equivalent to 17% of the apparent photic uptake. Net profundal sedimentation was estimated to be 102 mg cm-2 yr-1 (dry weight) and 5.2 mg cm-2 yr-1 amorphous silica. Recent sediments show annual couplets, apparently related to the inception of hypolimnetic anoxia accompanying cultural eutrophication.
W75-06190

PRELIMINARY OBSERVATIONS ON THE BIOGEOCHEMICAL CYCLE OF SILICA IN STOCKBRIDGE BOWL (LAKE),
Massachusetts Univ., Amherst.
S. D. Ludlam.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 914, $3.75 in paper copy, $2.25 in microfiche. Massachusetts Water Resources Research CEnter, Amherst, Publication No 38, May 1974. 33 p, 2 fig, 8 tab, 19 ref. OWRT A-052-MASS(1). 14-31-0001-3821.

Descriptors: *Silica, Lakes, Herbicides, Eutrophication, *Massachusetts, Diatoms, Plankton, Dissolved solids, Lake sediments.
Identifiers: *Stockbridge Bowl(Mass), Dissolved silica.

The silica cycle in Stockbridge Bowl was studied for the period 24 March through 9 September 1972. Diatoms dominated the plankton for only a very brief period in late May and eraly June, and silica never became limiting to diatom growth. Although diatoms utilized ca. 56% of the silica actually present or flowing into the photic zone from influent streams during the period of study at least 40 to 50% of the observed conversion of dissolved to amorphous silica took place in the littoral zone, probably by non-planktonic forms. Conversion rates in the littoral were as high as 2 g/sq m/diem at least 6 times the maximum rate for planktonic forms in the limnetic zone. Herbicide treatment caused significant release of dissolved silica in the littoral zone with release rates as high as 1.6 g/sq m/diem. Release rates from hypolimnetic sediments were very small under oxidizing conditions and were moderate under anoxic conditions, ranging from 0.03 to 0.04 g/sq m/diem early in the anoxic period to 0.004 g/sq m/diem in August and early September. Higher rates than this were observed but were probably due to dissolution of diatom frustules sinking through the hypolimnion or recently deposited on the sediment surface. Weathering rates for silica in the watersheds draining into Stockbridge Bowl averaged between 0.012 and 0.014 g/sq m/diem.
W75-06191

SUBSURFACE BIOLOGICAL ACTIVITY IN RELATION TO GROUND-WATER POLLUTION,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W75-06238

THE EFFECT OF DREDGING IN A POLLUTED ESTUARY ON THE PHYSIOLOGY OF LARVAL ZOOPLANKTON,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
P. J. DeCoursey, and W. B. Vernberg.
Water Research, Vol 9, No 2, p 149-154, February 1975. 5 fig, 17 ref. Contract No. DACW 60-71-C-0009.

Descriptors: *Dredging, *Estuaries, Physiological ecology, Disposal, Zooplankton, Assay, Water sampling, Toxicity, On-site investigations, Larvae, *South Carolina, Water pollution effects.
Identifiers: *Larval zooplankton, *Charleston Harbor(SC), Daphnia, Polydora, Paleomonetes.

The effect of water samples from three dredging locations in Charleston Harbor and its tributaries upon the physiology of larval or juvenile zooplankton was determined. The samples for each dredging location included dredge site, 200 yd downstream, and the weir of the diked disposal area. The effect of the water samples upon survival, metabolism, and behavior of larval or juvenile zooplankton was measured. Since salinities varied at the three locations, the assay organisms included juvenile Daphnia for Location I, newly hatched Paleomonetes for Location II, and larval Polydora for Location III. Weir water proved most toxic; the sample from 200 yd downstream was intermediate in effect. Least toxicity was observed in water from the dredge site. (Roberts-ISWS)
W75-06255

ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER - AN ECOSYSTEM APPROACH, VOL. 2,
Virginia Inst. for Scientific Research, Richmond.
W. S. Woolcott.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 036(Vol 3 $7.50), PB-241 035(Vol 1 $11.25) both volumes are available in $2.25 in microfiche. Final Technical Report, October 1974, 2 vol 669 p, 31 fig, 203 tab, 259 ref. OWRT C-4016(No 9003)(1), 14-31-0001-9003.

Descriptors: *Thermal pollution, Rivers, Freshwater, Electric powerplants, *Fish populations, *Periphyton, *Macrobenthos, *Food webs, *Seasonal, *Water temperature, Water chemistry, Discharge(Water), Aquatic insects, Algae, Food, Biomass, Water pollution effects, *Virginia, *Ecosystems, Distribution patterns, Rivers.
Identifiers: *Piedmont region(Va), *James River(Va), Artificial substrate, Diversity indices, Hurricane Agnes, Macroinvertebrate taxa, Algae taxa entrainment, Thermal profiles, Electro-fishing.

A two-year study (July 1972-June 1974) of an 8 km stretch of the James River in the Piedmont Province of Virginia was undertaken to determine the ecological relationships of organisms from natural temperature waters and those exposed to the thermal effluents of a fossil-fueled electric power station. Parameters investigated included seasonal changes and distribution of populations of fishes, benthic macroin-vertebrates and algae; entrainment of organisms in the cooling water system of the power station; food-web investigation within and outside of the plume; and physicochemical analyses of heated and ambient temperature water. Oxygen and dissolved nutrient levels indicated moderate organic loading. Substantial diversity of fishes (50 species), macroinvertebrates (196 genera) and algae (44 genera) corroborated these findings. Populations of fishes and macroinvertebrates affected by the heated effluent were smaller and less diverse than were those in ambient temperature water during the warm months (July-October). The fishes showed some recovery in the other months of the year whereas numbers and kinds of macroin-vertebrates in the heated water remained relatively low throughout the year. Diatoms were adversely affected when temperatures in the plume were 29C or higher; blue-green algae populations flourished under these high temperature conditions. Indices of diversity provided supplemental evaluative information on community structure. A compilation of pertinent literature and a list of pollution sources are included.
W75-06298

ASSOCIATION OF METHIONINE REQUIREMENT WITH METHYL MERCURY RESISTANT MUTANTS OF YEAST,
Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
For primary bibliographic entry see Field 5A.
W75-06311

TRACE METALS IN OYSTER SHELLS,
Louisiana State Univ., Baton Rouge. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W75-06312

BIOLOGICAL CYCLES FOR TOXIC ELEMENTS IN THE ENVIRONMENT,
Illinois Univ., Urbana. School of Chemical Sciences.
For primary bibliographic entry see Field 5B.
W75-06314

ADDING FLUORIDES TO THE DIET,
Center for Science in the Public Interest, Washington, D.C.
M. J. Privat, and F. Fisher.
Environment, Vol 16, No 5, p 29-33, June, 1974. 1 tab, 23 ref.

Descriptors: *Fluoridation, *Diets, *Public health, *Toxicity, Fluorides, Human pathology, Human physiology, Foods, Research and development.

In 1950 it was expected that water fluoridation would result in average fluoride intakes among adults of less than 2 mg/day. Recent data indicate that this is probably an underestimate though the magnitude and significance of this have not yet been resolved. The available evidence indicates that a very high fraction (over 80%) of the dietary fluoride consumed by human beings enters the bloodstream. Excess exposure to fluoride leads to fluorosis. Dental fluorosis occurs only in children although teeth affected in childhood remain affected throughout life. Fluorosis can occur at levels quite close to 'optimal' levels of fluoride intake. Serious skeletal fluorosis is associated with fluoride intake levels well above those anticipated from artificially fluoridated water. It is characterized by increased bone density and abnormal bone growths. In advanced forms, skeletal fluorosis can be painful and crippling. It appears from the data presently available that the intake of fluoride from all sources is probably higher than previously estimated. (Jernigan-Vanderbilt)
W75-06318

DECREASED ANTIBODY FORMATION IN MICE EXPOSED TO LEAD,
Oregon State Univ., Corvallis. Dept. of Veterinary Medicine.
L. D. Koller, and S. Kovacic.
Nature, Vol 250, No 5462, p 148-150, July, 1974. 2 fig, 1 tab, 16 ref.

Descriptors: *Lead, *Rodents, *Toxicity, *Cytological studies, Animal pathology, Laboratory animals, Laboratory tests, Testing procedures, Analytical techniques, Spectroscopy.
Identifiers: Antibodies.

The effect of lead exposure on the ability of the body to form antibodies was determined. The purpose of the article was to determine if the decreased circulating antibody in animals that were exposed to lead was a result of a decrease in the number of cells producing antibody. Mice 28 days old were given lead orally (1,375,131,5 or 13.75 ppm). The lead markedly decreased the number of cells forming antibody to SRBC. Mice that received 13.75 ppm lead had intranuclear inclusions up to five days after removal from lead. The cellular degeneration and necrosis in the renal cortex from this group of mice was not as severe at day 6 and could not be recognized by day 11, indicating that there was apparently rapid removal of lead from the kidney after discontinuing administration of lead as well as regeneration of the damaged tubular epithelium. (Jernigan-Vanderbilt)
W75-06319

INTERACTION OF MERCURIALS WITH SALMON SERUM LIPOPROTEINS,
National Oceanic and Atmospheric Administration, Seattle, Wash. Northwest Fisheries Center.
For primary bibliographic entry see Field 5B.
W75-06321

USE OF A NERITIC TROPHODYNAMIC CHAIN WITH MOLLUSKS TO STUDY THE TRANSFERS OF METALLIC POLLUTANTS (UTILIZATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d' Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5B.
W75-06327

LEAD: ASPECTS OF ITS ECOLOGY AND ENVIRONMENTAL TOXICITY,
Hawaii Univ., Honolulu. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W75-06329

RED BACTERIAL GROWTH (CORYNEBACTERIUM RUBRUM N. SPEC.) IN TAP-WATER SYSTEMS. (IN GERMAN),
W. Graef, and L. Bauer.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 157 No 4, p 291-303. 1973, Illus. English summary.

Descriptors: *Bacteria, Microorganisms, *Potable water, Lipids, Heat resistance, Resistance.
Identifiers: *Corynebacterium-Rubrum, Flagella, Morphology, Motility, Tap-water, Vacuole, Vermilion corynebacteria, Chlorine resistance.

The occurrence of vermilion corynebacterial growth and its effects in tap-water systems is reported. Of particular morphological importance is lipid storage vacuole formation and motility by means of monotrichous subpolar flagella. These water corynebacteria are thermoresistant at up to 80C. Resistance to chlorine is surprisingly high (up to 0.3 mg/l free chlorine). Proliferation takes place at about 5C--34C. The name C. rubrum sp. nov. is proposed.--Copyright 1974, Biological Abstracts, Inc.
W75-06340

MICROBIOLOGY-DETECTION OF BACTERIAL PATHOGENS AND THEIR OCCURRENCE, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-06342

THE PROBLEM OF MERCURY CONTAMINATION OF THE BIOLOGICAL ENVIRONMENT AND DOMESTIC ANIMALS,
Army Foreign Science and Technology Center, Charlottesville, Va.
T. Szprengier.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-780 998, $3.25 in per copy, $2.25 in microfiche. Translated from Medycyna Weterynaryjna, Vol 27, No 2, p 82-86. (1972). 3 tab.

Descriptors: *Mercury, *Fungicides, *Toxicity, *Public health, *Animal physiology, Environmental effects, *Path of pollutants, Fish physiology, Food webs, Water pollution effects.

The toxicity of mercury and organic and inorganic mercury compounds in human and animal organisms is discussed. Included were: (1) the toxicodynamics of mercury compounds, (2) the mechanism of activity and toxicity of mercury and mercury compounds, (3) the use of mercuric fungicides and the related mercury poisonings and contaminations. The widespread and prolonged use of mercury compounds is becoming a problem because of the creation of Hg residues in plant and animal tissues. As a consequence of using mercuric fungicides there exists the danger of contaminating the entire biological world, not only plants on which the preparatiions are directly used. The accumulation of mercury in the tissues of fish is particularly disturbing, since fish are capable of storing up fairly high quantities of Hg even in water with comparatively low concentrations of the element. (Pulliam-Vanderbilt)
W75-06343

5D. Waste Treatment Processes

OPTIMAL CAPACITY EXPANSION OF A SECONDARY TREATMENT SYSTEM,
General Motors Technical Center, Warren, Mich. Manufacturing Development Staff.
P. N. Mishra, L-T. Fan, and L. E. Erickson.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2704-2718, December 1974. 6 fig, 2 tab, 7 equ, 24 ref.

Descriptors: Water pollution control, *Waste water treatment, *Trickling filters, *Model studies, *Alternative planning, Optimization, Water quality, Standards, Effluents, Costs, Activated sludge, Aeration, Design, Equations, Systems analysis, Structure, Economics.
Identifiers: *Capacity expansion, *Structural parameter method, Treatment plants, Secondary clarifier, Cost minimization.

Examined is the least-cost expansion of an existing secondary trickling filter wastewater treatment system which is unable to meet new effluent quality standards and increased hydraulic and pollutant loading. Using the structural parameter method, a process system synthesis technique, alternative process subsystems are considered for augmentation, including additional trickling filters, secondary clarifiers, and activated sludge aeration vessels, and various combinations of these. Results for each of six alternative expansion schemes, obtained through selective simulation followed by optimization using a modified simplex pattern search technique, are discussed. Then a general structure for the expansion of the secondary wastewater treatment system using the structural parameters for all the possible subsystems is optimized. The minimum cost system, consists of the existing trickling filters followed by an activated sludge aeration vessel and by existing and additional secondary clarifiers. (Bell-Cornell)
W75-05852

PROCESS FOR FLOCCULATION OF SOLIDS FROM AQUEOUS SUSPENSIONS,
Georgia-Pacific Corp., Portland, Oreg. (assignee)
C. H. Ludwig.
U.S. Patent No. 3,850,799, 8 p, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1699, November 26, 1974.

Descriptors: *Patents, *Flocculation, *Waste water treatment, *Lignins, *Pollution abatement, Equipment, Suspended solids, Water pollution control, Water quality control.
Identifiers: Polyoxyalkylene linkages, Polyoxyalkylene dihalide, *Pollution prevention.

A process for the flocculation of solids from aqueous suspensions of finely divided solids comprises treating the suspension with from 1 to 1,000 parts per million of a water-soluble composition of lignin cross-linked with polyoxyalkylene linkages. This flocculates the finely divided solids dispersed in the aqueous suspension, settles the flocculated solids and separates the flocculated solids from the suspension. The composition of lignin is cross-linked with polyoxyalkylene linkages to the extent that the lignin composition has an intrinsic viscosity greater than 0.2 dl/g. The linkages have a molecular weight of from 120 to 1,000 prepared by reacting the lignin as an aqueous solution at a concentration of at least 20 weight percent with a polyoxyalkylene compound selected from the group consisting of polyoxyalkylene di-esters of monosulfonic acids and polyoxyalkylene dihalides under alkaline conditions, the di-esters and diha-

lides having oxyalkylene repeating units of from two to four carbon atoms. (Sinha-OEIS)
W75-05876

SEWAGE AND WATER TREATMENT WITH POLYACID HALIDE MODIFIED COPOLYMERS OF VINYLPYRIDINES AND ACRYLAMIDE OR METHACRYLAMIDE,
Phillips Petroleum Co., Bartlesville, Okla. (assignee)
R. C. Doss.
U.S. Patent No. 3,850,800, 5 p, 2 tab, 1 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1699, November 26, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Coagulation, *Flocculation, *Water treatment, Filtration.
Identifiers: *Chemical treatment, Vinylpyridine, Acrylamide, Methacrylamide, Polyacid halide, Copolymers.

Sewage and waste water are chemically conditioned with polyacid halide modified copolymers of vinylpyridine with acrylamide or methacrylamide. Coagulation, flocculation, and filtration in sewage and water treatment processes are significantly improved by the use of these modified copolymers. These modified vinylpyridine copolymers increase the settling rate of solids and make easier the removal of such solids in filtration and centrifugation processes. (Sinha-OEIS)
W75-05877

WASTE WATER PURIFICATION SYSTEM,
McQuay-Perfex, Inc., Minneapolis, Minn. (assignee)
P. J. Pearson.
U.S. Patent No. 3,850,801, 7 p, 6 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1699, November 26, 1974.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Filtration, *Sewage treatment, *Pollution abatement, Oxidation, Bacteria, Heat exchangers.
Identifiers: *Anaerobic treatment, Settling tanks, Sterilization.

A pump conveys anaerobically treated sewage from the septic tank to a biological oxidation tank which employs a plurality of partially submerged discs providing a surface for the growth of bacterial slimes. A motor rotates the discs so that the bacteria can oxidize the sewage thereby removing substantially all of the biochemical oxygen demand. After dropping to a settling tank, from the bottom of which sludge is returned to the septic tank, the clarified supernatant is passed through a filter to a high efficiency sterilizer which utilizes a heat exchanger. An artificial feed system is provided to supply nutrients to keep bacteria in the biological oxidation tank alive during extended periods of nonuse of the system. (Sinha-OEIS)
W75-05878

FILTER SYSTEMS,
Sutcliffe, Speakman and Co. Ltd., Leigh (England); and Pond (Alan) Equipment Ltd., Harlow (England). (assignees)
A. Armstrong.
U.S. Patent No. 3,850,805, 3 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1701, November 26, 1974.

Descriptors: *Patents, *Reclamation, *Filtration, *Water reuse, *Water quality control, *Water conservation, *Pollution abatement, Detergents, Wax, Activated carbon, Sand, Reclaimed water.
Identifiers: *Pollution prevention.

A filter and water reclamation system is disclosed in which a filter bed comprising a filter element of activated carbon and a filter bed comprising a filter element of sand are connected in series. Solids, detergent and wax are removed from water cycled through the system. The water passes from a drain sump to a settling tank in which the major part of the solids in the water is removed by settling. The water overflows from the settling tank into the overflow tank from where it is pumped into the first filter bed and passes through the sand or gravel, any grit being substantially removed in the process. The grit free water is then passed from the bottom of the first filter bed into the top of the second filter bed which contains activated carbon or charcoal. Any detergent and/or wax entrained in the water is adsorbed onto the activated carbon during passage through the second bed. The water leaving the second bed at the outlet is substantially pure. Any excess decontaminated water can overflow into the sewage system without contamination. (Sinha-OEIS)
W75-05880

A WASTEWATER TREATMENT SYSTEM,
W. Hoermann.
U.S. Patent No. 3,850,808, 5 p, 5 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1702, November 26, 1974.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Filtration, *Water treatment, *Pollution abatement, *Water quality control, Equipment, Aerobic treatment, Sewage treatment.
Identifiers: *Pollution prevention, Diffusers.

A multi-chamber storage treatment tank has a receiving chamber for accommodating waste products to be processed; an aeration chamber adjoining the receiving chamber to receive fluids; a first and second settling chamber for separating waste solids from liquids; a discharge chamber receiving liquid from the second settling chamber; and feedback means connected with the receiving chamber and with the second settling chamber for returning the higher density portions of the contents to the receiving chamber for further processing. The tank also includes a diffuser in the aeration chamber to introduce air under pressure into the fluid. An additional feedback means connected with the receiving chamber and with the first settling chamber transfers a portion of the contents to the receiving chamber for further processing. (Sinha-OEIS)
W75-05882

APPARATUS FOR THE TREATMENT AND THE CLARIFICATION OF WASTE WATER,
Institutul de Proiectari Pentru Industria Chimica Anorganica si a Ingrasamintelor, Bucharest, (Rumania). (assignee)
P. B. Teodoroiu.
U.S. Patent No. 3,850,810, 3 p, 2 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1703, November 26, 1974.

Descriptors: *Patents, *Water treatment, *Waste water treatment, *Flocculation, *Pollution abatement, *Water pollution control, Suspended solids, Equipment.
Identifiers: *Pollution prevention, Clarification, Agitation.

An outer basin or tank is centered on a vertical axis and a waste-water inlet is placed at the lowest point of its bottom on the axis. A mixing chamber within the tank is defined by a downward diverging open-bottomed housing centered on the same axis above the inlet. The housing is spaced from the tank bottom by a peripheral clearance to let the mixing chamber connect with the surrounding annular space in the tank. An agitator in the mixing chamber has its body centered on the tank axis and is provided with upper and lower peripheral vanes of opposite pitch placed on a larger-diameter part and on a smaller-diameter part, respectively of a stepped cylinder. As the body is rotated by a suitable drive, the upper vanes exert an upward thrust and the lower vanes exert a downward thrust upon a mixture of waste water and flocculating agent causing it to be intensely circulated and homogenized. The mixture leaves the chamber through the peripheral clearance and forms a slurry in the surrounding space, and a supernatant layer of clear water above the slurry which can be discharged through a collector system. (Sinha-OEIS)
W75-05883

METHOD FOR THE PRIMARY AND SECONDARY TREATMENT OF WASTEWATER IN A UNITARY APPARATUS,
Autotrol Corp., Milwaukee, Wis. (assignee)
W. N. Torpey, and R. A. Sullivan.
U.S. Patent No. 3,849,304, 4 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1222, November 19, 1974.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Pollution abatement, *Water quality control, *Water pollution control, Equipment, Flotsam, Slimes, Biochemical Oxygen Demand.
Identifiers: *Pollution prevention, *Primary treatment, *Secondary treatment.

The method utilizes a composite apparatus for the treatment of wastewater to remove settleable and flotable solids and to remove and oxidize organic matter and includes a treatment tank having at least two horizontally adjacent bays. Each of the bays has an upper biological treatment zone separated by a horizontally disposed baffle from a lower settling zone. Raw wastewater enters the lower settling zone of one of the bays where settleable and floatable solids are removed, and then turns vertically to flow in a reverse direction through the upper biological treatment zone of the first bay. From the first bay the wastewater is horizontally directed into and through the biological treatment zone of the second bay and is subsequently vertically directed into and through the lower settling zone of the second bay to the weir for collection of the treated fluid. Preferably, two secondary bays, each receiving about one half of the wastewater flow from the first bay, are provided. (Sinha-OEIS)
W75-05890

PROCESS AND APPARATUS FOR REMOVING IMPURITIES FROM CONDENSATE WATER,
Permutit Co., Paramus, N.J. (assignee)
J. R. Anderson.
U.S. Patent No. 3,849,306, 5 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1222, November 19, 1974.

Descriptors: *Patents, *Cation exchange, *Resins, *Anion exchange, *Ion exchange, *Filtration, *Demineralization, *Water treatment, Ammonia, Condensation.

The apparatus is designed to provide an improved method for removing undissolved and dissolved impurities from condensate water that contains ammonia while at the same time providing sufficient filtering and ion exchange capacity. Water to be treated is passed through a first bed consisting of a strong acid cation exchange resin in the hydrogen or ammonium form where removal of undissolved solids and substantial, but not necessarily entire, removal of cations takes place. It is then passed through a second bed, comprising strong base anion exchange resin in the hydroxide form where anions are essentially all removed. Finally the water is passed through a third bed consisting essentially of strong acid cation exchange resin in the hydrogen or ammonium form where any cations which may have passed through or leaked from the first bed are removed. (Sinha-OEIS)
W75-05892

METHOD AND APPARATUS FOR TREATING WASTE MATERIAL,
FMC Corp., Chicago, Ill. (assignee)

A. A. Lemke.
U.S. Patent No. 3,847,802, 5 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 741, November 12, 1974.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Water pollution control, *Water quality control, *Pollution abatement, Equipment, Sludge.
Identifiers: *Settling tanks, *Pollution prevention.

A novel method and apparatus provide for transferring sludge from a settling tank into an aeration tank and depositing the sludge in the aerating tank at a location that will prevent immediate return to the settling tank. The sludge withdrawal incorporates a simple and inexpensive mechanism for automatically 'wasting' a predetermined amount of sludge during each cycle of operation and the amount can readily be varied by a manual adjustment. The aeration and settling tanks have a common wall with ports adjacent the upper end of the wall to allow aerated waste material to flow from the aeration tank to the settling tank. The sludge from the aerated waste material settles to the tank floor and is returned to the aeration tank through withdrawal that includes a vertical conduit in the aeration tank with the withdrawal means having an open end located below the ports in the common wall. The sludge withdrawal includes a valve element that is freely pivoted on the bottom of the conduit. The valve element is pivoted to a closed position by a fixed member which has an arcuate camming surface at one end that progressively pivots the valve element from the opened to the closed position. (Sinha-OEIS)
W75-05894

METHOD AND APPARATUS FOR UPGRADING WASTEWATER TREATMENT PLANTS,
Autotrol Corp., Milwaukee, Wis. (assignee)
W. N. Torpey.
U.S. Patent No. 3,849,303, 7 p, 8 fig, 1 tab, 9 ref; Official Gazette of the United States Patent Office, Vol 938, No 3, p 1221, November 19, 1974.

Descriptors: *Patents, *Waste water treatment, *Oxidation, *Denitrification, *Biological treatment, *Microorganisms, *Aeration, *Pollution abatement, *Domestic wastes, Equipment, Activated sludge, Organic matter, Treatment facilities.
Identifiers: *Pollution prevention, *Carbonaceous matter, *Nitrogenous matter, Settling tanks, Ammonia nitrogen, Nitrate oxygen.

The method and apparatus are used for increasing the oxidation capacity of carbonaceous and nitrogenous matter in wastewater and provide a denitrification function to existing biological treatment plants, especially activated sludge. A single stage biological treatment unit employing partially submerged rotating biological contactors is used to grow microorganisms that oxidize organic matter, as well as ammonia nitrogen. The effluent from the single stage unit containing sloughed-off solids and nitrate oxygen, is supplied to a denitrification system which can be an existing aeration and final settling tank where such tanks are operated in a manner that denitrifying biological forms develop that utilize the sloughed-off solids from the single stage unit as an energy source and nitrate oxygen for their respiration. (Sinha-OEIS)
W75-05895

REMOVAL OF CYANIDE AND COLOR BODIES FROM COKE PLANT WASTEWATER,
Bethlehem Steel Corp., Pa. (assignee)
S. T. Herman, and R. J. Horst.
U.S. Patent No. 3,847,807, 4 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 742, November 12, 1974.

Descriptors: *Patents, *Waste water treatment, *Water quality control, *Pollution abatement, Organic compounds, Iron compounds, Sludge, Flocculation, Equipment, Industrial wastes, Coals.
Identifiers: *Cyanide, *Pollution prevention, Calcium lime, Discoloration, Coke.

Wastewaters, from a coke oven by-product plant, containing cyanides and complex organic compounds are treated by a high density sludge process. The wastewaters are mixed with an aqueous high calcium lime slurry and a portion of the sludge formed in the process which is recycled in the process. The aqueous high calcium lime slurry and the portion of recycled sludge are mixed for a time to obtain a uniform mix. A solution containing iron is added to the uniform mix. Iron cyanide compounds and a portion of the complex organic compounds are precipitated. The precipitate is flocculated and is passed to a settling tank wherein the precipitate settles out to form a high density sludge. (Sinha-OEIS)
W75-05899

PROCESS FOR PRODUCING AND MAINTAINING PURIFIED, STERILE WATER,
Secretary of the Interior, Washington, D.C. (assignee)
K. C. D. Hickman.
U.S. Patent No. 3,860,494, 5 p, 13 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 841, January 14, 1975.

Descriptors: *Patents, *Water purification, *Distillation, Evaporation, Condensation, Water quality control, Recycling, *Waste water treatment.
Identifiers: *Sterilization.

A system for maintaining purified, sterile distilled water under a permanent blanket of steam in a storage vessel is disclosed. The improvement supplies fresh distillate to the storage vessel which is already substantially filled with steam-blanket distillate. Simultaneously some stored water is removed from the reservoir and recycled back to the still for repurification. Recycle conduits are positioned on the storage vessel to remove oldest water from the vessel. Heat transfer means or flow directing devices are provided to insure that water flows through the storage vessel in close approximation to plug flow. (Sinha-OEIS)
W75-05904

ION EXCHANGE WASTE WATER TREATMENT PROCESS,
Combustion Engineering, Inc., Windsor, Conn. (assignee)
D. L. Dixson, and B. A. Roche.
U.S. Patent No. 3,862,032, 6 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1329, January 21, 1975.

Descriptors: *Patents, *Waste water treatment, *Demineralization, *Pollution abatement, *Ion exchange, Filtration, Resins, Anion exchange, Cation exchange, Water pollution control.

The waste water from the regeneration system of a demineralizer system is treated by ion exchange and filtration so that the water can be immediately reused in subsequent steps of the regeneration process. This reduces the amount of waste requiring further treatment before being released to the environment. The resin used to treat the water can either be exhausted resin from a demineralizer unit or regenerated resin. Some of the acid from the regeneration process may also be recovered for reuse. (Sinha-OEIS)
W75-05906

SLIME CONTROL COMPOSITIONS AND THEIR USE,
Betz Labs., Inc., Trevose, Pa. (assignee)
B. F. Shema, and R. H. Brink, Jr.
U.S. Patent No. 3,862,034, 5 p, 1 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1330, January 21, 1975.

Descriptors: *Patents, *Slime, *Water treatment, Fungi, Bacteria, Algae, *Microorganisms, *Pulp wastes, Pollution abatement, Industrial wastes.
Identifiers: Aerobacter aerogenes, Morpholine, Anilide, Biocides.

Processes and compositions useful for inhibiting the growth of slime in water and, in particular, water used for industrial purposes are described. The novel processes and compositions are processes or mixtures which show unexpected synergistic activity against microorganisms, including bacteria, fungi and algae, which produce slime in aqueous systems or bodies which are objectionable from either an operational or aesthetic point of view. Specifically the invention is directed to the use of compositions comprising a combination of N-2-nitrobutyl - morpholine and 3, 4', 5 - tribromosalicylanilide. (Sinha-OEIS)
W75-05907

LIQUID SUSPENSION PURIFYING UNIT,
K. R. W. Robinson.
U.S. Patent No. 3,862,041, 7 p, 13 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1332, January 21, 1975.

Descriptors: *Patents, *Pollution abatement, *Waste water treatment, *Pulp wastes, Suspension, Equipment, *Water purification, Liquid wastes, Industrial wastes.
Identifiers: Liquid purification, Hydrocyclones, Fiber suspensions.

One or more hydrocyclones are arranged in a common housing to form a liquid purifying unit. Each hydrocyclone has a casing having an inject inlet, for the suspension to be cleaned, an accept outlet and a reject outlet. The common housing is divided up so as to have an inject chamber, an accept chamber and a reject chamber. Each hydrocyclone is arranged so that each accept outlet is located at the bottom of the unit and each reject outlet is located at the top thereof, with reject outlet open above the surface of the liquid in the reject chamber. The reject chamber forms part of a closed circuit with the reject outlet connected to an outlet line in a manner to maintain a generally constant level of liquid in the reject chamber. This arrangement enables the outflow of reject in the reject chamber to be seen and also enables the unit to be incorporated in a closed system. (Sinha-OEIS)
W75-05908

THE COUNTESS WEAR SEWAGE-TREATMENT WORKS OF EXETER CITY COUNCIL,
Exeter Sewage Treatment Works (England).
J. A. Garry, K. A. Barrett, and A. Garton.
Water Pollution Control, Vol 73, No 3, p 321-324, 1974. 3 fig, 1 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Sludge disposal, Sludge treatment, Construction materials, Design criteria.
Identifiers: United Kingdom(Exeter City-Eng).

The present Exeter, U.K. sewage works designed for a population of 120,000 and completed in 1970 is described. A main interceptor sewer and treatment works are the central features for the new construction because problems of overloading and sludge treatment and disposal were becoming increasingly more troublesome. The sludge treatment and disposal method as well as the apparatus and procedure employed in the treatment method are described. (Sandoski-FIRL)
W75-05940

LIQUID FILTER SYSTEM HAVING AUTOMATIC FILTER BACK WASH CONTROL AND METHOD OF OPERATION,
T. M. Walters, and C. H. Brown.

U.S. Patent 3,826,368. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1218, July 30, 1974. 1 fig.

Descriptors: *Waste water treatment, *Filtration, *Filters, *Patents, Pressure, Solids, Liquids, Equipment, Screens, Operations.
Identifiers: *Back wash control.

A filter for removing solid particles from a fluid is described in which an inlet supplies the fluid to be filtered to one side of the screen. An outlet carries away the filtered fluid from the other side of the screen, where means coupled to the outlet are responsive to an absolute drop in normal pressure. These introduce a higher pressure back wash into the outlet. Additional means are coupled to the inlet responsive to an increase in normal pressure in the inlet for terminating the flow of back wash into the outlet. (Prague-FIRL)
W75-05941

POROUS POLYETHYLENE IN SEWAGE AND WATER TREATMENT PLANTS.
Chemical Processing, Vol 20, No 5, p 22, May, 1974.

Descriptors: *Construction materials, *Plastics, Aeration, *Sewage treatment, Treatment facilities, Performance, *Waste water treatment, *Water treatment.

Oy Nokia AB developed two kinds of aerating elements made of Nopol 100 porous polyethylene for use in the aeration and purification of waste water, sludge, and for alleviating oxygen loss in lakes, rivers, and ponds. The HKP600 tube and the HKL210 disc and all other supporting component parts are made of plastics to withstand the corrosive effects of effluents and waste. The HKP600 has been installed in the factory built sewage treatment plant developed by Valmet Oy which operates on the activated sludge principle and is assembled on-site from interchangeable elements used for various functions and for plant extensions. This material repels water, absorbs oil, attracts dust, reduces noise, and can be molded in rod, tube, disc, and other shapes. Also it is unaffected by mineral acids, alkalis, alcohols, ketones, and aldehydes. (Sandoski-FIRL)
W75-05943

WASTEWATER TREATMENT FOR SMALL COMMUNITIES: PART TWO - SPECIAL DESIGN CONSIDERATIONS,
California Univ., Davis. Dept. of Civil Engineering.
G. Tchobanoglous.
Public Works, Vol 105, No 8, p 58-62, 98-99, August, 1974. 1 fig, 5 tab, 11 ref.

Descriptors: *Waste water treatment, *Operation and maintenance, Costs, Waste water(Pollution), Effluents, Environmental control, *Design.

A variety of processes have been developed that are suitable for the treatment of waste water from small communities. Due to variable local conditions, there is no best process that can be applied universally. Most important factors are the operation and maintenance requirements due to the budget limitations faced by most small cities. Selection of the process should be based on an analysis of the waste water characteristics, effluents requirements, costs, budgetary limitations, and assessment of local impacts. (Sandoski-FIRL)
W75-05944

NUTRITIONAL IRON-PROTEIN COMPLEXES FROM WASTE EFFLUENTS,
Department of Agriculture, Washington, D.C. (assignee)
For primary bibliographic entry see Field 5E.
W75-05946

METHOD OF SEPARATING METALLIC CHLORIDES FROM AN AQUEOUS MIXTURE THEREOF,
Aktiebolaget Gullspang Elektrokemiska (Sweden). (assignee)
A. I. Aue, H. Reinhardt, J. H. A. Rydberg, B. Frolunds, and L. Skjutare.
U.S. Patent 3,824,161. Issued July 16, 1974. Official Gazette of the United States Patent Office, Vol 924, No 3, p 625, July 16, 1974. 1 fig.

Descriptors: *Separation techniques, *Waste treatment, *Patents, *Mixtures, *Chlorides, Metals, Extraction.
Identifiers: Metallic chlorides.

A method for separating one or more metallic chlorides from an acid aqueous mixture is described. It employs a multi-stage, selective extraction process and a water immiscible extraction agent which consists of a solution of an amine capable of forming extractable compounds with the metallic chlorides. Subsequently the metallic chloride or chlorides are washed out of the mixture. (Prague-FIRL)
W75-05947

FULL FLOW FLUID FILTER,
California Inst. of Tech., Pasadena. (assignee)
L. Troth, R. Hagler, and O. Keller.
U.S. Patent 3,827,568. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 138-139, August 6, 1974. 1 fig.

Descriptors: *Waste water treatment, *Patents, *Filters, Flow, Fluid mechanics, Equipment, *Filtration, Sediments, Detritus, Sediment load, Sedimentation, *Suspended load, *Suspended solids, Water pollution sources.
Identifiers: Particulate impurities removal.

A filter has been designed to remove particulate impurities from a fluid. It is a hollow, generally cylindrical housing having axial fluid channels along the inner surface and open opposite ends forming an inlet and an outlet for the filter. Several annular, generally disc-shaped filter elements are tightly stacked within the housing. The outer edges of the filter elements bear on the inner surface of the housing and combine to form the axial fluid channels while the inner edges of the filter elements combine to form a hollow inner core communicating with one of the open ends of the housing. Each filter element includes radial channels between the axial channels and the hollow inner core. Each channel has a low-velocity pocket for trapping particulate impurities in a fluid flowing along. One end of the hollow inner core is blocked so that the path for fluid flowing between the inlet and outlet is through the axial and radial channels and the hollow inner core. (Orr-FIRL)
W75-05948

METHOD FOR THE DISPOSAL OF COMBUSTIBLE AND DILUTE AQUEOUS WASTES,
Atomic Energy Commission, Washington, D.C. (assignee)
E. Grimmett, and P. Lamont.
U.S. Patent 3,827,946. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 233, August 6, 1974. 1 fig.

Descriptors: *Waste disposal, *Waste water treatment, *Patents, *Water reuse, *Potable water, Reclaimed water, Evaporators, Equipment, Water pollution treatment, Water supply, Steam, Potable water.
Identifiers: Steam power, Aqueous waste disposal, Steam generator.

A method for the disposal of combustible and dilute aqueous wastes produces both potable water and useful power. Combustible waste, together with conventional fuel, is burned in a fluidized-bed steam generator; the steam produced is used to evaporate dilute aqueous wastes in the first stage of a two-stage fluidized-bed evaporator. The steam in the first stage is used to evaporate dilute aqueous wastes in the second stage of the two-stage fluidized-bed steam generator; the steam produced in the second stage is used to generate power. Spent steam from the first and second fluidized-bed evaporators is condensed as potable water. (Orr-FIRL)
W75-05949

APPARATUS FOR REMOVAL OF CONTAMINANTS FROM WASTES,
K. Okubo, and A. Ueno.
U.S. Patent 3,827,964. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 236-237, August 6, 1974. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, Equipment, Electricity, *Electrolytes, Suspended load, Suspended solids.
Identifiers: Contaminant removal, Electrolyte cell.

Apparatus consists of an electrolytic cell partitioned by a membrane into two electrolytic chambers. The chambers are filled with electric conductors in a granular or fibrous form with positive and negative major electrodes respectively thereby forming an anode chamber and a cathode chamber in abutting relation through the membrane. The anode chamber or the cathode chamber which are filled with the granular or fibrous conductors with major electrodes may be replaced by a porous conductive metal sleeve. (Orr-FIRL)
W75-05950

METHOD OF INTRODUCING OXYGEN INTO A LIQUID TO BE CLARIFIED AND DEVICE FOR CARRYING THE METHOD INTO EFFECT,
J. Kaelin.
U.S. Patent 3,827,679. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 168, August 6, 1974. 1 fig.

Descriptors: *Waste water treatment, *Patents, *Oxygen, Aerobic treatment, Water pollution treatment, Water treatment, Sewage, Sewage treatment, Oxidation, Sanitary engineering, Water supply.
Identifiers: *Clarification plants, Activation tanks.

A method of introducing oxygen into a liquid located in an activation tank of a clarification plant is described. The liquid is circulated in toroidal flows. Oxygen or air is then bubbled through. (Orr-FIRL)
W75-05951

THE PROPERTIES AND COMPOSITION OF SLUDGES,
National Environmental Research Center, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5A.
W75-06033

STORM AND COMBINED SEWER RESEARCH AND DEVELOPMENT,
Federal Water Pollution Control Administration, Washington, D.C.
For primary bibliographic entry see Field 8C.
W75-06049

WATER QUALITY DECISION MAKING IN ATLANTA, GEORGIA, THREE RIVERS STUDY,
Black, Crow and Eidsness, Inc., Atlanta, Ga., and Atlanta Public Works Dept., Ga.
A. I. Perez, and G. D. Barnes.
In: Proceedings of Fourth Annual Environmental Engineering and Science Conference, Louisville, Kentucky, March 4-5, 1974. p 41-57, 5 fig, 5 tab, 6 ref.

Descriptors: *Decision making, *Water pollution control, *Sewage treatment, *Waste water disposal, *Alternate planning, Environmental engineering, Sanitary engineering, Water quality standards, Sewage effluents, Combined sewers, Overflow, Water quality control, Georgia, Treatment facilities, River basins.
Identifiers: *Atlanta(Georgia), West Point Reservoir, South River, Flint River, Chattachoochee River.

In August, 1972, the Georgia Water Quality Control Board directed the City of Atlanta to develop a program to comply with new effluent standards for discharges to the South River Basin to provide adequate treatment for combined sewer overflows in the South River Drainage Area. The analysis of alternate solutions has been completed and the recommended program has been submitted to the State for preliminary review. The factors which were considered in selecting an optimum plan for meeting present and possible future water quality standards were included with the recommendations. When Atlanta began the major improvement program to provide secondary treatment as required by the State, the City believed that the new facilities would be adequate to meet standards. Neither the City nor the regulatory agencies can afford to put forth the efforts and finances to implement another major water pollution control program without assurance that such a program will not become inadequate before it is even completed. Effective regional planning and consideration of all viable alternatives is essential if meaningful pollution abatement programs are to be developed. Implementation of the proposed plan will result in the elimination of discharges from the City's treatment facilities in the South River and Flint River Basins. (Poertner)
W75-06058

AUTOMATION OF THE CONTINUOUS COAGULATION MONITOR,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5F.
W75-06074

DEVELOPMENT OF A METHOD FOR MEASURING DISSOLVED COLOR IN WASTEWATERS AND RECEIVING STREAMS,
Dept. of Environmental Systems Engineering. Clemson Univ., S.C.
For primary bibliographic entry see Field 5A.
W75-06086

WATER MANAGEMENT IN LIVESTOCK WASTE HANDLING SYSTEMS,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
C. L. Barth, and J. H. Bond.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 856, $4.75 in paper copy, $2.25 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 51, January 1975. 87 p, 35 fig, 11 tab, 23 ref. OWRT A-025-SC(2).

Descriptors: *Waste water treatment, Water management(Applied), *Farm wastes, *Farm lagoons, Aerobic conditions, *Anaerobic conditions, *Hogs, Liquid wastes, *Salmonella, *Mathematical models, *Water reuse, Water conservation, Waste storage, Waste treatment.

The potential for minimizing the use of water in several animal waste treatment and storage procedures was evaluated. Laboratory units simulated the operation of aerobic lagoons, anaerobic lagoons, and storage for diluted swine feeding floor waste under conditions of controlled temperature, lighting, loading rate and detention time. Reduction of volatile solids (VS) content under conditions similar to those of aerobic lagoons was limited due to algae production. Anaerobic lagoon simulators achieved volatile solids reduction rates of 75.8% at 24C and 200 days detention time and as little as 22.1% at 10C and 100 days detention time. Degradation of VS was generally high in the loading rate range of 50 to 400 g VS/day-m3 and sludge storage efficiency was also high in that range. Liquefaction was a significant factor in the storage simulators with reductions of total solids by as much as 69%. Survival of the swine pathogens Salmonella cholerae-suis and Salmonella typhimurium in laboratory simulators of swine manure lagoons was determined and compared with the survival of the indicator organisms Escherichia coli and fecal coliforms. The heaviest populations of the pathogens died off in 33 days. A cause for Salmonella die-off was proposed. A mathematical model was developed to describe the operation of the anaerobic animal waste lagoon and compared with relevant data which characterized the lagoon simulators. The symbiotic relationship of the acid formers (facultative heterotrophs) and methane formers (obligate anaerobes) was emphasized along with the possible inhibition of both cultures by high concentrations of volatile organic acids.
W75-06087

AN EVALUATION OF THE EFFECTIVENESS AND APPLICABILITY OF PHYSICAL-CHEMICAL TREATMENT OF URBAN LAND RUNOFF,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
P. Samar.
PhD Thesis, 158 p. 52 fig, 26 tab, 67 ref, 5 append. EPA No 11030 HJP.

Descriptors: *Urban runoff, *Coagulation, *Flocculation, Sedimentation, *Chemical precipitation, *North Carolina, *Waste water treatment, Evaluation, *Sludge treatment, Polyelectrolytes.
Identifiers: Durham(NC), *Physical-chemical treatment, Alum.

A physical-chemical treatment comprising coagulation and flocculation, sedimentation, and sludge handling was developed and applied to urban land runoff. The study deals with selecting an efficient coagulant, assessing the parameters involved, and evaluating criteria for efficient treatment. A number of organic and inorganic coagulants were evaluated in jar test analyses. The most efficient coagulants in terms of removal of suspended solids, COD, and turbidity were alum and the cationic polyelectrolyte Calgon 2660. The parameters involved in treatment with the coagulants were initial suspended solids, alkalinity, and mixing conditions. Based on the parameters mentioned and characteristics of the individual coagulant, alum was selected as the best coagulant for treatment of urban land runoff. The effect of scale up was evaluated in a long tube sedimentation study for each coagulant. Scale up did not influence the choice of coagulants or mixing conditions. Sludge characteristics were studied by evaluating the density, resistivity, and solid content of the sludge. (Stewart-North Carolina State)
W75-06094

RENOVATED WASTE WATER: THE QUESTION OF PUBLIC ACCEPTANCE,
George Williams Coll., Downers Grove, Ill. Dept. of Counseling Psychology.
J. H. Sims, and D. D. Baumann.
Water Resources Research, Vol 10, No 4, p 659-665, August, 1974. 2 fig, 6 tab, 15 ref. OWRT C-2178(H3379)(2).

Descriptors: *Psychological aspects, *Reclaimed water, *Potable water, *Water supply, *Attitudes, Water treatment, Water types, Effluents, Impaired water use, Waste water treatment, Water pollution control, Motivation, Decision-making, Social aspects, Water sources, Water utilization, Water quality, Water consumption, Water reuse.
Identifiers: Kokomo(Indiana), Lubbock(Texas), San Angelo(Texas), Colorado Springs(Colorado), Santee(California), Human behavior, Psychology.

Since no program using renovated wastewater can be initiated without public acceptance, it is crucial that the public's responses be identified. A study of attitudes of 400 respondents in five communities considering recycling renovated wastewater (Kokomo, Ind.; Lubbock and San Angelo, Tex.; Colorado Springs, Colo.; and Santee, Calif.) shows people's attitudes depend on the amount of knowledge they have about wastewater reuse and their general level of education rather than upon unconscious fears of contamination or beliefs about technology, aesthetics, progress, authority, nature, or destiny. Half of the sample would drink renovated water, 78-81% accepted use for body contact (swimming, washing), 94% accepted use for industrial cooling, and 96% accepted it for irrigation. The extremely positive attitudes are questioned since they might reflect the respondents' desire to be ecologically responsible, especially since the questions were hypothetical. However, the study results are encouraging in that there appears to be less psychological resistance to adopting renovated wastewater for potable use than was expected. In addition, the data show that information campaigns would be effective for encouraging public support. (Grden-North Carolina)
W75-06096

PUBLIC ACCEPTANCE OF RENOVATED WASTE WATER: MYTH AND REALITY,
Southern Illinois Univ., Carbondale. Dept. of Geography.
D. D. Baumann, and R. E. Kasperson.
Water Resources Research, Vol 10, No 4, p 667-674, August, 1974. 3 fig, 3 tab, 37 ref. OWRT C-2178(3379)(3).

Descriptors: *Psychological aspects, *Water quality, *Waste water treatment, *Potable water, *Attitudes, Behavior, Fluoridation, Chlorination, Waste treatment, Waste water disposal, Water pollution, Water pollution treatment, Waste dilution, Water treatment, Water supply, Water demand, Water requirements, Water storage, Water reuse.
Identifiers: *Human behavior, *Public acceptance, Public works.

Although wastewater treatment technologies have greatly improved during the last decade, adoption of water reuse to supplement municipal water supplies has not been extensively assessed. Controversy exists over the public health hazard involved with direct use of renovated water for potable purposes, but recent progress in treatment technologies, combined with natural buffers, makes direct reuse tenable. Implementaing wastewater renovation and reuse systems would not only alleviate water shortages, but would improve stream quality. The potential obstacle of public acceptance should be examined; the chlorination and fluoridation experiences provide sufficient precedent for concern. For example, although chlorination is inexpensive and an effective disinfectant, fifty year elapsed before 90% of the public water supplies were chlorinated due to acceptance factors. However, recent studies of public attitudes towards water reuse provide some basis for optimism. Evidence suggests that with proper education and exposure to wastewater renovation, with a sequential experience with a hierarchy of uses, and with support from local health, scientific, water supply, and water treatment personnel, community support can be obtained. It is also necessary to understand why the myth of public unacceptance of wastewater reuse arose in the first place. (Grden-North Carolina)
W75-06097

CITY OF FRESNO--LONG RANGE PLAN: METROPOLITAN AREA, TRUNK SEWER SYSTEM.
Jenks and Adamson, Palo Alto, Calif.
Prepared for City of Fresno, California, August, 1971. 28 p, 6 fig, 9 tab.

Descriptors: *Sewers, *Sewage, *Sewage districts, Waste water(Pollution), *Waste water disposal, Waste disposal, Storm drains, Drainage systems, *California.
Identifiers: *Fresno(Calif.), Metropolitan Fresno Sewer System.

In addition to presenting long range planning for the City of Fresno Sewer System, the report incorporates seven systems in outlying areas and project requirements for the metro system to the years 1985 and 2015. Present system characteristics (plant flow records, industrial discharges, water metering, storm drainage), future population and land use characteristics, and projected units flows are analyzed. Sewer system improvements are suggested to meet the needs of the estimated 495,000 population in 1985 and 945,000 population in 2015. A diagram showing 1985 needs reveals that all proposed lines are outside the present sewer system indicating that with a few exceptions the present system will be adequate to 1985. New lines will be necessary to accomodate the 2015 requirements, since by that time all existing north and south trunk lines and trunks flowing to the west will be overloaded. Individual trunk lines are discussed for both time parameters. Additional recommendations include elimination of connections to storm water inlets, universal installaion of water meters, interior protective coating for all concrete sewer pipe to be installed, and construction of larger than presently necessary lines to provide for future needs. (Park-North Carolina)
W75-06102

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 449, $8.75 in paper copy; $2.25 in microfiche. February, 1973. 302 p, 34 fig, 9 tab, 58 ref, 5 append. MIP-336-372.

Descriptors: *Sewage disposal, *Water supply, *Waste water treatment, *Waste water disposal, *Water supply, Water storage, Water management(Applied), Water quality, *Michigan, Water distribution, Sewers, Sewage districts.
Identifiers: Antrim County(Mich.), Benzie County(Mich.), Charlevoix County(Mich.), Emmet County(Mich.), Grand Traverse County(Mich.), Kalkaska County(Mich.), Leelanau County(Mich.), Manister County(Mich.), Missaukee County(Mich.), Wexford County(Mich.).

Present conditions and future requirements of water supply and wastewater control are investigated for an area consisting of 10 counties, Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manister, Missaukee, and Wexford, with growth projected from 1970 to 1990 of 50,000 to 209,000. The area has been popular for second homes with a minimal burden to water problems. Permanent urbanization, especially in Grand Traverse County and City, is projected. Goals and objectives developed served as a basis for developing the plan and are intended to be used by local governments in helping to determine local policy. Factors considered including existing facilities (primarily individual system), water quality standards maintenance, land use controls, and specific community needs are delineated within each county for both water and wastewater systems. Proposals include consolidation of some wastewater facilities, expansion of service areas, and construction of new or upgrading present water storage facilities, trunk lines, and treatment facilities. Cost estimates are given by locality and funding mechanisms are proposed (federal and state grants, revenue, special assessment, and general obligation bonds, and allocation of current revenues). (Park-North Carolina)
W75-06106

CITY OF FLORENCE, SOUTH CAROLINA EXTENSION OF WATER AND SEWER SERVICE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Economic Development Administration, Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-SC-73-0887-F, $5.75 in paper copy, $2.25 in microfiche. May 1973. 141 p, 12 fig, 15 tab.

Descriptors: Environmental effects, *Urbanization, *Sewage treatment, *Sewage disposal, *South Carolina, Future planning(Projected), Waste water treatment, Atlantic Coastal Plain, Southeast United States, Water policy, Land use, Utilities, Sewers, Interceptor sewer, Federal government, Local governments, Governmental Interrelations, Land management, Water resources development.
Identifiers: *Environmental Impact Statements, *Florence(SC).

The city of Florence, South Carolina, plans to extend water and sewer service to the west of the city. Florence serves as the focal point of the region known as the Great Pee Dee River Basin which defines a natural unit for planning and development. The project area is essentially undeveloped land, approximately one third of which was used for farming, but now lies fallow. The project's major impact will be the gradual urbanization over the next twenty five years of 3,450 acres of rural land. Increases in noise level, auto and other air emissions and congestion will accompany development. The runoff from the developing area will carry contaminants to Jeffries Creek and the small game population now living in the area will be forced to emigrate. Compliance with air and water standards will mitigate the adverse effects of urbanization. The project will stimulate development of the project land and will not irreversibly or irretrievably commit any scare resource within the Pee Dee Basin. The alternative of no action was rejected, and there is no significant opposition to the project. (Deckert-Florida)
W75-06181

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-FL-73-1489-F, $7.60 in paper copy, $2.25 in microfiche. September 11, 1973. 285 p, 7 map, 11 tab.

Descriptors: *Florida, *Waste water treatment, *Waste water disposal, *Waste disposal, *Waste treatment, Waste water(Pollution), Sewage, Sewage disposal, Sewage treatment, Outfall, Sewers, Sewerage, Construction, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Dade County(Fla).

The project consists of construction of wastewater pumping stations, waste water force mains, a waste water treatment plant and a waste water treatment plant outfall in Central Dade County, Florida. Unavoidable adverse effects related to the construction of the facility including noise, traffic, and the stripping of trees and foliage, will be minimized by pursuing construction precautions. The elimination of 31 waste water pollution sources which currently discharge waste water to inland canals and bays will reduce potential health hazards, and eliminate nuisances such as odors and unsightly conditions. In addition the project will eliminate the discharge of 32 million gallons of sewage a day by septic tanks to the Biscayne Aquifer reducing the possibility of groundwater contamination. The treatment of waste water will be raised to 90% of total treatment and will be discharged 18,000 feet offshore improving near shore ocean water quality. Feasible alternatives include exclusion of saline infiltration, effluent disposal techniques, sludge treatment and disposal methods or no action. (Denvir-Florida)
W75-06183

A REGIONALIZATION PROCEDURE WITH OPTIMIZING CHARACTERISTICS FOR WATER DISPOSAL SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
R. S. McAvoy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 884, $7.50 in paper copy, $2.25 in microfiche. MSc thesis, December 1973. 136 p, 17 fig, 31 tab, 13 ref, 2 append. OWRT B-035-PA(4). 14-31-0001-3327.

Descriptors: *Planning *Decision making, Financial feasibility, *Pennsylvania, Administration, Economies of scale, Alternative costs, *Regional analysis, Waste water treatment, Treatment facilities, Optimization, *Optimum development plans.
Identifiers: Regionalization, *Waste management systems, Community leadership, Waste water plans, Community size, Regional alternatives.

A procedure provides for the generation of alternate schemes for the regionalization of a geographic area for locating waste-water treatment facilities. An integral part of the procedure is the degree of involvement of the decision makers, the community leaders, in it. They make their preferences known concerning their municipality. These characteristics or basic decision units of the municipality are the quantitative measure (Affinity Coefficient Sets) of the relationships which exist between communities. These sets are ordered by Paired Comparisons and weighted so each decision maker's individual preferences can be accounted for. A Combined Affinity Coefficient Set is produced for each set of Affinity Coefficient Sets chosen as decision criteria. The Combined Affinity Coefficient Set is partitioned into two sets, those municipalities which are the components of a regionalization scheme and those which are not. This partitioning is accomplished by using the barrier value which is subjective and depends solely on the decision makers. (Sink-Penn State)
W75-06195

DEVELOPMENT OF ECONOMIC CRITERIA FOR REGIONALIZATION OF A WASTE WATER MANAGEMENT SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
D. J. Palm.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 935, $5.75 in paper copy, $2.25 in microfiche. PhD Dissertation, December 1972. 130 p, 8 fig, 18 tab, 75 ref, append. OWRT B-035-PA(3). 14-31-0001-3327.

Descriptors: *Planning, *Administration, *Pennsylvania, Decision making, Financial feasibility, Economies of scale, *Alternative costs, *Regional analysis, Waste water treatment, Sewage treatment, Treatment facilities, *Cost comparisons.
Identifiers: Regionalization, *Waste management systems, Waste water plans, Community size, Regional alternatives, Economic criteria.

The development of economic criteria for regionalization of waste water management systems reported in this study was part of an interdisciplinary research effort concerned with the development of criteria for regionalization of water supply and waste water management systems. The study's central hypothesis was that economies of size would result through the regionalization process which was supported by the findings of the analysis. The factors of prime importance influencing the magnitude of reductions were the size of the sewage treatment plant and the distance the effluent had to be transported given the spatial

distribution of the effluent generators within the area to be serviced. The estimated costs of immediate regionalization exceed those of phased regionalization. It was concluded that the costs of developing a regional system from the existing systems within the study area were very small relative to the reduction in cost achievable by regionalization. (Sink-Penn State)
W75-06200

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
R. E. Markland, L. D. Smith, and J. D. Becker.
Available from University of Missouri, St. Louis, $6.00 for paper copy. Also, available from the National Technical Information Service, Springfield, Va 22161 as PB-240 991, $7.50 in paper copy, $2.25 in microfiche. Technical Completion Report, December 31, 1974. 141 p, 19 fig, 15 tab, 65 ref, 5 append. OWRT C-5302(4221)(1). 14-31-0001-4221.

Descriptors: *Return flow, *Waste water disposal, *Waste water treatment, *Long-term planning, *Alternative planning, *Mathematical models, *Land use, Sewage disposal, Computer models, Decision making, Estimated benefits, Estimated costs, Regional development, Optimization, Investment, Cost comparisons, *Cost-benefit analysis, Project planning, Mathematical studies, Water reuse, Waste water(Pollution), *Missouri.
Identifiers: *St. Louis(Mo), Standard Metropolitan Statistical Areas, Mixed integer programming, Land disposal wastewater treatment site selection, Land use forecasting, Urban land use.

A large scale mixed integer programming model for the selection of land disposal wastewater treatment sites was developed and tested for the St. Louis Standard Metropolitan Statistical Area (SMSA). Initially, some thirty-one potential land disposal sites within the St. Louis SMSA were isolated, utilizing a previously developed land use forecasting model. Next, the mathematical framework of the model was developed, as various technical, economic, capital, pollution, and engineering constraints were constructed, and the model's objective function was derived in a manner in which the net present value of all capital investment costs, operating costs, benefits, and the salvage value resulting from the construction of the various land disposal wastewater treatment sites was minimized. The model was then computerized, calibrated, and tested, using data developed for each of the potential land disposal sites within this region. Analysis of the test results indicated the model's general usefulness as a means of performing a large scale, regional, benefit/cost analysis for a set of potential land disposal wastewater treatment sites. The solution to the model provided the basis for a regional plan for land disposal wastewater site development, over a fifty year time horizon.
W75-06203

WATER SURVEILLANCE PROGRAM, EGLIN AFB FL,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5A.
W75-06216

CHARACTERIZATION OF WASTEWATERS FROM THE ETHICAL PHARMACEUTICAL INDUSTRY,
Gulf South Research Inst., Baton Rouge, La.
For primary bibliographic entry see Field 5A.
W75-06244

WATERBORNE WASTES OF THE PAINT AND INORGANIC PIGMENTS INDUSTRIES,
Southern Research Inst., Birmingham, Ala.
For primary bibliographic entry see Field 5B.
W75-06249

ENGINEERING, LEGAL AND ECONOMIC ASPECTS OF STORM SEWER ASSESSMENTS,
Iowa Univ., Iowa City. Dept. of Economics.
J. Barnard, N. W. Hines, and L. H. Mashaw.
Available from the National Technical Information Service, Springfield, Virginia 22161, as PB-240 945, $4.75 in paper copy, $2.25 in microfiche. Final Report, October 1973. 75 p, 2 fig, 4 tab. OWRT C-3227(No 3703)(1).

Descriptors: *Storm drains, *Assessments, Legal aspects, Water pollution control, Economics, Evaluation, Construction, *Financing, Engineering structures, Treatment facilities, *Combined sewers, Conveyance structures, Benefits, Cost-benefit analysis, *Financial feasibility.
Identifiers: *Benefit-assessment method, Special assessments.

The legal and engineering aspects of financing storm sewer construction through special assessments are examined. In considering the utility of the special assessment for this purpose, the nature of the special assessment and its declining popularity as a financing technique has been described. Three explanations for the relative disuse of special assessments are then identified and analyzed separately. The legal status of the special assessment is surveyed on a nationwide basis, addressing both the authorization for and actual use of the device. Various procedural requirements are discussed and a model assessment process is described. Then the legal rules and engineering procedures involved in establishing a proper relationship between an assessment and a special benefit derived by the affected property are explored as a background for an evaluation of current prodedures for determining assessments. Finally, a rational benefit-assessment method is proposed and its operation is illustrated with a simulated assessment case.
W75-06297

A PROPOSED STRUCTURE OF AN ALUMINUM-PHOSPHATE SPECIES OF IMPORTANCE IN WASTEWATER TREATMENT,
Towill (R. M.) Corp., Honolulu, Hawaii.
B. H. H. Chen, P. H. King, and C. W. Randall.
Environmental Letters, Vol 6, No 2, p 129-138, 1974. 2 fig, 1 tab, 6 ref. OWRT A-040-VA(2).

Descriptors: *Chemical precipitation, *Aluminum, *Phosphates, *Waste removal, *Tertiary treatment, Phosphorus compounds, Laboratory tests, *Waste water treatment.

The purpose was to determine the aluminum phosphate species formed in wastewater treatment at pH 5.0. Although the constituents were not as diverse as those in normal waste water, the experimental procedures and chemical concentrations were selected to simulate as closely as possible the practical situation. The aluminum/hydroxide/phosphate molar ratio in the precipitates at pH 5.0 was 13/10/9. The species formulated in the precipitates may vary or even be a combination of several different species, but the most likely formula is A1 13(OH)30(H2P04)9-18H20. The aluminum/phosphate molar ratio for optimum phosphate removal at pH 5.0 was 1.44. Since there are many competing and interferring organic and inorganic constituents in wastewater, other than those chemicals used in this experiment, the practical aluminum/phosphate molar ratio for optimum phosphate removal is expected to be higher than 1.44. The system pH throughout the experiment was set at 5.0. Future investigations should look into the pH range from 5.0 to 7.0, which applies to most practical situations. (Jernigan-Vanderbilt)
W75-06300

PRETREATMENT STANDARDS FOR DISCHARGE,
L. C. Gibney.
Environmental Science and Technology, Vol 8, No 7, p 613, July, 1974, 1 tab.

Descriptors: *Waste treatment, *Standards, *Industrial wastes, *Effluents, Federal government, Sampling, Chromium, Copper, Zinc, Nickel, Cadmium, Iron, Lead, Cyanide, Water quality standards, *Pre-treatment(Water), Waste water treatment.

Until recently, pretreatment guidelines for pollutents entering waterways had been developed by the federal government. Now, pretreatment standards are being promulgated for 31 industries. Specifically prohibited wastes listed by the EPA encompassed wastes which are inflammable, corrosive to the treatment plant's structure, obstructive to the sewer's flow and have an excessive flow or discharge rate. The EPA requires that major contributing industries pretreat, their incompatible pollutants with the best practicable control technology. (Jernigan-Vanderbilt)
W75-06313

PHILOSOPHY AND METHODOLOGY OF METALLIC WASTE TREATMENT,
New York State Dept. of Environmental Conservation, Albany. Bureau of Industrial Wastes.
N. A. Curry.
In 27th Industrial Waste Conference, Purdue University, West Lafayette, Indiana, May 2-4, 1972. 29 p, 3 tab, 5 ref.

Descriptors: *Heavy metals, *Waste treatment, *Regulations, *Water pollution, Toxicity, Evaporation, Recycling, Concentrations, Precipitation, Neutralization, Clarification, Sludge, Effluent, Solubility, Oxidation, Reverse osmosis, Contamination, Incineration, Sanitary fill.

Steps to be taken to reduce the amount of pollutant in a discharge is discussed, assuming that some discharge is required in the process. In any such process, the amount of pollutant is the product of the amount of flow and of the concentration of the pollutant in the flow. Reduction in either the flow or the concentration will reduce the pounds of pollution in the discharge. Seven rules are presented and discussed concerning the reduction of pollutants: I. Omit flows with a pollution concentration lower than the concentration in equilibrium with the precipitate formed; II. Reduce the waste volumes requiring treatment-static fog or spray rinses, counter-current flow; III. Minimize the solubility of the pollutant (a) eliminate compounds that form soluble complexes (b) reduce concentration of interfering ions that increase the pollutant ion solubility (c) maintain conditions that minimize total solubility; IV. Control conditions to increase the proportion of pollutant in the ionic form required for its precipitation or adsorption; V. Avoid conditions that will form toxic gases during treatment; VI. Select a process that will give the lowest practical concentration of pollutant in the effluent; VII. Select process that gives a sludge that can be disposed with minimum danger of contamination of the environment. (Rowe-Vanderbilt)
W75-06320

OPERATIONAL CONTROL AND PLANT PERFORMANCE OF THE HAMPTON ROADS SANITATION DISTRICTS AT WILLIAMSBURG WASTE TREATMENT PLANT.
National Field Investigations Center, Cincinnati, Ohio.
February 1973. 60 p, 10 fig, 8 tab, 3 append.

Descriptors: *Treatment facilities, *Wastewater treatment, *Activated sludge, Domestic wastes, Sewage treatment, Water pollution sources, Quality control, *Virginia, Biochemical oxygen demand.

Identifiers: *Brewery wastes, *Williamsburg(Va), Operational control.

A technical assistance project was conducted at the Williamsburg Waste Treatment Plant, Williamsburg, Virginia, to demonstrate the start-up and operational control procedures of a treatment plant. Included are descriptions of the facilities, waste characteristics, sample collection and analysis, operational control methods, and also suggested plant modifications and recommendations. The Williamsburg Waste Treatment plant is an activated sludge plant designed to treat 9.6 mgd of combined brewery and domestic waste. Reductions in BOD5 averaged 97 percent for the project and reductions in the suspended solids averaged 92 percent. The oprational control tests that were used to monitor plant performance permitted process imbalances to be quickly recognized and corrected. (Orr-FIRL)
W75-06341

UTILIZATION OF ACTIVATED SLUDGE (ISPOL'ZOVANIE AKTIVNOGO ILA),
Khorskii Gidroliznyi Zavod (USSR).
A. P. Dolzhenko.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 6, p 29, 1974.

Descriptors: *Sludge disposal, *Activated sludge, *Yeasts, Ultimate disposal, Proteins, Vitamins, Nutrients, Water pollution sources, Waste disposal, Industrial wastes, Wastes, Hydrolysis, Effluents, Water purification.
Identifiers: Minerals.

At the Khorsk hydrolysis plant, activated sludge from secondary sedimentation tanks is used as an additive for feed yeast suspensions. The sludge is added prior to drying in an amount of 15%. The additive enriches the yeast with proteins, B group vitamins, and minerals. In addition, the activated sludge reduces the risk of bursting during yeast drying and increases the yeast yield by 200 kg/ton of dry raw material. Another advantage is an improved mechanical purification of the plant effluents, as all ponds can be used for sludge from primary tanks. (Stapinski-IPC)
W75-06344

STATE OF THE ART OF THE WATER PREPARATION TECHNOLOGY IN THE USSR (DER GEGENWAERTIGE STAND DER WASSERAUFBEREITUNGS TECHNOLOGIE IN DER UDSSR),
J. B. Bagozkij.
Wasserwirtschaft-Wassertechnik, Vol 24, No 6, p 184-187, 1974. 6 fig, 2 tab.

Descriptors: *Potable water, *Flocculation, Design criteria, Filters, Ozonation, Lime sludge, Equipment, Ozone, Turbidity, Aluminum sulfate, Color.

Latest achievments in drinking-water preparation technology in the UDSSR were surveyed. The use of new flocculants and flocculation aids, design improvements, the use of new filter materials and layer filter designs, as well as the use of modern integrated analytical instruments for automatic process control are the basic trends of the technological development. Aluminum sulfate with 14-15 percent active alumina, and, less often, iron chloride are used as flocculants, combined with activated silicic acid and polyacrylamide as flocculation aids. The minimum interval between the flocculant and flocculation dosaging is 30 to 90 seconds, depending on the water temperature. The aggressivity of the water as caused by the flocculants is eliminated by slaked lime. Ozone is used as a reagent for the elimination of slight coloration and turbidity in the ozonization-filtration-ozonization or chlorination scheme, or for the improvement of the organoleptic properties of the drinking water. Ozonization alone is sufficient if the turbidity and coloration of the raw water do not exceed 6 mg/liter and 60 degrees, respectively. The sludge contact process and reverse filtration for the better utilization of the sludge retention capacity of the filter are among principal equipment design improvements. (Takaes-FIRL)
W75-06346

WASTE OIL RECOVERY PRACTICES--STATE OF THE ART.
Environmental Quality Systems, Inc., Washington, D.C.
December, 1972. 250 p, 39 fig, 46 tab, 128 ref, 3 append.

Descriptors: *Oil wastes, *Oil pollution, Fuels, Industrial wastes, Gasoline, Waste disposal, *Maryland, Water pollution sources, Economics, Legislation, Water pollution control, *Reviews.
Identifiers: *Waste oil production, *Waste oil re-refining, Acid/clay re-refining.

A study of waste oil production, collection, reprocessing, re-refining and disposal was performed primarily on the state of Maryland. Data is presented on the origin and amounts of waste automotive, industrial and other waste oils. The effect of changing gasoline lead concentration on waste crankcase oils is found to be significant with respect to future uses of such waste oils. The exact fate of waste oils within Maryland is being investigated. Methods for purifying, re-refining, reprocessing or disposing of waste oils of several types are given. The predominant process for re-refining waste crankcase oils is the acid/clay method using sulfuric acid and adsorbent clays. Newer processes reducing or eliminating the need for acids or clay are being tried. When the burning of waste oils for heat recovery or incineration is practiced, metallic compounds in the oil may pose a health hazard if released to the atmosphere. Waste oil reprocessing is generally not economically feasible because of high collection costs, low process yields, small plant operations and unfavorable legislation. (Orr-FIRL)
W75-06347

5E. Ultimate Disposal Of Wastes

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5B.
W75-05911

METHODS AND MACHINES.
Mining Journal, Vol 283, No 7249, p 74-75, July 26, 1974. 1 fig.

Descriptors: *Waste water treatment, Waste disposal, Dam construction, *Mining, *Water pollution control, Operations, Equipment.
Identifiers: United Kingdom.

The Kaolin mining operation, Cornwall, U.K., produces two million tons per year of micaceous fines from the processing stage. A tailings disposal scheme to prevent further pollution from this source includes the Kernick Dam, now under construction. The basis of the system is to utilize disused clay pits in the area by pumping fines into them and allowing settlement to occur. The disposal system consists of a 12-mile network of pipelines and includes twelve positive displacement pumps and a number of centrifugal pumps. (Sandoski-FIRL)
W75-05942

NUTRITIONAL IRON-PROTEIN COMPLEXES FROM WASTE EFFLUENTS,
Department of Agriculture, Washington, D.C. (assignee)
S. B. Jones, E. B. Kalan, T. C. Jones, and F. Hazel.
U.S. Patent 3,823,127. Issued July 9, 1974. Official Gazette of the United States Patent Office, Vol 924, No 2, p 348, July 9, 1974.

Descriptors: *Waste water treatment, *Patents, *Proteins, Iron, Industrial wastes, Effluents, Water reuse, Food, Recycling.
Identifiers: Ferripolyphosphates, Food additives.

Proteins may be precipitated and recovered from industrial waste effluents such as whey by the addition of Ferripolyphosphate to the effluents. The recovered product, a Ferripolyphosphate-protein complex in powder form, contains from 8 to 15 percent iron and from 15 to 50 percent protein. It is highly nutritional and highly assimilable, and has great potential as an iron-protein enriching additive in food and other products. (Prague-FIRL)
W75-05946

METHOD FOR THE DISPOSAL OF COMBUSTIBLE AND DILUTE AQUEOUS WASTES,
Atomic Energy Commission, Washington, D.C. (assignee)
For primary bibliographic entry see Field 5D.
W75-05949

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
For primary bibliographic entry see Field 5B.
W75-06164

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 5G.
W75-06174

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 5G.
W75-06176

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-06183

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
For primary bibliographic entry see Field 5D.
W75-06203

WATER SURVEILLANCE PROGRAM, EGLIN AFB FL,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5A.
W75-06216

PESTICIDE PYROLYSIS DEVICE,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5G.
W75-06227

SURVIVAL OF VIRUSES AND BACTERIA IN A SIMULATED SANITARY LANDFILL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.

W75-06231

WATERBORNE WASTES OF THE PAINT AND INORGANIC PIGMENTS INDUSTRIES,
Southern Research Inst., Birmingham, Ala.
For primary bibliographic entry see Field 5B.
W75-06249

PHILOSOPHY AND METHODOLOGY OF METALLIC WASTE TREATMENT,
New York State Dept. of Environmental Conservation, Albany. Bureau of Industrial Wastes.
For primary bibliographic entry see Field 5D.
W75-06320

UTILIZATION OF ACTIVATED SLUDGE (ISPOL'ZOVANIE AKTIVNOGO ILA),
Khorskii Gidroliznyi Zavod (USSR).
For primary bibliographic entry see Field 5D.
W75-06344

5F. Water Treatment and Quality Alteration

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA. APPENDIX A: WATER SUPPLY.
California State Dept. of Water Resources, Sacramento.
California Dept. of Water Resources Bulletin No. 104-3, September 1970. 108 p, 32 fig, 41 tab, 20 plates, 201 ref.

Descriptors: *Water supply, *California, *Groundwater basins, *Surface waters, Geology, Hydrology, Artificial recharge, Reclaimed water, Imported water, Water quality, Future planning(Projected), Zone of saturation.
Identifiers: *Southern California, *Chino-Riverside(Calif).

The results of comprehensive geologic, hydrologic, and water quality studies of the Chino-Riverside Area, in Los Angeles, San Bernardino, and Riverside Counties of California are presented. Data on the geologic properties of the basin include the volume of groundwater in storage (about 12,000,000 acre-feet in 1960), the thickness and lithology of the aquifers, and the structural features that influence groundwater movement. Also included is information on the quantity and quality of the historical amounts of water supply, use, and disposal. Seasonal fluctuations in groundwater levels and groundwater in storage are described. The compiled information was used in the operational-economic phase of the overall investigation on meeting water demands in the area and these results will provide local agencies with information for optimum management of the area's groundwater basin. The hydrologic information includes analyses of past water use and disposal for the period 1934-35 to 1959-60 and estimates of future water supplies and water quality. Estimates of land use show that gross urban and suburban water service areas ranged (in acres) from 27,000 in 1932 to 121,800 in 1963; water services to gross irrigated agriculture from 113,900 in 1932 to 87,100 in 1963; and nonwater services areas from 136,200 in 1932 to 68,200 in 1963. (Auen-Wisconsin)
W75-05867

REVERSE OSMOSIS WATER PURIFYING SYSTEM FOR HOUSEHOLD USE,
S. Manjikian.
U.S. Patent No. 3,849,305, 4 p, 1 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1222, November 19, 1974.

Descriptors: *Patents, *Reverse osmosis, *Water purification, *Water quality control, Equipment, Separation techniques, Membranes, Semipermeable membrane, Desalination, Pressure, *Water treatment.

A water purifying system employs a reverse osmosis purifying unit in which a porous, semipermeable membrane-covered support, or preferably a frame carrying a plurality of membrane elements having semipermeable membrane outer surfaces, is rotated within a pressure resistant container. Water under pressure is introduced into the purifying unit and water more concentrated in salts originally present is released from the purifying unit by an automatically actuated on-off valve. Purified water produced by the purifying unit is delivered to an unpressurized water storage tank so that no back pressure can be applied to the membrane from its product water side. Purified water is dispensed from the water storage tank by a submerged pump and a valve. Water is maintained not above a predetermined level in the water storage tank by a float actuating a release valve. (Sinha-OEIS)
W75-05891

PROCESS AND APPARATUS FOR REMOVING IMPURITIES FROM CONDENSATE WATER,
Permutit Co., Paramus, N.J. (assignee)
For primary bibliographic entry see Field 5D.
W75-05892

WATER DISTILLATION APPARATUS,
Oral Corp., Boca Raton, Fla. (assignee)
R. C. Ruckstuhl.
U.S. Patent No. 3,849,260, 3 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1209, November 19, 1974.

Descriptors: *Patents, *Distillation, *Water treatment, *Condensation, *Water quality control, *Water vapor, Equipment, Separation techniques.

A water distillation apparatus is disclosed which has a boiling chamber which receives water at the bottom from a constant level device having an overflow tube. A drain opening in the overflow tube automatically drains the boiling chamber after each use. A condenser, connected to receive water vapor from the boiling chamber, has a spiral tube inside which passes the water that is to be distilled into the inlet of the constant level device, and the water in this tube produces a cooling effect on the water vapor output from the boiling chamber. (Sinha-OEIS)
W75-05893

ANTI-BACKFLOW WATER CONTROL AND SOLUTION PROPORTIONER,
For primary bibliographic entry see Field 8C.
W75-05909

POROUS POLYETHYLENE IN SEWAGE AND WATER TREATMENT PLANTS.
For primary bibliographic entry see Field 5D.
W75-05943

AUTOMATION OF THE CONTINUOUS COAGULATION MONITOR,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
D. Mitchell, and J. J. Oskowis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 815, $3.75 in paper copy, $2.25 in microfiche. University of Arkansas Water Resources Research Center, Fayetteville, Publication No 20, December 1974. 30 p, 10 fig, 10 ref. OWRT A-016-ARK(2).

Descriptors: Chemical precipitation, *Coagulation, *Water treatment, Water conditioning, Turbidity, *Automation, *Instrumentation, *Chemcontrol, Monitoring, *Control systems, *Waste water treatment.
Identifiers: *Chemical treatment.

The development of a fully automated continuous coagulation monitor is reported. The automated monitor has demonstrated the ability to automatically control the chemical coagulation process in both drinking water and wastewater treatment. Logic circuitry has been developed such that the automatic control system provided continuous, cyclic sampling of the effluents of the six separate flow channels of the monitor through a continuous flow turbidimeter. Control instrumentation has been developed to provide continuous indication of the chemical treatment producing the lowest turbidity. All circuitry and instrumentation designs are included.
W75-06074

A REGIONALIZATION PROCEDURE WITH OPTIMIZING CHARACTERISTICS FOR WATER DISPOSAL SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06195

DEVELOPMENT OF ECONOMIC CRITERIA FOR REGIONALIZATION OF A WASTE WATER MANAGEMENT SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06200

ADDING FLUORIDES TO THE DIET,
Center for Science in the Public Interest, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-06318

PROCESS FOR ELECTRICAL COALESCING OF WATER,
Combustion Engineering, Inc., New York. (assignee)
For primary bibliographic entry see Field 5G.
W75-06339

5G. Water Quality Control

INTERSTATE PLANNING FOR REGIONAL WATER SUPPLY AND POLLUTION CONTROL.
Delaware River Basin Commission, Trenton, N.J.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $3.00. EPA Water Pollution Control Research Series 16110 FPP, November 1971. 374 p, 8 fig, 92 tab. FWPCA WPD-136-01-66.

Descriptors: *Delaware River Basin, *Comprehensive planning, *Governmental interrelations, *Interstate rivers, *Cost analysis, Sewage districts, River basin commissions, River basin development, Potential water supply, Land use, Waste disposal, Future planning(Projected), Alternative planning, Water quality, Solid wastes, Wastewater disposal.
Identifiers: *Tocks Island Region, *Population growth effects, *Least-cost analyses.

In response to rapid economic and recreation development of the Tocks Island Region of the Delaware River Basin and its consequent population growth, recommendations for resources management on an interstate regional basis were developed. The Tocks Island region portion of the Delaware River includes local, state, interstate, and natural interests, and all of these levels have responsibilities in the conservation, utilization, development, management, and control of the water and related land resources. Population and related water supply requirements, wastewater volumes, and solid-waste loads for the study area were projected. The advantages and disadvantages of various alternative master plans for water supply and waste disposal in the area are discussed, and the reasoning for the selection of

the proposed plans is included. Least-cost analyses of the alternatives within the prescribed quality constraint were reviewed before recommendations were developed. Recommendations include the designation of the Delaware River Basin Commission as the central administration agency of waste disposal for the TIRES area, with six subregional systems. Detailed studies to investigate alternative solid waste disposal methods and ground and surface water potentials in meeting the projected increased demands are needed before the recommendations can be further refined. (Becker-Wisconsin)
W75-05860

STUDY OF SINGLE-RESPONSIBILITY CONCEPTS FOR WATER POLLUTION CONTROL PROJECTS.
Bechtel Corp., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 056, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Washington, D.C. Municipal Wastewater Systems Div., Final Report 10293-001, April 1974. 134 p, 7 fig, 3 tab. EPA 68-01-0073.

Descriptors: *Projects, *Contracts, *Construction, *Performance, *Facilities, Contract administration, Design, Institutional constraints, Management, Operations, Protection, Scheduling, Waste water treatment.
Identifiers: *Single-responsibility contractors.

Four basic organizational forms of performing public works projects involving variations of arrangement, contract terms, payment provisions, obligations, and interrelationships between the parties involved in major capital projects are discussed. The 'Engineering and Construct (EPC)' form evaluated provides good overall project performance and other benefits. It makes it difficult for the owner to exercise control over the project, however the contractor is in a position to assume a significant contractual responsibility. If maximizing the contractor's responsibility to furnish guarantees and provide for financial recovery were the owner's only consideration, the EPC contract would always be the one of choice. In actual practice, however, a compromise has to be struck between contract responsibility and owner control. The tradeoff is therefore between a contractual form in which the owner's interest is well represented, but which does not provide firm guarantee provisions, versus an EPC or similar form, in which the contractor has total financial responsibility, but in which the owner relinquishes a portion of control. Given the relaxation of existing external factors inhibiting change, the form best suited to any given project will vary with project size, complexity of technical or managerial aspects, competency of the owner's staff, availability of single-responsibility contractors and of a complete performance criteria package. (Auen-Wisconsin)
W75-05868

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CEMENT INDUSTRY,
Southern Research Inst., Birmingham, Ala. Economic Research and Planning Section.
S. Schaffer, and P. Tropper.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 442, $4.25 in paper copy, $2.25 in microfiche. Report EPA-230/2-74-004, April 1974. 69 p, 5 fig, 16 tab, 16 ref. EPA P4-01-03377.

Descriptors: *Cements, *Economic impact, *Costs, *Pollution abatement, Industrial wastes, Standards, Investment, Operating costs.
Identifiers: *Cement industry.

The economic impact of pollution controls on the cement industry was based on the estimated costs of controls at the 120 cement plants investigated, with estimated profitability and cash flow per average plant in 1972. The total cost of achieving essentially pollutant-free discharges is considered to be approximately $19 million for capital investment by 1977 and an additional $4 million by 1983. Total annual operating costs for pollution controls are estimated at about $6 million by 1977 and an additional $1 million by 1983. All but four of the companies could meet the costs of pollution controls in all of their plants without difficulty, often from internal funds generated just in 1972. The cost of installing pollution control equipment might justify price increases of from 1% to 3% per ton in polluting plants. There are, however, almost as many non-polluting plants in the cement industry as plants that discharge pollutants. Competitive pressures from non-polluting plants selling in approximately the same market areas may serve to restrain plants from recovering pollution control costs through price increases. Plant closings and resulting unemployment in affected areas, are more likely to result from a decrease in cement consumption than from pollution control requirements. (Auen-Wisconsin)
W75-05869

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES. THE ELECTROPLATING INDUSTRY, COPPER, NICKEL, CHROMIUM AND ZINC.
Kearney (A. T.) and Co., Inc., Chicago, Ill.
For primary bibliographic entry see Field 6B.
W75-05873

FILTER SYSTEMS,
Sutcliffe, Speakman and Co. Ltd., Leigh (England); and Pond (Alan) Equipment Ltd., Harlow (England). (assignees)
For primary bibliographic entry see Field 5D.
W75-05880

SYSTEM FOR REMOVING FLOATING OIL FROM WATER,
Amoco Production Company, Tulsa, Okla. (assignee)
L. W. Jones.
U.S. Patent No. 3,850,807, 3 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1702, November 26, 1974.

Descriptors: *Patents, *Pollution abatement, *Water quality control, Equipment, Separation techniques, *Oil spills, *Oil pollution, Barriers, Rivers, Streams.
Identifiers: *Pollution prevention, Sulfur beds.

A combination oil accumulator-separator is floated on the stream containing the oil slick or sheen. It is preferably tied in the middle of the stream to both banks by floating vertical barriers. The stream current carries the floating oil plus some water off the top of the stream guided by the vertical barriers into the throat of the oil accumulator-separator. The separator contains a bed of granular sulfur supported by a perforated plate. The supporting plate has non-perforated corrugations or protected channels. The oily water flows through the sulfur bed where the oil is coalesced and concentrated. As the water and coalesced oil flows out the lower perforations, the oil seeks the protection of the channels. The channels are tilted upward in a downstream direction toward a collecting conduit which is connected to a pump. The coalesced oil is removed by the pump and the oil-free water flows downward and out the perforations of the plate and again becomes a part of the main flow of the stream. (Sinha-OEIS)
W75-05881

INFLATABLE BARRIER FOR SUBSTANCES FLOATING ON WATER,
P. Preus.
U.S. Patent No. 3,849,989, 3 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1447, November 26, 1974.

Descriptors: *Patents, *Water quality control, *Oil spills, *Oil pollution, *Pollution abatement, Barriers, Equipment.
Identifiers: *Pollution prevention.

The inflatable barrier includes floatation chambers which are fabricated from a tough, puncture resistent material. It is provided with independent subchambers, each capable of supporting the barrier in the event of loss of pressure in the neighboring subchamber. A liquid impervious flexible skirt depending from the chambers provides a barrier below the waterline. Boom segments are fabricated so that a fin is formed along the upper surface of the floatation chamber. The fin functions as a spoiler to 'kill' aerodynamic lift. It functions to trip the flow over the surface to provide non-lifting turbulent flow. (Sinha-OEIS)
W75-05886

APPARATUS FOR SKIMMING FLOATING POLLUTION FROM A LIQUID SURFACE,
H. Westerman.
U.S. Patent No. 3,849,308, 3 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1223, November 19, 1974.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control, Equipment, Separation techniques.
Identifiers: *Pollution prevention.

A floating container has a closed bottom and an open shallow end and a deep end. An interior float is fixed in the open shallow end. A suction pipe line is fixed midway between both ends. The suction end reaches near the bottom to discharge the liquid contents. The interior float is weighted to submerge the open shallow end and raise the deep end when the liquid content has been reduced by discharge from the suction pipe line to approaching its suction end. The interior float is buoyant, so that the ends may change position when the contents are increased and raised by the submergence to approach overflowing the container. The raising and lowering of the opposite ends is automatic and causes a back and forth flow of the contents to dissolve soluble solids and prevent insoluble solids from entering the suction end or to slow the discharge from the container. The frequency of the rocking motion is self regulating. (Sinha-OEIS)
W75-05888

DEVICE FOR REMOVING OIL AND THE LIKE FROM WATER CONTAMINATED BY OIL OR THE LIKE,
International Pollution Control Systems, Inc., Washington, D.C. (assignee)
P. Jakubek.
U.S. Patent No. 3,849,311, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1224, November 19, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water quality control, Separation techniques, Skimming.
Identifiers: *Pollution prevention.

To remove oil or the like from a water surface, the ship carries a bilge pump controlled by a float switch. An air separator and oil separator are provided. Contaminated water is pumped via the air separator through the oil separator. The oil separator includes at least one collecting tank for the removed oil. At least one coarse and one fine separator or foam are arranged. The coarse separator is connected with the collecting tank which includes a shutoff member. An insert provided within the coarse separator separates an inlet from an outlet, as well as has at least one flow channel extending obliquely upward, seen in the direction of flow. (Sinha-OEIS)
W75-05889

APPARATUS FOR AVOIDING WATER POLLUTION AT AN OFFSHORE DRILLING SITE,
Texaco, Inc., New York. (assignee)
L. P. Teague.
U.S. Patent No. 3,860,019, 4 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 694, January 14, 1975.

Descriptors: *Patents, *Pollution abatement, Water pollution, *Oil wastes, *Oil pollution, *Drilling fluids, Water quality control, Screens, Detergents, Oily water, Mud.
Identifiers: *Offshore drilling, Drilling cuttings, Drilling mud.

An apparatus is disclosed which treats well drilling cuttings that normally accrue from the boring of a subterranean oil or gas well. Ancillary to a well drilling operation, drilling cuttings are sequentially carried, together with drilling mud, through a first shaker. This device comprises in essence a screen separator of such a mesh that a major component of the fluid mud will pass through the screen. The more solid drilling cuttings remain on, and are carried to the screen discharge. The mud free cuttings are then passed through a cleaning cycle where they are washed by contact with a liquid detergent. The cuttings, together with used detergent, are again separated at a second shaker. The detergent passes through the shaker screen and is recycled for subsequent reuse. The oil free cuttings are discharged from the shaker to a collector where they are subjected to a final bath comprising relatively clean water, which can be sea water. The clean, and detergent free cuttings are then deposited beneath the water's surface where they gravitate to the ocean floor. (Sinha-OEIS)
W75-05900

SCOOP FOR COLLECTING A LAYER OF POLLUTING MATERIAL ON WATER SURFACES,
L. Chastan-Bagnis.
U.S. Patent No. 3,847,815, 2 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 745, November 12, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Pollution abatement, Water quality control, Flotsam, Equipment, *Separation techniques.
Identifiers: *Scoops.

A device for collecting hydrocarbons, granular materials, absorbing bodies and various polluting agents which float as a layer on the surface of water such as seas, lakes, rivers, harbors, estuaries, pools, etc. is disclosed. The device operates by producing a sufficiently thick layer of polluting material so that it can be collected. It comprises a scoop having substantially the shape of a circular sector and a header with diffusing tubes circulating water under pressure towards the rear of the scoop where it is allowed to escape through a suitable opening. The thickened layer of polluted material which floats on top of water is removed through a separate duct. (Sinha-OEIS)
W75-05903

OIL SLICK SKIMMER,
D. J. Weatherford.
U.S. Patent No. 3,860,519, 5 p, 7 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 847, January 14, 1975.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Boats, Barges, *Skimming, Filtration, Equipment, *Separation techniques.

A maneuverable boat or barge employs an appended hull to gather and skim from the surface of the water, oil slicks along with a minimal amount of surface water into a compartment in the craft isolated from its main deck. This oil-water mixture is then pumped through a flexible hose to a storage compartment in a barge where the oil rises to the top of the water in seconds. Surface oil is then bled off the top and pumped into oil accumulation compartments. Each of these compartments, when filled, is pumped into a tanker for continuous removal and reclaiming. The water in the barge is also pumped through a water filter before returning to the sea. The boat functions effectively when floating in an oil slick by the effects of gravity drawing the oil slick into its hull as well as when it is moving and the oil slick is forced by the forward movement of the water into the boat. (Sinha-OEIS)
W75-05905

APPARATUS FOR SEPARATING OIL FROM WATER AND MEASURING THE AMOUNT OF OIL SO SEPARATED,
A. C. Tulumello.
U.S. Patent No. 3,847,810, 5 p, 8 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 743, November 12, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Water purification, *Water quality control, *Pollution abatement, *Water pollution control, Separation techniques.
Identifiers: *Pollution prevention, Capacitance measurement.

The apparatus for separating trace amounts of oil from water and measuring the amount of oil in the water comprises a rotor including an absorber material which selectively absorbs oil. The rotor is mounted on a drive shaft of a motor and is contained in a housing. There is an inlet in the housing for introducing an oil and water mixture, and an outlet near the periphery of the rotor for removing separated water. The drive shaft is turned by a motor to thus establish in the housing a centrifugal force-field. This field separates the oil from the water pulling the oil to the center of the rotor and pushing separated water to the periphery of the rotor and out the outlet. The preferred absorber material is polyurethane foam. The oil can be removed by introducing air into the rotor. The rotor also includes a pair of spaced plates secured to the drive shaft with the absorber material between them. These plates are conductive, electrically isolated from each other, and connected in a capacitance measuring circuit. The plates and absorber material are a variable capacitor whose capacitance changes as a function of oil collected by the absorber material. This capacitance is a measure of oil in water. (Sinha-OEIS)
W75-05910

CHANGED SPOIL DUMP SHAPE INCREASES STABILITY ON CONTOUR STRIP MINES,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
G. P. Williams.
In: Research and Applied Technology Symposium on Mined-Land Reclamation. March 7-8, 1973, Bituminous Coal Research Inc., Monroeville, Pennsylvania, p 243-249, (1973). 2 fig, 1 tab, 3 ref.

Descriptors: *Strip mines, *Slope stabilization, *Soil mechanics, *Soil physical properties, Mining engineering, Appalachian Mountain region, Water pollution control, *Kentucky.

In steep terrain, deposits of surface mine waste often are unstable, as evidenced by spoil slides. In 1966, the state of Kentucky implemented regulations specifying the shape and dimension of mine spoil dumps. Increased storage of spoil on the bench accounted for a 42% reduction in area disturbed by slides and a 17% reduction in total areal disturbance. The overall level of instability on spoil dump outslopes is still excessive, but this instability can be reduced as knowledge of the physical and mechanical properties of spoils and of site characteristics is accumulated and incorporated into mining and spoil placement techniques. (Forest Service)
W75-05921

SURFACE SLICKS AND FILMS - A NEED FOR CONTROL,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06023

ROCK TUNNELS RECENTLY COMPLETED IN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 8H.
W75-06061

SALT BRINE RUNOFF CONTROL AT STOCKPILE SITES,
Minnesota Dept. of Highways, St. Paul. Maintenance Standards Section.
R. A. Pletan.
Office of Engineering Standards, Research and Standards Division, Minnesota Highway Department, St. Paul, November 1, 1972. 18 p.

Descriptors: *Chemcontrol, *Water pollution control, *Saline water-fresh-water interfaces, *Aesthetics, Highway effects, *Sodium chloride, Highways, Minnesota, Surface runoff, Chemical industry, Storage requirements, Sodium compounds, Ice-brine systems, Highway beautification, Roads, Water pollution sources, Brines.
Identifiers: *Salt stockpiles, *Road salt, *Ice control materials, Eutectic.

The pollution problems from salt brine runoff at bulk salt and treated sand stockpile sites has always been a concern to the Minnesota Highway Department. In order to alleviate these concerns, three objectives were established: (1) analyze the extent of salt brine runoff from salt and treated sand stockpiles; (2) study and evaluate possible solutions; and (3) recommendations where visual or chemical pollution problems exist or are anticipated. Basically, all of the 260 sites on which chemicals are stored contribute to visual pollution and as such are subject to public criticism. While visual pollution is an indicator of chemical pollution, it is concluded that efforts to abate the unsightliness of stockpile sites will in most cases also curtail or eliminate any detrimental chemical effect the salt brine from stockpiles will have on the life and health of plants, wildlife, and man. Once the brine is allowed to form, the only way to completely control it is to confine and collect the contaminated solution and dispose of it either by evaporation or hauling it away to an approved disposal site. Due to the chemical characteristics of salt in solution, it will not settle or filter out at some of the current control facilities. (Poertner)
W75-06062

ANALYSIS AND DESIGN OF SETTLING BASINS FOR IRRIGATION RETURN FLOW,
Idaho Univ., Moscow.
F. J. Watts, C. E. Brockway, and A. E. Oliver.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 814, $4.75 in paper copy, $2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, September 1974. 74 p, 9 fig, 11 tab, 1 ref, append. OWRT A-042-IDA(1).

Descriptors: Sediments, *Sediment yield, *Settling basins, Irrigation, *Return flow, Erosion, *Design, Loam, Soils, Beans, Sugar beets, Corn(Field), Computer programs, Simulation analysis.

Equations for sediment yield from sandy loam and loamy soil were obtained from four furrow irrigated fields. Sediment yields from bean, sugar beet and corn field ranged from 0.1 to 13.5 tons per acre with a representative yield of 1.2 tons per acre. Temperature and point velocity measurements were obtained in a 500 foot long by 60 foot wide by 5 foot deep settling basin. Concentration

of sediment in the inflow to the basin varied from 30 to 400 mg/l and the overall trap efficiency based on average discharge and average concentrations was about 65 percent. A computer program for simulating the performance of a settling basin was developed. Data input consists of basin dimensions, inflow, concentration and gradation of sediment and time and spacial increments used for control. The depth of sediment, efficiency, weight of settled sediment and volumetric amount of sediment is printed out for specified cross sections along the centerline of the basin and for the total basin.
W75-06078

A STUDY OF NATURAL WATER SYSTEMS IN WESTERN MONTANA,
Utah Univ., Salt Lake City. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06082

WATER MANAGEMENT IN LIVESTOCK WASTE HANDLING SYSTEMS,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-06087

AN EVALUATION OF THE EFFECTIVENESS AND APPLICABILITY OF PHYSICAL-CHEMICAL TREATMENT OF URBAN LAND RUNOFF,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-06094

RENOVATED WASTE WATER: THE QUESTION OF PUBLIC ACCEPTANCE,
George Williams Coll., Downers Grove, Ill. Dept. of Counseling Psychology.
For primary bibliographic entry see Field 5D.
W75-06096

PUBLIC ACCEPTANCE OF RENOVATED WASTE WATER: MYTH AND REALITY,
Southern Illinois Univ., Carbondale. Dept. of Geography.
For primary bibliographic entry see Field 5D.
W75-06097

A SOCIOLOGICAL APPROACH TO THE PROBLEM OF WATER POLLUTION,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Rural Sociology.
P. H. Gore, S. Wilson, and H. R. Capener.
Growth and Change, A Journal of Regional Development, Vol 6, No 1, p 17-22, January 1975. 4 fig, 1 tab.

Descriptors: *Water pollution, *Water pollution control, *Psychological aspects, *Attitudes, Management, Watershed management, Water policy, Public access, *New York.
Identifiers: Cornell University(N.Y.), Fall Creek(N.Y.), Canadarago Lake(N.Y.).

Dimensions of public concern for environmental quality and its origins were explored in research which probed public attitudes by means of a questionnaire designed to gather information about respondents' water use practices and their attitude and knowledge about various water pollution problems, methods of control and water quality standards. The study area included the watersheds of Fall Creek, which has a watershed area of 395 square kilometers, and is a tributary of Cayuga Lake, and Canadarago Lake, a highly eutrophic lake in east central New York having a watershed of 197 square kilometers. The population sample of 623 was remarkably stable: 62% had lived there five years or more; 87% owned their homes. A proximity measurement (closeness to lake) yielded no significant differences which strengthens rationale for treating the watershed as the unit for management purposes. Awareness of water pollution and need for stringent controls were both majority attitudes. Results supported a continued involvement for state and regional governments in land use planning, control regulations and enforcement and funding for pollution control techniques. All available pollution control techniques should be applied even considering the cost according to 73% of the sample. Improved environmental quality depends upon proving the case for a pollution problem by adequate information, lowering the public's perception of the cost of abatement and building the case that this is an appropriate arena for government leadership. (Salzman-North Carolina)
W75-06099

STATE OF OHIO V. REPUBLIC STEEL CORP (ACTION FOR POLLUTION OF WATERS WITHOUT A VALID PERMIT).
For primary bibliographic entry see Field 6E.
W75-06142

LLOYD HARBOR STUDY GROUP, INC. V. DIAMOND (ACTION CHALLENGING DETERMINATION THAT WATER QUALITY STANDARDS WOULD NOT BE CONTRAVENED BY CONSTRUCTION OF NUCLEAR POWER PLANT).
For primary bibliographic entry see Field 6E.
W75-06143

ARMSTRONG CHEMCON, INC. V. POLLUTION CONTROL BOARD (APPEAL OF BOARD'S ACTION LIMITING DISCHARGES OF MERCURY INTO WATERS).
For primary bibliographic entry see Field 6E.
W75-06144

LOWER ST. LOUIS RIVER BASIN--SANITARY SEWERS (AS AMENDED).
For primary bibliographic entry see Field 6E.
W75-06146

COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. V. TRAIN (SUIT CHALLENGING ACCORD FOLLOWED BY EPA AND AEC TO CORRELATION OF THE FWPCA AND THE ATOMIC ENERGY ACT),
For primary bibliographic entry see Field 6E.
W75-06151

THE STATE OF TEXAS, ET AL. V. FRI (CHALLENGE OF EXECUTIVE IMPOUNDMENT OF FWPCA FUNDS),
1 Pollution Control Guide, Vol. 3, paragraph 15029, p. 15248-15252, 1974.

Descriptors: *Judicial decisions, *Government finance, *Budget, *Administrative agencies, *Administrative decisions, Adoption of practices, Economic aspects, Water law, Water pollution control, Federal Water Pollution Control Act, Construction, Treatment facilities, Federal government, *Texas, planning, Local governments, State governments, Administrative decisions.
Identifiers: Immunity(Legal aspects), Sovereign immunity.

This federal district court case in Texas held that the Administrator of the Environmental Protection Agency is required to allot all appropriations authorized by Congress. This decision will make money available for contract obligation on sewage treatment works construction projects approved by the Administrator for federal funding. The language of the Federal Water Pollution Control Act and its legislative history show that the Administrator was intended to have some discretion over the rate of spending. However, Congress also showed its intent to marshall the requisite federal funds to achieve the water quality goals in the Act. Consequently the Administrator has a mandatory duty to allot the full sums authorized for contract obligation. The State of Texas has requested money in excess of its reducted allotment. Impoundment of funds imparis the long-range planning ability of the state and local governments. Sovereign immunity as a defense is inapplicable in a suit requesting relief which directs the Administor to perform a non-discretionary statutory act. (Sperling-Florida)
W75-06152

STATE V. REED (ACTION BY STATE TO PREVENT CONSTRUCTION OF DRIVE-WAY THRU WETLANDS, A VIOLATION OF STATUTE),
For primary bibliographic entry see Field 6E.
W75-06155

LICENSES--MOTOR VEHICLE--SUSPENSION FOR DUMPING,
For primary bibliographic entry see Field 6E.
W75-06156

STATE OF VERMONT V. STATE OF NEW YORK (ACTION TO ABATE POLLUTION OF INTERSTATE WATERS--CONSENTDECREE),
For primary bibliographic entry see Field 6E.
W75-06157

KIRKLAND V. HARDWICKE CHEMICAL CO. (ACTION FOR POLLUTION OF STREAM),
For primary bibliographic entry see Field 6E.
W75-06158

PUBLIC WROKS--COUNTIES--EROSION CONTROL (AS AMENDED),
For primary bibliographic entry see Field 6E.
W75-06160

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 4A.
W75-06161

NATIONAL GOALS AND ENVIRONMENTAL LAWS,
Library of Congress, Washington, D.C. Congressional Research Service.
For primary bibliographic entry see Field 6E.
W75-06165

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
For primary bibliographic entry see Field 8A.
W75-06168

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-MI-74-0041-F, $3.75 in paper copy, $2.25 in microfiche. January 1974. 149 p, 13 fig, 2 tab.

Descriptors: *Environmental effects, *Sludge disposal, *Landfills, *Michigan, *Water pollution control, Great Lakes, Lake Michigan, Dredging,

Spoilbanks, Disposal, Federal government, Local governments, Governmental interrelations, Harbors, Inland waterways, Navigation, Rivers and Harbors Act, Waste disposal, Water pollution, Water pollution sources, Water quality control.
Identifiers: *Environmental Impact Statements, Grand Haven(Mich), National Environmental Policy Act.

Maintenance dredging of Grand Haven Harbor, Michigan produces approximately 50,000 cubic yards of polluted dredge material annually. In the past this has been disposed of in the open waters of Lake Michigan. The proposed action calls for disposing of this material in a contained area adjacent to the harbor, thereby reducing the adverse environmental impact of the dredging activities. This project would render a partial pollution abatement function for 10 years, after which time pollutants presently reaching lake waters are expected to be controlled at their sources. The proposed sites, a 36-acre tract on Harbor Island which is currently used as a sanitary land fill area by the City of Grand Haven, and a 15-acre area of privately-owned land, will be converted from semimarsh condition to total terrestial environment. The proposed sites are of no environmental or economic significance and represent a change in the choice of alternatives from the site indicated in the draft statement. The change was made in response to strong environmental opposition to the original site proposal. The present proposal is considered the least damaging compared to other alternatives. (Deckert-Florida)
W75-06174

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-NY-73-1351-F, $3.75 in paper copy, $2.25 in microfiche. August 15, 1973. 44 p, 5 tab, 2 map.

Descriptors: *New York, *Environmental effects, *Channel improvement, *Harbors, *Dredging, Rivers and Harbors Act, Excavation, Federal government, Siltation, Aquatic environment, Turbidity, Water pollution effects, Spoil banks, Navigation, Benthos, Bottom sediments, Coastal engineering, Economic impact, Inudstries, Environment, Recreational facilities, Administrative agencies, Transportation, Alternatives, Cost-benefit analysis, Oceans.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, Navigation obstructions, Coastal zone, Coastal zone management, Port Chester Harbor, Byram Channel, New York.

The proposed project consists of maintenance dredging of the Port Chester Harbor and Byram river channels to authorized dimensions, and the dumping of excavated material at the approved site in the New York Bight. The project, located on the New York-Connecticut boundary, is vital to the economic health and industrial activity of the surrounding area. Environmental impacts include excavation of 60,000 cubic yards of bottom materials and enhanced economy of commodity transportation. Adverse effects consist of temporary interference in marine activity, temporary increase in turbidity and siltation, temporary loss of bottom life and spoilage disposal at an already degraded approved dumping area in the New York Bight. Alternatives to enlargement of the channel are continued use of the present channel or the use of other modes of commodity transportation. None of the alternatives to ocean dumping are as feasible as the proposed action. The temporary disturbance to aquatic life is outweighed by the long-term benefits to riverfront industry. Harbor and materials are the only irretrievable resource commitments as the removal of toxic bottom material may stimulate aquatic life. Comments were received from federal, state and local agencies. (Dillingham-Florida)
W75-06176

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-NY-73-1350-F, $3.75 in paper copy, $2.25 in microfiche. August, 15, 1973. 38 p, 1 tab, 1 fig.

Descriptors: *New York, *Environmental effects, *Dredging, *Channel improvement, *Harbors, Rivers and Harbors Act, Excavation, Federal government, Siltation, Turbidity, Aquatic environment, Water pollution effects, Spoil banks, Navigation, Coastal engineering, Bottom sediments, Aquatic soils, Benthos, Economic impact, Industries, Recreation, Administrative agencies, Environment, Adoption of practices, Conservation, Cost-benefit analysis, Oceans.
Identifiers: *Environmental Impact Statements, Mamaroneck Village(NY), National Environmental Policy Act, Navigation obstructions, Coastal zone, Ocean dumping.

The action proposed consists of maintenance dredging of the existing federal channel in Mamaroneck Harbor, New York to its authorized project dimensions and spoil disposal in the approved dumping grounds of the New York Bight. This would permit safer and more efficient use of the harbor by the petroleum industry and the boaters which are important to the economy of Mamaroneck Village. The adverse effects include the removal of bottom life associated with sediments to be dredged, siltation and turbidity caused by dredging, and disposal of the spoilage at an already degraded dumping site. The alternative of no action would result in the gradual elimination of the harbor's use for recreational and commercial boats because of steady siltation. Alternate methods of dredging aren't feasible. Other spoil disposal methods are costly and environmentally hazardous. Dredging may benefit the harbor area but will further degrade the dumping area. The Harbor bottom, its marine life and funds will be irretrievably committed. Comments were received by eight government departments. (Dillingham-Florida)
W75-06177

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-06182

AN ANALYTICAL APPROACH TO REORGANIZATION OF WATER MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 6B.
W75-06193

PESTICIDE PYROLYSIS DEVICE,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
H. H. Rosen.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 553, $3.25 in paper copy, $2.25 in microfiche. Technical Report No. 74-89, June 1974. 19 p, 5 fig, 3 tab, 2 append.

Descriptors: Pesticides, *Incineration, *Environmental sanitation, *Burning, *Pesticide residues, DDD, DDT, Chemical wastes, Chemicals, Analysis, Instrumentation, Oxygen, Nitrogen, Opacity, Carbon dioxide, Organic compounds, Pumps, Refractivity, *Waste disposal.
Identifiers: *Pesticide pyrolysis, *DDT destruction, Kerosene, Oil burner, Pipe fittings, Sheet metal, Furnace, Carbon monoxide.

A system for destroying small stocks of DDT-kerosene solutions in situ was developed. The system was designed to be fabricated by Post Engineers from commonly available materials, i.e., an oil burner, pipe fittings, sheet metal, a water pump, and refractory material for lining the 55-gal drum used as a furnace. The system is capable of burning about 5 gallons of DDT solution per hour. Tests of the effluent from a prototype system by the Army Environmental Hygiene Agency showed that the emissions were below the prescribed safe limits. (Henley-ISWS)
W75-06227

OBSTACLES TO TAMING CORPORATE POLLUTERS: WATER POLLUTION POLITICS IN GARY, INDIANA,
Hampshire Coll., Amherst, Mass. Dept. of Political Science.
E. Greer.
Environmental Affairs, Vol 3, No 2, p 199-220, 1974, 117 ref.

Descriptors: *Water pollution control, *Legal aspects, *Indiana, *Industrial wastes, *Steel, *Political aspects, Lake Michigan, Rivers, Iron, Effluents, Cyanide, Nitrogen, Toxicity, Aquatic life, Algae, Federal government, Federal jurisdiction, Federal Water Pollution, Control Act, State jurisdiction, Political constraints.

Damage to the Lake Michigan ecosystem from the United States Steel Corporation plants at Gary, Indiana, has resulted from discharges of oil, iron particles and other solid particulates. In theory, the City of Gary, the State of Indiana and the federal government can require a cessation of the dumping, but none have done so. The City of Gary was inactive in this area because the Mayor did not control the Board of health nor have a majority on the City Council. Administration aides assigned low priority to water pollution because of lake of knowledge and because most pollutants are dispersed in a northwesterly direction away from Gary, and local political pressure was concentrated on the more obvious problem of air pollution. The State of Indiana is seen to have a relatively weak water pollution statute and unusual solicitude for giant corporations. Actions of the Stream Pollution Control Board are summarized. The federal givernment constricted enforcement of the 1899 Rivers and Harbors Act by prosecuting only exceptional discharges rather than pollution of a continuing nature. Administrative complexity in the 1972 Amendments to the Water Pollution Control Act has led to procedural delays. U.S. Steel has promoted plans which call for the general public to assume a large part of the cost of pollution control equipment. (Eagle-Vanderbilt)
W75-06322

MORE LIFE FOR DIAPHRAGM CELLS.
Chemical Week, Vol 113, No 18, p 32, October, 1973-1 photo.

Descriptors: *Industrial wastes, *Chlorine, *Research and development, *Pollution abatement, Mercury, Toxicity, Anodes, Electrodes, Membranes, Organic compounds.
Identifiers: Nafion.

The new cells that have gone into chlorine plants were coated metal anodes instead of graphite. This enables chlorine producesrs to boost amperage and obtain a similar increase in output. Metal anodes permit the use of lower voltages and enable operators to increase amperage without generating excessive heat. This means that cell size does not have to be increased. PPG Industries introduced a

new cell of bipolar design that operates at lower (72,000) amps. Diamond Shamrock and other companies have been working on new membrane materials that promise to increase significantly the life of the diaphragm in the cell. DuPont introduced the first new membrane, which is being used in commercial development work. The material, called Nafion, is made from perfluorosulfonic acid and has greater strength characteristics than asbestos. Use of diaphragm cells eliminates the need for dangerous mercury cells in chlorine production. (Jernigan-Vanderbilt)
W75-06324

PROCESS FOR ELECTRICAL COALESCING OF WATER,
Combustion Engineering, Inc., New York. (assignee)
F. L. Prestridge.
U.S. Patent No. 3,847,775, 7 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 733, November 12, 1974.

Descriptors: *Patents, *Coalescence, Oil wells, Oily water, Drops(Fluids), Emulsions, Gravity, Secondary recovery(Oil), Separation techniques.
Identifiers: *Water droplets, Electrical system, *Electrostatic fields.

A process for coalescing water which is dispersed in the form of droplets throughout a second liquid includes: passing a mixture of a liquid and water droplets dispersed throughout the liquid through an electrostatic field; generating the electrostatic field with two sources of D.C. voltages, each source being periodically applied to one of two spaced electrodes; forming a body of water droplets coalesced by the electrostatic field and gravitated below the electrodes; withdrawing water from the body while maintaining a predetermined level for the body below the electrodes; connecting the body to the reference common to the two sources; and withdrawing from the field the liquid from which the water droplets are gravitated. (Sinha-OEIS)
W75-06339

WASTE OIL RECOVERY PRACTICES--STATE OF THE ART.
Environmental Quality Systems, Inc., Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06347

TRANSLATIONS OF PAPERS PRESENTED AT THE THIRD PANEL ON THE PEACEFUL USES OF NUCLEAR EXPLOSIONS ORGANIZED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY HELD IN VIENNA, AUSTRIA, 27-30 NOVEMBER 1972.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
W75-06349

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMAL CAPACITY EXPANSION OF A SECONDARY TREATMENT SYSTEM,
General Motors Technical Center, Warren, Mich. Manufacturing Development Staff.
For primary bibliographic entry see Field 5D.
W75-05852

COORDINATION OF REGIONAL WATER RESOURCE SUPPLY AND DEMAND PLANNING MODELS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
Y. Y. Haimes, and W. S. Nainis.
Water Resources Research, Vol 10, No 6, p 1051-1059, December 1974. 6 fig, 5 tab, 37 equ, 20 ref.

Descriptors: Water resources, *Long-term planning, *Water supply, *Water demand, *Projects, *Scheduling, *Economic efficiency, Optimization, Algorithms, Cost-benefit analysis, Dynamic programming, Linear programming, Input-output analysis, Evaluation, Estimating, Methodology, Regions, Mathematical models, Systems analysis, Equations, *Coordination, *Regional analysis.
Identifiers: Capacity expansion, Cost minimization, Benefit maximization, Multilevel theory, Net benefits.

A water resources planning framework is provided in which scheduling, construction, and expansion of water resources projects are determined with economically-based objectives in mind. A long-range capacity expansion planning model is formulated that provides a projection of future water supply availabilities based on economic efficiency. A water supply model provides a least-cost schedule of development projects to meet an initial fixed demand function for project outputs. Using the initial demand function as an availability function, a demand model maximizes the value added and determines the possible outputs of various industrial sectors. A dynamic programming algorithm is used to schedule the projects and a Leontief input-output linear program is used to model the response to project supplies. Multilevel theory provides a dynamic coordination scheme that seeks the best joint solution of the scheduling problem and the input-output linear program: The initial demand functions are modified by a coordination model that utilizes the dual variables and other information from the two optimization models (supply and demand). The sequence of optimization is iterative, and the time sequence of water supplied and demand that maximizes the net benefits is found. A regional planning example from the North Atlantic Region study is given. (Bell-Cornell)
W75-05856

DEVELOPMENT OF A COMPREHENSIVE TVA WATER RESOURCE MANAGEMENT PROGRAM.
Tennessee Valley Authority, Knoxville. Div. of Water Control Planning.
Project Status Report July 1974, October 1974. 83 p, 19 fig, 2 tab, 24 ref, 10 append.

Descriptors: *Systems analysis, *Computers, *Tennessee Valley Authority, *Management, Optimization, Algorithms, Economic justification, Water resources development, Comprehensive planning, Conjunctive use, Reservoirs, Nuclear powerplants, Hydroelectric plants.
Identifiers: Out-of-kilter algorithm.

The basic underlying idea of a program initiated by TVA in 1971 is to apply operations research methodology to real world problems of the TVA system management to optimally operate the reservoir system for the specified multipurpose uses under observation of all constraints of balanced resource development and conservation. A case study of the impact assessment of the Browns Ferry Nuclear Plant uses system simulation models, with results showing which specific cooling mode is the most economic operation. Systems analysis techniques for reservoir release scheduling led to the adoption of 'dynamic programming by successive approximation' as a promising method to produce flexible multipurpose reservoir operation guidelines. An outline is given of the tentatively planned model for day-to-day multipurpose water management, the use of various models in the overall scheme, and the hardware requirements for its implementation. The initial phase indicates that by proper use of all system capabilities at least marginal improvements in operation and costs can be achieved. Preliminary results of the optimization studies indicate that by using these methods in reservoir scheduling several million dollars annually can be saved in system generation costs, while the expense for the proposed methodology development including the initial phase, is estimated to cost about $4 million over a ten-year period. (Auen-Wisconsin)
W75-05874

INTERNATIONAL SYMPOSIUM ON MATHEMATICAL MODELS IN HYDROLOGY, WARSAW, POLAND, JULY 26-31, 1971,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2A.
W75-05934

DEVELOPMENT OF A FLOOD CONTROL AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA: SUMMARY OF TECHNICAL REPORTS.
Cook County Flood Control Coordinating Committee, Chicago, Ill.
For primary bibliographic entry see Field 8A.
W75-06047

FLOODWATER MANAGEMENT PLAN, NORTH BRANCH OF THE CHICAGO RIVER, LAKE AND COOK COUNTIES, ILLINOIS.
Chicago River Steering Committee, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-06048

PLANNING INDUSTRIAL AREAS FOR BARGE PORTS,
Lockwood, Andrews and Newnam, Inc., Houston, Tex.
E. A. Brinkman, and G. F. West.
Preprint No. 1566, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 23 p, 11 fig.

Descriptors: *Planning, *Industrial plants, *Ports, *Inland waterways, *Barges, Transportation.
Identifiers: *Barge ports, Port facilities, Industrial parks.

A basic principle for planning a port oriented industrial area is that it be responsive to the economy of the area and to the function of the particular port. The port facilities in the terminal area must be adequate and deversified enough that industry will be enticed to locate in an area integrated with the function of the port. The elements that influence the function of the port include the economic base of the contributory area, industry mix, and product mix of both inbound and outbound freight. The list of products and their projected tonnages suggest the port facilities required to handle them. They are the basis for an estimate of the probable number and type of barges that will ply the port. Then, facilities can be planned for this traffic. General requirements for industries surrounding the port include access to roads, railroads, utilities, reasonable cost of land, construction, operation, protection from flooding, adequate provision for waste treatment, and community acceptance. These requirements form the guidelines to be followed in the planning phase. Proper site selection, provisions for future expansion, and flexibility of layout are also crucial factors to insure the final development of the industrial area. (Poertner)
W75-06052

KETCHIKAN WATERFRONT DEVELOPMENT,
Tippetts-Abbett-McCarthy-Stratton, Seattle, Wash.
R. V. Kycek, and P. Semrod.
Preprint No. 1554, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 9 p, 2 fig.

Descriptors: *Water resources planning, *Comprehensive planning, *Project planning, *Future planning, *Social aspects, *Decision making, Social values, Regional development, Alaska.
Identifiers: *Waterfront development, *Ketchikan(Alaska), Public participation, Implementative planning.

The key elements which can appear in implementive planning include: (1) a crisis factor, (2) an existing comprehensive plan, and (3) a dialogue between local groups and the Consultant Planning Engineer. The crisis factor is that situation that can precipitate action on the part of those persons subjected to making a decision of some sort. The comprehensive plan, usually available, takes into account the overall transportation needs and land use requirements of a community. This plan may or may not be up-to-date. Allowing citizen participation in the planning process results in the establishment of current community needs and goals. Dialogue between citizens and the engineer enhances community interest in the development of a plan. The result, then, of public participation through dialogue in the planning process is identification and relative priority of the facilities desired. Spatial location of these facilities, tempered by physical limitations, desired land-use requirements, and the limits of available area is that part of the work left to the engineer as implementive planning. The report deals specifically with the Ketchikan waterfront and the use of implementive planning in its development. (Poertner)
W75-06055

HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING,
Catholic Univ. of America, Washington, D.C.
For primary bibliographic entry see Field 2E.
W75-06070

USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
D. M. King, and D. A. Storey.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-240 918, $4.75 in paper copy, $2.25 in microfiche. University of Masachusetts Amherst Water Resources Research Center Publication No 40 - Special Report 1974. 73 p, 8 fig, 20 tab, 44 ref, 2 append. OWRT-A-046-MASS(1), 14-31-0001-3821.

Descriptors: Coasts, Management, *In-put-output analysis, *Massachusetts, *Planning, *Model studies, Economic impact, Environmental effects, *Regional analysis.
Identifiers: *Cape Cod(Mass).

The basic problem in coastal zone management is to determin how the limited set of coastal land and water resources should be allocated among a number of competing human uses or activities. The application of input-output analysis to the coastal zone resource planning process was investigated. The input-output model provides a potential method of displaying within a single framework the economic and environmental impacts of a change in the mix of coastal activities and of displaying tradeoffs between economic and environmental objectives. The economic portion of the model is given empirical content for shoreline activities within a specific planning region, the Cape Cod area of Massachusetts. Suggestions are made for the environmental portion of the model, but empirical data were not developed for that portion of the model. A critical discussion is provided about the potential and limitations of this model as a tool in the coastal planning process.
W75-06299

SIMULATION TECHNIQUES FOR WATER PROJECT ANALYSES,
Texas State Office of Information Services, Austin.
M. L. Holloway, and L. F. Tischler.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR3, Proceedings paper No. 10784, p 211-229, September 1974. 7 fig, 4 ref. OWRT C-2070(no.3360)(4).

Descriptors: *Water management(Applied), *Multiple-purpose projects, *Simulation analysis, *Planning, *Irrigation, *Economic impact, *Environmental effects, *Social aspects, Methodology, Input-output analysis, Aquatic environment, Long-term planning, Resource allocation, Water allocation(Policy), Terrestrial habitats, Reserch, Analytical techniques, Regional analysis, Mathematical models, Systems analysis.
Identifiers: Comprehensive analysis.

Described is a set of analytical tools designed to measure and evaluate market and nonmarket costs of large water resource systems; selected components may be useful for analyzing individual small projects or for a general application to a system of small projects. Three major areas are considered: economic, environmental and social. In the economic area, a regional input-output model, modified to operate in a simulation framework, is used to estimate demand and output in the regional economy subject to primary resource constraints, which include water. Environmental effects of water development and management are estimated by using a simulation model of the aquatic environment. Social impacts of water resource systems are considered through selected social indicators and the differences between the actual and the perceived measures of these indicators over the life of a project. The interrelationships between the three components are examined. A suggested procedure to systematically investigate water resource development questions is outlined. Possible questions are listed under the topics of water supply, recreation, and flood control. Finally, applications, recommendations, and limitations of the techniques in analyzing small projects are considered. (Bell-Cornell)
W75-06328

6B. Evaluation Process

AN ECONOMIC ANALYSIS OF THE PROPOSED WATER RESOURCES PROJECT FOR THE UPPER FRENCH BROAD RIVER BASIN IN WESTERN NORTH CAROLINA,
Georgia Univ., Athens.
J. Sellers.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 563, $9.25 in paper copy, $2.25 in microfiche. PhD thesis, 1972. 312 p, 6 fig, 12 tab, 189 ref, 3 append. OWRR A-040-GA(1).

Descriptors: *Water resources development, *River basin development, *Evaluation, *Cost-benefit analysis, North Carolina, Project planning, Social aspects, Economic impact, Recreation, Regional economics, Flood control, Water pollution control, Water supply, Reviews, Methodology, Welfare(Economics), Multiple-purpose projects.
Identifiers: Upper French Broad River Basin(NC), Case study.

A procedure is developed and tested for evaluating water resources projects based on economic, social, legal, and environmental considerations. The areas of economic theory and public finance that apply to water resources investments supplied the basis for the analysis. Additional information concerning the environmental aspects were integrated with the economic and public finance aspects to develop a systematic process for evaluation. The proposed water resources project for the Upper French Broad River Basin in North Carolina was completely based on the methodologies that have been developed up to the present time. The case analysis indicates that the proposed project would be undesirable under present conditions. If the project were evaluated using currently acceptable discount rates and the benefits generated by the construction agency (TVA), the project would be rejected by any criterion that requires benefits to exceed costs. The study shows the necessity of updating any project evaluation if there is a time lag between planning and implementation. Water resources projects evaluation techniques should be broadened to include the possible external effects on the surrounding environment and the loss of resources of the area and the nation as a whole, and the options for future generations. (Auen-Wisconsin)
W75-05857

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK. EXECUTIVE SUMMARY.
Little (Arthur D.), Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11270, $3.75 in paper copy, $2.25 in microfiche. Maritime Administration, Report MA-GEN-740-74058, May 1974. 35 p, 10 fig.

Descriptors: *Transportation, *Hazards, *Chemicals, *Costs, Safety, Inland waterways, Analysis, Highways, Pipelines, Railroads, Barges, Risks, Water pollution control, Insurance, Penalties(Legal).
Identifiers: *Hazardous substances, Acrilonytrile, Anhydrous ammonia, Benzene, Caustic soda, Chlorine, Ethylene glycol, Methanol, Styrene, Sugar, Sulfuric acid.

Comparative economic costs and safety risks (to people, property, and the environment) of transporting ten nonremovable hazardous substances in bulk over varied origin-destination combinations including inland waterways, rail, highways, and pipelines are summarized. In every case, the total per-ton cost of barge is less than three-quarters that of the next mode, and for some the fraction is as low as one-fifth to one-third. Only anhydrous ammonia transport by pipeline cost is a little below that of the barge mode, but neither is presently fully utilized. Insurance costs are normally buried in line haul rates (for carriers) or in the overall liability coverage of the large corporations that are shippers and consignees. Barge transport generally involves less urban exposure to risk than does truck or rail. The recurrence interval (years) of spill causing accidents was longest for barge by a wide margin; truck was usually next. Barge is, however, the only transportation mode likely to present a water pollution hazard. The future of barge transport of these hazardous substances will be contingent on the penalties to be imposed by the EPA and on whether it is possible for the carrier or shipper to buy insurance against these penalties. Spill prevention programs are discussed. (Auen-Wisconsin)
W75-05858

INTERSTATE PLANNING FOR REGIONAL WATER SUPPLY AND POLLUTION CONTROL.
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 5G.
W75-05860

A METHODOLOGY FOR ASSESSING ECONOMIC RISK OF WATER SUPPLY SHORTAGES,
Water Resources Engineers, Inc., Springfield, Va.
G. K. Young, R. S. Taylor, and J. J. Hanks.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-752 153, $6.25 in paper copy, $2.25 in microfiche. Corps of Engineers, Institute for Water Resources, IWR Final Report 72-6, May 1972. 167 p, 31 fig, 16 tab, 2 append, 92 ref. DACW 31-71-C-0046.

Descriptors: *Water shortage, *Economic prediction, *Risks, *Costs, Water works, Water management(Applied), Computer models, Droughts, Methodology, Water supply, Water users, Income, Assessments, Planning.
Identifiers: *Risk analysis, York(Pa), Case study, Income losses.

The described methodology determines regional losses and risks in an urban-industrial area for actual and potential water shortage conditions. Sector losses were identified as households, industrial, and commercial users. Probability-loss functions are defined for both short- and long-term losses arising from specific water supply and use situations under typical conditions. The methodology is useful as a planning tool for both estimating requirements of future water supplies, and in allocating short supplies during emergencies. Water supply shortage is defined as 'any time the water purveyor chooses, or is forced into, a position where he cannot supply the total demand for water in the system.' The simulation data consists of the expected water demand, the hydrology of the supply stream(s), the reservoir storage, and information describing how the system is to be managed. The specific application of the simulation within an optimization framework to York, Pennsylvania determines an optimum reservoir storage which would minimize the economic risk of water shortage, i.e., that after completion of additional reservoir capacity in 1972, the level of regional risk in York is about $40,000 per year, or about 30 cents per capita. Reduction of this risk to $20,000 would require an additional 750 million gallons of storage. (Auen-Wisconsin)
W75-05861

THE USE OF MARKET SEGMENTATION IN PLANNING FOR A RECREATION-BASED ECONOMY,
Wisconsin Univ., Madison. Graduate School of Business Administration.
W. A. Strang.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11136, $4.25 in paper copy, $2.25 in microfiche. Technical Report No. 5 (WIS-SG-71-205), February 1971. 53 p, 27 tab, 7 ref, 1 append.

Descriptors: *Water quality, *Economic impact, *Tourism, *Econometrics, Recreation.
Identifiers: *Door County(Wis), Markets analysis.

The daily expenditures made by segments of the tourist market and the total economic impact that these expenditures had on Door County, Wisconsin economy are analyzed. The major market segments identified were residence, occupation, age, party size, accommodations, and first or repeat visit. Expenditure data was directly related to income, although differences in total expenditures among the several activity groups varied significantly. The direct expenditures made to each industry by the market segment were multiplied by the industry multiplier to obtain the total economic activity generated. By dividing the total direct and indirect activity generated by the total direct expenditures made by each segment, a multiplier for the market segment was obtained. The county received $13,164,000 from tourists in 1968, and through the multiplier effects, it gained $28,619,000 of total economic activity. Although lodging, eating and drinking, food stores, and automobile service industries received 59% of the direct benefits, the households and government received almost 50% of the indirect benefits. The county planners have an opportunity to shape their plans for facilities and promotion to attract specific groups that will have the greatest positive economic impact, but the benefits should be evaluated against the costs associated with attracting and serving that segment. (Auen-Wisconsin)
W75-05862

SAN JUAN RIVER HYDROELECTRIC PROJECT. FEASIBILITY REPORT.
Tippetts-Abett-McCarthy-Stratton, New York.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-212 373, $8.50 in paper copy, $2.25 in microfiche. Agency for International Development, Report No. TA/OST-AN-71-6-4, June 1971. 261 p, 53 fig, 36 tab, 4 append. AID 514 L-025.

Descriptors: *Dams, *Hydroelectric power, *Reservoirs, *Benefit-cost ratio, *Dam design, Water control, Earth dams, Damsites, Economic feasibility, River regulation, Construction costs, Cost-benefit analysis, Water storage, South America, Reservoir sites, Project planning, Annual costs, Social aspects, Hydrology, Soils, Lumbering, Power marketing.
Identifiers: *San Juan River(Colombia), *Dam crest elevation, Damsite selection, Pulpwood potential.

On the basis of benefit-cost ratios and physical analyses, the San Juan River Project is technically and economically feasible and will provide a large source of low-cost power and energy for the Columbian interconnection network. After considering various combinations of dam crest elevations, sites, and system capacities, and in order to meet proposed market demands of electric power for 1980, a 38-meter crest, 12-generator dam was recommended for the Malaguita site. In the recommendation are the specifications for all of the project components, including power plant, dam, dikes and the preliminary associated construction. Power will be transmitted to the national system at Yumbo. The total cost is estimated to be 390 million dollars. If the project is to be implemented, investigations of its impact on the population and economy of the affected area are necessary. If the yearly timber potential of the 400,000 cubic meters in the proposed reservoir is to be exploited, then development of the timber market should start as soon as possible. Additional physical and economic investigations are required on the soil, subsoil and topographic characteristics of certain areas of the reservoir and dam, and on the feasibility of constructing a navigation channel. (Becker-Wisconsin)
W75-05863

MICHIGAN'S 1969 SALMON AND TROUT SPORT FISHERY,
Michigan Dept. of Natural Resources, Lansing.
G. C. Jamsen, J. R. Ryckman, and F. W. Jamsen.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11005, $4.25 in paper copy, $2.25 in microfiche. Research and Development Report No. 203, June 1970. (NOAA-73052404). 50 p, 1 fig, 7 tab, 3 append. AFSC-8.

Descriptors: *Michigan, *Fisheries, *Sport fish, Lake trout, Salmon, Benefits, Rainbow trout, Chinook salmon, Recreation.
Identifiers: Coho salmon.

The results of a survey of eligible fishermen who fished for coho and chinook salmon and steelhead and lake trout in 1969 in Michigan are described. The intent was to guide public and private investment in the Great Lakes and related programs. The sampling frame consisted of license holders that were eligible to fish in Michigan. Approximately 450,000 licensed anglers spent 7.75 million days fishing for all species, or an average of 17 fishing days per fisherman. Of this total statewide effort, generated by an estimated 180,000 anglers, 23%, or 1.8 million angler-days, were spent specifically fishing for salmon, steelhead and lake trout. Only 12% of all fishermen who fished for salmon, steelhead and lake trout were nonresidents. The four neighboring states, Illinois, Indiana, Ohio, and Wisconsin, accounted for 88% of the non-resident salmon and trout fishermen. Better than 60% of the fishing activity for salmon and trout occurred in Lake Michigan. An additional 28% of Great Lakes fishing effort occurred in Lake Superior. Lake Michigan anadromous streams accounted for more than three-quarters of the total stream effort. Streams tributary to Lake Huron and Lake Superior accounted for 13% and 9% of the fishing activity, respectively. (Auen-Wisconsin)
W75-05864

1970-71 YAQUINA BAY RESOURCE USE STUDY,
Oregon Fish Commission, Portland. Div. of Management and Research.
T. Gaumer, D. Demory, L. Osis, and C. Walters.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10816, $3.75 in paper copy, $2.25 in microfiche. February 1974. 32 p, 7 fig, 17 tab. DACW 57-72-C-0138, NOAA N208-0073-72(N), N04-3-208-55.

Descriptors: *Estuaries, *Intertidal areas, *Estuarine fisheries, Recreation, Commercial fishing, Shellfish, Commercial shellfish, Oregon, Fish harvest, Varieties.
Identifiers: *Yaquina Bay(Ore).

The 1971 Yaquina Bay, Oregon survey of recreational use of marine food fish, shellfish, and other miscellaneous invertebrates is summarized. The bay is located 152 miles south of the Columbia River and consists of 3,910 acres containing 1,353 acres of tidelands. The principal boat fishing areas, clam beds, eel grass beds, commercial oyster leases and potential oyster growing areas, food production areas, fish feeding areas, fish migration routes, and known herring spawning areas were mapped. A total of 100,700 resource user trips were expended on the bay during the study, which harvested 626,500 animals. July was the peak activity month for the combined fisheries. Principal species harvested by boat anglers were Dungeness crab (39%), Pacific herring (15%), and starry flounder (14%). Fish represented 87% of the shore anglers' catch with Pacific herring, starry flounder, and northern anchovy the main species landed. Clams comprised 90% of the tideflat users' total take with cockle, softshell, and gaper clams the principal species dug. Black rockfish, lingcod, and cabezon were the main species harvested by skin divers. Tideflat users harvested 440,400 or 70% of the animals taken. Commercial marine food fish and shellfish caught totaled 67,968 pounds valued at $97,121 (fisherman's level). Oysters, the principal harvest, were valued at $81,000. (Auen-Wisconsin)
W75-05865

ECONOMICS OF SMALL WATERSHED PLANNING IN MINNESOTA,
Minnesota Agricultural Experiment Station, St. Paul.
T. E. Daves.
Technical Bulletin 295, 1974. 47 p, 2 fig, 16 tab, 28 ref.

Descriptors: *Watershed management, *Project planning, *Minnesota, *Watershed Protect. and Flood Prev. Act, Legal aspects, Small watersheds, Water districts, Institutional constraints, Induced costs, Associated costs, Evaluation, Amortization, Interest rates, Project benefits, Economic feasibility, Cost-benefit ratio.

Small watershed projects under PL 566 are largely financed with federal funds and are based on the primary evaluation criterion as to whether the resources expended are allocated so that they will yield an equally high return in social benefits as they would in alternative uses. However, because of their legal, political, and operational characteristics, institutions involved in watershed planning in Minnesota are unable (or unlikely) to arrive at public expenditure decisions that are economically efficient. Planning and project evaluation strategies are critized and suggestions for their improvements are given. For example, interest rates used in developing work plans for the

study projects (2-1/2 to 3-1/8%) are too low to reflect the real opportunity cost of capital. When the slightly higher 4% rate is assumed, five of the 13 projects are found economically not viable. The use of net benefit-cost ratio instead of total benefit-cost ratio obscures the real economic efficiency of projects. Watershed districts are financially limited in their project development and management functions. Among the recommended changes in planning procedures for efficient investment allocation are that interest rates used in estimating costs and in discounting should reflect true opportunity costs and time discount rates of society accurately. (Auen-Wisconsin)
W75-05866

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA. APPENDIX A: WATER SUPPLY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 5F.
W75-05867

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CEMENT INDUSTRY,
Southern Research Inst., Birmingham, Ala. Economic Research and Planning Section.
For primary bibliographic entry see Field 5G.
W75-05869

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK, FINAL REPORT (REVISED).
Little (Arthur D.), Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11271, $8.50 in paper copy, $2.25 in microfiche. Maritime Administration Report MA-GEN-740-75006, May 1974. 266 p, 3 fig, 47 tab, 11 ref, 6 append. C-76446.

Descriptors: *Transportation, *Hazards, *Chemicals, *Comparative costs, Risks, Safety, Inland waterways, Railroads, Barges, Pipelines, Highways, Water pollution sources, Federal Water Pollution Control Act, Frequency analysis, Environmental effects, Regulation.
Identifiers: *Hazardous substances, Safety regulations, Styrene, Acrylonitrile, Sulphuric acid, Liquid chlorine, Ethylene glycol, Methanol, Caustic soda, Benzene, Liquid anhydrous ammonia, Refined sugar.

Ten hazardous substances were chosen to show the varied nature of shipping hazards in inland waterways and the cost/risk tradeoffs that would occur in transport by alternative transportation modes. The risks involved of shipping each substance were quantified utilizing (1) the expected frequency and quantity of accidental releases for each transportation mode based on historical data, (2) the hazard due to the release based on physical interactions that take place on land or water, (3) risks to people, property and the environment are evaluated from the hazard assessment and knowledge of the vulnerable resources in the vicinity of the release. For the cargo flows in question, the cost of barge transportation is considerably below that of rail or truck. With the exception of chlorine and benzene, the annual expected exposure associated with the transport of these substances is lowest for barges. The truck mode is equally safe, and both barge and truck are substantially safer than rail. The future of transporting hazardous substances by barge seems to hinge not only on the exact nature of the penalty system to be imposed by the EPA, but also on whether it is possible for carriers/shippers to buy insurance against civil penalties. (Auen-Wisconsin)
W75-05870

PROGRAM PLAN FOR ENVIRONMENTAL EFFECTS OF ENERGY,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 9D.
W75-05871

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES, THE ELECTROPLATING INDUSTRY, COPPER, NICKEL, CHROMIUM AND ZINC.
Kearney (A. T.) and Co., Inc., Chicago, Ill.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 595, $7.50 in paper copy, $2.25 in microfiche. EPA report 230 2-74-007, September 1974. 231 p, 2 fig, 119 tab, 16 ref, 1 append. EPA 68-01-1545.

Descriptors: *Metals, *Pollution abatement, *Economic impact, *Industries, Standards, Zinc, Nickel, Copper, Chromium, Operating costs, Capital costs, Unemployment.
Identifiers: *Electroplating industry.

The economic effects of various alternative effluent and waste treatment technologies on firms which perform copper, nickel, chromium, and zinc electroplating only, are evaluated in terms of product price increases, effects upon employment, the continued viability of affected plants, and other competitive effects. This study was limited to independent shops of less than 100 employees as it is believed that larger firms would not be severely impacted by the waste treatment guidelines. Two alternatives, A and B, were established for treatment levels for both direct dischargers and municipal system users, i.e., Best Practicable Technology and Best Available Technology. Small direct dischargers will be required to install technology to meet less stringent standards. The total investment costs required for this industry to meet the 1977 standards are approximately $242 million for Alternate A and approximately $379 million for Alternate B. The annual operating cost increase is expected to amount to $85 million for Alternate A and $135 million for B. The average price increase will be 8.3% for municipal dischargers and 15.5% for direct dischargers according to Alternate A; the price increase for Alternate B is 15.5% for both dischargers. The employment reduction for Alternate A totals 1824, or 5.4% and for B, 2649, or 7.8%. (Auen-Wisconsin)
W75-05873

MODERN TECHNIQUES IN PLANNING THE MANAGEMENT OF WILDLAND RESOURCES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W75-05915

INTEGRATED RIVER BASIN DEVELOPMENT AND REGIONAL PLANNING IN NEW ZEALAND,
Nelson Catchment Board (New Zealand).
G. Pemberton.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 14-20, 1974. 2 ref.

Descriptors: *Regional analysis, *Regional development, *River basin development, *Comprehensive planning, Environmental effects, Water resources, Administration.
Identifiers: *New Zealand.

The importance of thorough and extensive regional planning was discussed. A method of comprehensive planning of regional water and soil resources, called integrated river basin development, was outlined. The information required for this method is basic to any sound regional planning. Finally, the present administrative structure and the proposed Local Government Act were commented on from a regional planning point of view. (Dawes-ISWS)
W75-05952

OPTIMUM RUNOFF FORECAST FOR A FLOOD-CONTROL RESERVOIR,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 4A.
W75-05994

METHODOLOGY FOR OPTIMIZATION OF FLOOD PROTECTION MEASURES ILLUSTRATED BY AN EXAMPLE IN THE GERMAN FEDERAL REPUBLIC,
Karlsruhe Univ. (West Germany). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05995

BENEFIT-ESTIMATE OF DRAINAGE AND FLOOD-CONTROL WORKS IN SMALL WATERSHEDS OF SEMI-ARID CLIMATE,
Technion-Israel Inst. of Tech., Haifa.
B. Z. Kinori.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 315-327. (1973) 3 fig, 12 ref.

Descriptors: *Estimated benefits, *Flood control, *Agricultural watersheds, *Graphical analysis, Small watersheds, Arid climates, Statistical methods, Direct benefits, Drainage.
Identifiers: Israel.

Discussion was restricted to the direct benefits achieved by drainage and flood-control works on agricultural areas and small watersheds in semi-arid climatic conditions only. The question of the indirect and intangible benefits, the calculation of costs and the rate of return (benefit-cost ratio, etc.) were not included. The author did not intend to give a ready-made solution of this complex problem, but to point out the difficulties and shortcomings of the widely used methods of benefit calculations in general and in semi-arid small watersheds in particular. Much study and research will have to be carried out in order to be able to suggest a more reliable method. An attempt was made for a graphical-statistical analysis of the problem. (See also W75-05973) (Humphreys-ISWS)
W75-05997

INSTITUTE FOR WATER RESOURCES (ARMY CORPS OF ENGINEERS), ANNUAL REPORT, 1972.
Institute for Water Resources (Army), Alexandria, Va.
(1973). 41 p.

Descriptors: *Water resources institute, *Projects, *Training, *Flood control, Planning, Benefits, Evaluation, Harbors, Water resources, Droughts, Economics, Publications.

The work accomplished during calendar year 1972 was briefly described, and the direction of future efforts was indicated. Methodological investigations included flood control benefit evaluation, planning for better harbors and ports, measuring the impact of employment generation from water resources projects, measurement of the economic risk of water supply shortages from drought, and assessment of non-market values. Research findings reported were U.S. deepwater port needs, analysis of Corps environmental statements, and an evaluation of public workshops on the Puget Sound and adjacent waters study. Also discussed were special studies in social and cultural dimensions as related to the Corps of Engineers mission and professional development programs. Published reports and papers were listed. (Humphreys-ISWS)
W75-06018

POWER PLANT SITING-SOCIAL/POLITICAL CONSIDERATIONS,
Northern States Power Co., Minneapolis, Minn.
R. S. McGinnis.
Preprint No. 1528, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 5 p.

Descriptors: *Sites, *Powerplants, *Power systems operation, *Political aspects, *Social aspects, *Social values, Planning, Communication, Coordination, Project planning.
Identifiers: Public participation.

Selecting a site for a large power generating plant or any large industrial complex involves a consideration of the local community. The social considerations may vary from one region to another and the only way to define these is to go directly to the people. Northern States Power Company (NSP) in January, 1970, invited approximately 30 environmental and conservation groups in the State of Minnesota to attend meetings to discuss the future siting and development of power plants and transmission lines in its service area. All groups contacted accepted and sent a representative to the Plant Siting Task Force (PSTF) formed by NSP. NSP invited the participation of Minnesota's environmental cabinet, consisting of state department heads, and they also accepted. Weekly meetings of the PSTF began in March and the PSTF was asked to make a recommendation on the location of its generating station. After many meetings, the site recommended by the citizens group was selected. NSP is continuing to use the task force in hope that it will not only avoid the usual public resistance, but also provide the highest degree of environmental protection. (Poertner)
W75-06050

ENVIRONMENTAL CRITERIA FOR RECLAMATION PROJECTS,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06067

PLANNING WATER RESOURCES PROJECTS TO MAXIMIZE ENVIRONMENTAL BENEFITS,
Bureau of Reclamation, Washington, D.C.
W. D. Fairchild.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington, D.C. p 5-14.

Descriptors: *Planning, *Environmental effects, *Water resources development, *Federal project policy, *Alternate planning, Colorado River Basin, Social impact, Project planning, Project benefits, Evaluation, Alternative planning, Environmental engineering, Water policy, Governments.
Identifiers: *National Environmental Policy Act, Impact statements, Western U.S. Water Plan Study.

In the formulation of environmental alternatives, structural as well as nonstructural and non-development plans are considered in the water planning effort. Environmental alternatives must be acceptable, effective and efficient as well as representative of recognized practices in the social, natural and physical sciences for formulation of plans. The 1968 Colorado River Basin Project Act conducted two interrelated studies: (1) to determine the feasibility of augmenting supplies of the Colorado River; and (2) to develop comprehensive reconnaissance plans to meet water needs of the 11 states west of the Continental Divide. Environmental planning entails several steps as described by the Water Resources Council: (1) identification of existing and projected problems; (2) evaluation of resource capabilities and future conditions; (3) formulation of alternative plans to achieve varying levels of contributions to the environmental quality objective; (4) evaluation of differences among alternative plans; and (5) a selection of a recommended plan of action from among alternatives developed and analyzed, based on the evaluation of the tradeoffs among the various objectives. An interim evaluation device has been developed by the management team of the Western U.S. Water Plan Study. Criteria used to evaluate and describe environmental conditions are: quantity, quality, human influence, uniqueness, magnitude and significance. These factors provide perspectives on relative availability of the resource category within the planning setting, and provides maximum economic efficiency for environmental planning. (Poertner)
W75-06068

CONSTRUCTION OF RECLAMATION PROJECTS TO ENHANCE ENVIRONMENT,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06069

HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING,
Catholic Univ. of America, Washington, D.C.
For primary bibliographic entry see Field 2E.
W75-06070

RENOVATED WASTE WATER: THE QUESTION OF PUBLIC ACCEPTANCE,
George Williams Coll., Downers Grove, Ill. Dept. of Counseling Psychology.
For primary bibliographic entry see Field 5D.
W75-06096

PUBLIC ACCEPTANCE OF RENOVATED WASTE WATER: MYTH AND REALITY,
Southern Illinois Univ., Carbondale. Dept. of Geography.
For primary bibliographic entry see Field 5D.
W75-06097

A SOCIOLOGICAL APPROACH TO THE PROBLEM OF WATER POLLUTION,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Rural Sociology.
For primary bibliographic entry see Field 5G.
W75-06099

A MOSAIC PATTERN OF BALANCED LAND-WATER PLANNING FOR COTTAGE DEVELOPMENT AND LAKE PLANNING,
Toronto Univ. (Ontario).
R. Jaakson.
Plan Canada (Journal of the Canadian Institute of Planners), Vol 14, No 1, p 40-45, October 1974. 2 fig.

Descriptors: *Recreation, *Lakes, *Land management, *Optimum development plans, *Planning, *Canada, Access routes, Land use, Water management.
Identifiers: Ontario(Can.), *Temagami Lake(Can.), Cluster development, Ribbon development, Development-in-depth.

Lakes on the Pre-cambrian Shield in Ontario have come under increasing pressure for development for lake cottages and recreational uses. Past solutions of either ribbon development around the lake or development in depth receding from the lake side have proved inefficient and unacceptable in maintaining a high level of environmental quality. A new concept for planning of lakes and development of cottage subdivisions is outlined. By removing pressures for private development and subsequent environmental deterioration, the subdivisions cluster cottages in the intervening land between lakes, thereby reserving the shorelines for public ownership and use. Under public management, the environmental quality of the lakes is further enhanced by determining specific uses for the lakes, reducing number of road accesses (disrupting the ecosystem), locating a central efficient disposal system, and enforcement of other general regulations. The plan is already operative at Temagami Lake in Ontario, and the social opportunities it has opened to lower income groups are evident. This phase monitored development allows for continued planning so as to further enhance and anticipate changes. (Salzman-North Carolina)
W75-06101

CITY OF FRESNO--LONG RANGE PLAN: METROPOLITAN AREA, TRUNK SEWER SYSTEM.
Jenks and Adamson, Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W75-06102

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-06104

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 4B.
W75-06105

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
For primary bibliographic entry see Field 5D.
W75-06106

AN ANALYTICAL APPROACH TO REORGANIZATION OF WATER MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
B. V. Dall.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 940, $5.75 in paper copy, $2.25 in microfiche. PhD Dissertation, September 1972. 223 p, 11 fig, 13 tab, 105 ref, append. OWRT B-035-PA(2). 14-31-0001-3327.

Descriptors: *Management, *Water resources, Waste water treatment, Waste water disposal, *Legislation, *Water law, Social aspects, Psychological aspects, Political aspects, Judicial decisions, Federal government, Community development, Administrative decisions, Systems analysis, *Social change, *Pennsylvania, Water quality standards, *Attitudes, Water policy.
Identifiers: *Social perceptions, Water service needs, Water service systems, Socio-political bargaining.

The laws of Pennsylvania and of the Nation are examined and used to develop an analysis of change in social perceptions of water service needs and change in the legal-institutional setting in water management organizations. The analysis shows that a condition of institutional obsolescence resulted chiefly because of growth in social perceptions of the interrelatedness of water resource connected activities. A significant change in man-resource relations occurred in Pennsylvania and the Nation. The study's main objective is to demonstrate the need for an interdisciplinary approach for studying water management problems and the associated difficulties. The value

of the broad interdisciplinary approach is shown to be in its high level of generality and relevancy in problem formulation. There is analysis of research in several relevant disciplines leading to an integrated view of current water management problems and the development of an integrated model of the community water service system. Knowledge about the environment of governance of such systems is used to construct a conceptualized bargaining model which structures key entities and identifies functional relationships which exist between them. Taken together the models serve as an interdisciplinary framework for the formulation and study of water management problems. (Sink-Penn State)
W75-06193

THE ROLE OF CITIZEN ADVISORY GROUPS IN WATER RESOURCES PLANNING,
Massachusetts Univ., Amherst. Dept. of Political Science.
M. O. Ertel.
Available at W.R.R.C., UMass/Amherst, for $3.00. Also available from the National Technical Information Service, Springfield, Va 22161 as PB-240 877, $5.75 in paper copy, $2.25 in microfiche. University of Massachusetts, Amherst, Water Resources Research Center Publication No. 43 - Completion Report FY-75-1, July 1974. 141 p, 14 fig, 48 ref, 2 append. OWRT B-036-MASS(1). 14-31-0001-4093.

Descriptors: *Planning, *Social participation, *Interstate commissions, Interstate compacts, History, *Social function, Social needs, *Institutional constraints, Organizations.
Identifiers: *Citizen Advisory Groups.

A systematic, case-study observation was made of the citizen advisory groups operating in conjunction with three reconnaissance level planning studies of the New England River Basins Commission: the Long Island Sound Study, the Southeastern New England Study and the Connecticut River Basin Program. The activities of a predecessor to these groups, 'The Citizen Review Committee on the Connecticut River Basin Comprehensive Water and Related Land Resource Investigation' are briefly reviewed, as are the activities of the scientific advisory groups associated with the three on-going studies. As innovative attempts to operationalize the concept of citizen participation in the planning process, these groups and their supporting staffs have faced many difficulties in defining their roles and developing appropriate procedures and functions. The ways in which these groups have dealt with these problems and their experience in general are described for the benefit of other citizen advisory groups and planning agencies. While citizen advisory groups can serve as only one component of a public participation program, they can perform certain valuable functions on their own, while also providing a key link to other strategies included in such a program. A set of guidelines derived from this research is included for the use of planning agencies seeking to maximize the effectiveness of citizen advisory groups.
W75-06198

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
For primary bibliographic entry see Field 5D.
W75-06203

ENGINEERING, LEGAL AND ECONOMIC ASPECTS OF STORM SEWER ASSESSMENTS,
Iowa Univ., Iowa City. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-06297

USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 6A.
W75-06299

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ESTIMATING THE VALUE AND INCIDENCE OF RECREATION BENEFITS FROM A BEACH EROSION CONTROL PROJECT,
Institute for Water Resources (Army), Alexandria, Va.
M. R. Krouse.
IWR Paper 74-P4, October 1974. 33 p, 8 fig, 2 tab, 7 ref.

Descriptors: *Analytical techniques, *Shore protection, *Recreation, *Estimated benefits, Economics, Estimating, Evaluation, Erosion control, Beach erosion, Regression analysis, Maryland.
Identifiers: Ocean City(Maryland).

The primary objectives of this empirical study were to examine the feasibility of (1) estimating the value of shoreline recreation experience using the zone-cost demand analysis technique and (2) estimating the value of the shoreline experience to user subgroups classed by social and economic characteristics as a means of obtaining benefit incidence information. The study applies to a shoreline experience in a resort setting and illustrates that recreation value for beaches can be estimated using zone-cost analysis and that individual demands and values for different user groups can also be estimated to gain incidence information. An accurate measure of user surplus value requires that demand be estimated according to an average site expenditure value within the length-of-stay group. The study indicates that the business sector would likely be the major direct beneficiary of an erosion control project developed at a commercial beach. The question of what incidence information is relevant is still unresolved. Information about benefits to local and non-local sectors would be a powerful tool for determining and arguing for appropriate and acceptable cost-sharing arrangements. While benefit incidence is primarily dealt with, it is necessary to realize that the incidence problem involves far more than just tracing benefit flows. (Auen-Wisconsin)
W75-05859

COST SHARING FOR SHORELINE PROTECTION,
National Bureau of Standards, Washington, D.C. Technical Analysis Div.
H. E. Marshall.
Army Engineer Institute for Water Resources, Fort Belvoir, Va., IWR Contract Report 74-7, August 1974. 63 p, 4 fig, 14 tab, 49 ref, 2 append. ACOE.

Descriptors: *Cost sharing, *Shore protection, Federal project policy, Equity, Multi-purpose projects, Cost allocation, Management, Coastal structures, Insurance.

To provide the Army Corps of Engineers with an evaluation of existing and alternative cost-sharing rules for shoreline protection with respect to efficiency, equity, and administrative feasibility, cost-sharing is evaluated in terms of its incentive effects and the fact that local interests will not necessarily choose from a combination of techniques or the scale that is optimal from the national viewpoint. Existing cost-sharing rules, those being proposed in legislation, and those recommended here are compared and a model illustrates how cost-sharing affects local decision making in project planning. Recommended are (1) The Association Rule, which requires local beneficiaries of shoreline protection to share in all of the project costs in the proportion of local benefits to national benefits at the margin. A second-best solution is to retain the existing rule for beach erosion control and to raise local cost shares to a flat 50% for hurricane protection and emergency programs. (2) All management and engineering techniques should be subject to the same percentage cost-sharing rule. (3) All categories of project costs, including construction, lands, easements, etc., should have the same percentage cost share applied to them. (4) Federal cost sharing should be used as an incentive to nonfederal interests to comply with certain land-use requirements. (Auen-Wisconsin)
W75-05872

FLOOD DAMAGE IN NEW ZEALAND,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 4A.
W75-06001

EVALUATION OF AGRICULTURAL POLICY ALTERNATIVES TO CONTROL SEDIMENTATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4D.
W75-06079

A REGIONALIZATION PROCEDURE WITH OPTIMIZING CHARACTERISTICS FOR WATER DISPOSAL SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06195

DEVELOPMENT OF ECONOMIC CRITERIA FOR REGIONALIZATION OF A WASTE WATER MANAGEMENT SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06200

ECON2, PROJECT FORMULATION--ECONOMICS--COMPUTER PROGRAM USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06220

ENGINEERING, LEGAL AND ECONOMIC ASPECTS OF STORM SEWER ASSESSMENTS,
Iowa Univ., Iowa City. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-06297

6D. Water Demand

COORDINATION OF REGIONAL WATER RESOURCE SUPPLY AND DEMAND PLANNING MODELS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 6A.
W75-05856

PEAK RATIOS AND ALTERNATE MODEL FACTORS FOR RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez.
A. Guilbe.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 831,

$4.25 in paper copy, $2.25 in microfiche. University of Puerto Rico Water Resources Research Institute, Mayagues, Completion Report, August 1974. 61 p, 20 fig, 12 tab, 7 ref. OWRT A-038-PR(1).

Descriptors: *Distribution systems, Peak discharge, *Water demand, Model studies, *Puerto Rico, *Water utilization, *Water users, *Alternative water use, Regression analysis, Data collections, *Municipal water.
Identifiers: Regression models.

The impact of residential water-use factors (other than assessed property valuation) on residential water-use in Puerto Rico. Estimating peak ratios were investigated for their application to the average water-use estimators previously developed. Data from sampled dwelling units in the cities of San Juan, Ponce and Mayaguez (on socio-economic factors and water usage) were subject, among other analyses, to: computer-generation of transformed water use data (water-use indices) to serve as basis for graphical analysis and model building; graphical analysis of the relationship between alternate water use factors (number of bedrooms per dwelling, equivalent index of bathroom water-using fixtures, number of people per dwelling unit, and number of people per bedroom) and the generated water-use indices; computer-generation of model parameters and the corresponding water-use models for each alternate factor whose impact residential water use was found 'significant', on the basis of a factorial experiment conducted regression plot-back analysis to determine the fitness and reliability of model parameters for each significant alternate factor; and the determination of maximum to average water-use indices. Of the four potential-alternate residential water-using factors studied, only two were significant: number of bedrooms per dwelling unit and the equivalent index of bathroom water-using fixtures. In both cases, the relationship between each alternate factor and the corresponding water-use index may be approximated by an exponential function, with the alternate factor as the independent variable and water use as the 'response' variable.
W75-06085

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
Bulletin No 104-3, May, 1971. 27 p, 20 fig, 3 tab.

Descriptors: *Alternative costs, *Alternative planning, Management, *Groundwater resources, *Water demand, Hydrogeology, *Planning, Water resources development, *Water supply development, Surface water availability, Model studies, Water sources, Project feasibility, Comparative costs, *California.
Identifiers: Chino-Riverside Area(Calif.), Metropolitan Water District(MWD).

A wide range of alternative plans to be used as a guide by local agencies for selecting a plan for managing their groundwater supplies and facilities is presented. The study area includes 641 square miles of land changed from agricultural to urban uses, thereby changing supply from stream flow water to diverted and/or surface waters. Areas of geology, hydrology and operation economics were investigated. Data on locally available water supplies were used to construct a mathematical model of the ground water basin that simulated water responses under various postulated plans. The model was then used in the operational and economic phase to determine cost of water services although variance of factors such as pricing policy, quality of imported water, water demand, mean water supply and land use could not be predicted and values were assumed for the model. Using the modeling technique, 4 selected alternative plans for the period 1965 to 2015 were evaluated in terms of the economic impact caused by operational variables. Cost and change in water quality were analyzed and compared for efficiency in meeting future water demands. By extending the period of analysis to 2055, the value of groundwater in storage after 2015 was determined. (Salzman-North Carolina)
W75-06104

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
For primary bibliographic entry see Field 5D.
W75-06106

6E. Water Law and Institutions

STUDY OF SINGLE-RESPONSIBILITY CONCEPTS FOR WATER POLLUTION CONTROL PROJECTS.
Bechtel Corp., San Francisco, Calif.
For primary bibliographic entry see Field 5G.
W75-05868

INTEGRATED RIVER BASIN DEVELOPMENT AND REGIONAL PLANNING IN NEW ZEALAND,
Nelson Catchment Board (New Zealand).
For primary bibliographic entry see Field 6B.
W75-05952

FLOOD MANAGEMENT IN DEVELOPING COUNTRIES,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06002

MANAGING WATER RESOURCE PROJECTS TO MAINTAIN ENVIRONMENTAL BENEFITS,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-06066

SURVEY AND ANALYSIS OF URBAN DRAINAGE ORDINANCES AND A RECOMMENDED MODEL ORDINANCE,
Georgia Inst. of Technology, Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06076

THE COLORADO: A WEARY RIVER,
For primary bibliographic entry see Field 4A.
W75-06100

THE BEACH EROSION HAZARD,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2J.
W75-06113

MICUCCI V. WHITE MOUNTAIN TRUST CO. (ACTION FOR DAMAGES AND RELIEF CAUSED BY RUNOFF FLOW FROM ADJACENT PROPERTY).
321 A.2d 573 (N.H. 1974).

Descriptors: *New Hampshire, *Judicial decisions, *Legal aspects, *Surface runoff, *Repulsion(Legal aspects), Snowmelt, Land tenure, Water management, Drainage systems, Natural flow, Construction, Flood damage, Water law, Reasonable use, Adjacent landowners, Adjudication procedure, Surface drainage.
Identifiers: *Common enemy rule, Injunctive relief, Liability(Legal aspects), Nuisance(Legal aspects), Proximate causation.

Action was brought for injunctive relief and damages caused by surface runoff from an adjacent landowner's property. The Supreme Court of New Hampshire held that the owner paved its lot in an unreasonable manner, even though the land had been previously covered by a building. A property owner may use, manage or control diffused surface waters on his land in any manner so long as it is reasonable in view of his own interest and that of all other persons adversely affected. The owner's alteration of natural and existing runoff patterns is a factor to be considered along with the nature of his use of the land, the foreseeability of harm to adjacent property, and the amount of resulting injury in arriving at a determination of whether it is reasonable. The court upheld, as being supported by the evidence, an award of fourteen hundred dollars for construction of a drainage system to divert flooding. The case was remanded, however, for determination of whether the three thousand dollar damage award should be reduced because the defendant was not solely responsible for all of the damage to plaintiff's property. (Sperling-Florida)
W75-06141

STATE OF OHIO V. REPUBLIC STEEL CORP (ACTION FOR POLLUTION OF WATERS WITHOUT A VALID PERMIT).
311 N.E.2d 911 (Ohio Mun. Ct. 1973).

Descriptors: *Discharge(Water), *Ohio, *Water pollution control, *Industrial wastes, *Judicial decisions, Permits, Federal Water Pollution Control Act, Legislation, Water law, Waste water disposal, Federal government, Legal aspects, Navigable waters, State governments, State jurisdiction, Regulation, Control, Rivers, Streams, Governmental interrelations, Federal-State water rights conflicts.
Identifiers: National Pollution Discharge Elimination System, FWPCA Amendments of 1972, Refuse Act of 1899, Administrative regulations, Environmental policy, State policy.

The State of Ohio charged a steel company with polluting the waters of Nimishillen Creek without a valid and unexpired permit. Such a permit is required by state law. The court held that the national discharge permit system established by the Federal Water Pollution Control Act Amendments of 1972 was not intended to preempt the authority of the state to issue permits for discharge into navigable waters within the state. The state had interim authority to establish a permit system. The corporation's pending application for a federal permit under the Refuse Act of 1899 did not obviate the necessity of a state permit. To deny Ohio the authority to control the discharge of pollutants in its water while a comprehensive program was being established under the 1972 Amendments would obviate the granting of interim authority to the states to issue permits for discharges of industrial waste within their jurisdiction. (Sperling-Florida)
W75-06142

LLOYD HARBOR STUDY GROUP, INC. V. DIAMOND (ACTION CHALLENGING DETERMINATION THAT WATER QUALITY STANDARDS WOULD NOT BE CONTRAVENED BY CONSTRUCTION OF NUCLEAR POWER PLANT).
355 N.Y.S.2d 693 (N.Y. S. Ct. 1973).

Descriptors: *New York, *Judicial decisions, *Water quality standards, *Administration, *Thermal pollution, Federal Water Pollution Control Act, Water law, Administrative agencies, Legal aspects, Nuclear powerplants, Water pollution, Thermal water, Heated water, Adjudication procedure, Water pollution control, Water pollution sources, Water pollution effects, Water quality control, State governments.
Identifiers: *Certification, Declaratory judgments, Private interest groups, Environmental policy.

Various environmental groups and individuals brought action challenging the determination of the New York State Commissioner of Environmental Conservation, respondent, that applicable water quality standards would not be contravened by the proposed construction and operation of a nuclear generating station. Prior to the ruling, a public hearing was conducted at which some of the environmental effects of the project were considered. However, radiological effects, including related water quality standards were not considered. The petitioners sought to have the determination nullified on the grounds that the respondent exceeded his authority and that the determination was arbitrary, capricious, and an abuse of discretion. They also contended that because the state's water quality standards which insofar as they related to thermal pollution, had not been approved by the Environmental Protection Agency, there was no lawful bases for the determination. A New York Supreme Court ruled that the respondent had authority to issue the determination and, because the respondent was not required to hold the hearing at all, his failure to adopt the findings of the hearing officer was not arbitrary, capricious, or an abuse of discretion. Recognizing that such hearings are nothing more than a 'pro forma ritual and a hollow exercise', the court stated that it was the responsibility of the legislature, not the courts, to fill this void. (Deckert-Florida)
W75-06143

ARMSTRONG CHEMCON, INC. V. POLLUTION CONTROL BOARD (APPEAL OF BOARD'S ACTION LIMITING DISCHARGES OF MERCURY INTO WATERS).
310 N.E.2d 648 (Ill. App. 1974).

Descriptors: *Judicial decisions, Water pollution, *Water pollution sources, *Regulation, Effluents, *Illinois, Water quality control, Waste treatment, Sewage treatment, Waste water(Pollution), *Mercury, Public health, Water resources development, Water law, Economic aspects, Adjudication procedure, Waste water disposal, Water quality standards, Administrative decisions.

Proceeding stems from a petition by a group of manufacturers and suppliers seeking judicial review of the validity and application of the Illinois Pollution Control Board's regulation limiting discharges of mercury into Illinois waters. The petitions urge that the regulation is not warranted and will adversely affect their business. They also contend that the Board does not possess the power to regulate discharges into sewers. The court cites the purpose of the regulation is to restore, maintain, and enhance the purity of state waters in order to protect the health, welfare, property and the quality of life. The regulations also seek to assure that no contaminants are discharged into the waters without being given the degree of treatment or control necessary to prevent pollution. Based upon these purposes, the court held that the Board has the power to regulate the discharge of contaminants and the discharges into sewers. (Proctor-Florida)
W75-06144

NATURAL RESOURCES--CONSERVATION RESTRICTIONS.
Minnesota Sess. Laws, Vol 4, Ch. 531, H.F. No. 3129, p 1024-1025, approved April 11, 1974 (1974).

Descriptors: *Minnesota, *Legislation, *State governments, *Scenic easements, *Preservation, Land tenure, Legal aspects, Land management, Resources development, Land use, Conservation, Natural resources, Water conservation, Real property, Protection, Easements, Ecology, Administration, Water policy, Water law, Public rights, Public access, Public lands, Eminent domain, Wildlife conservation, Environmental control.
Identifiers: Environmental policy.

The commissioner of natural resources is authorized to acquire by gift, purchase or exchange, conservation restrictions in the name of the state of Minnesota with funds specifically made available for that purpose. 'Conservation restriction' is defined as any right, whether or not stated in the form of a restriction, easement, covenant or condition, in any deed or other valid instrument, appropriate to retaining land or water areas predominantly in their natural state or as suitable habitat for fish or wildlife. No such restriction held by the commissioner shall be unenforceable on account of lack of privity of estate or contract or lack of benefit to particular land. Such restrictions shall be duly registered, shall be enforceable by injunction, and shall entitle the holder to enter the land in a reasonable manner to assure compliance. Said restrictions may be released by the holder in the same manner as any other interest in land, subject to conditions, if any imposed at the time of creation of the restriction. No provision of this statute shall render unenforceable any restriction not having the benefit of this statute. (Deckert-Florida)
W75-06145

LOWER ST. LOUIS RIVER BASIN--SANITARY SEWERS (AS AMENDED).
Minnesota Sess. Laws, Vol 4, Ch. 377, H.F. No. 3473, p 612-616, approved April 9, 1974 (1974).

Descriptors: *Minnesota, *Legislation, *Water pollution control, *Waste disposal, *Sewage disposal, Water law, Planning, Waste water(Pollution), Waste water disposal, Water quality control, Environmental control, Abatement, Water pollution, Water policy, State governments, Local governments, Governmental interrelations, Regulation, Administration, Jurisdiction, Legal aspects, Sewage districts, Sewage treatment, Administrative agencies.
Identifiers: Environmental policy, State policy, Effluent limitations.

There is hereby established a sanitary board with jurisdiction in the Western Lake Superior Sanitary District to provide for the prevention, control, and abatement of water pollution and the disposal of sewage and solid waste in the lower St. Louis River basin area. The board is a public corporation and a political subdivision of the state of Minnesota and is responsible for carrying on a long range planning program with respect to water pollution control and waste disposal. It has authority to take over, acquire, construct, and operate all interceptors and treatment works needed for the disposal of sewage and solid waste, as well as local sanitary sewer facilities over which the board agrees to assume responsibility at the request of any local government unit. The board may construct, operate, and regulate solid waste disposal sites and facilities, may establish a system of user charges, may issue general obligation certificates of indebtedness and general obligation bonds, and may levy property taxes for debt service of the district disposal system. An annual budget shall be prepared and adopted by the board prior to September 1, 1972, and each year thereafter. (Deckert-Florida)
W75-06146

SEVENTEEN, INC. V. PILOT LIFE INSURANCE CO. (ACTION FOR INJUNCTION TO RESTRAIN DIVERSION OF SURFACE WATERS).
205 S.E.2d 648 (Va. 1974).

Descriptors: *Judicial decisions, *Surface runoff, *Ditches, *Easements, Drainage, Drainage engineering, Land use, *Virginia, Trespass, Legal aspects, Public rights, Water law, Land development, Public utilities, Public benefits, Social aspects, Land tenure, Adjudication procedure.
Identifiers: *Injunctive relief.

The action before the Supreme Court of Virginia was for injunction to restrain defendants from diverting surface water into a drainage ditch extending across plaintiffs property. Defendants are the City of Chesapeake, a life insurance company, and the State Highway Commissioner. Plaintiffs, local landowners, filed their bill for injunction following the replacement of drainage pipes to accommodate an increased volume of water across their land, thus increasing the easement. Plaintiffs allege that the increased volume of water would cause irreparable damage to their property and unlawfully increase the burden of the drainage easement. The appellate court reversed the trial court holding that the plaintiff must have an opportunity to present its case on the merits. If plaintiffs' allegations are true, an injunction may issue. An injunction is not a remedy in every case of nuisance or continuing trespass. In determining the relief to be granted the chancellor must balance the interests of the parties and of the public. (Proctor-Florida)
W75-06147

MOULTON V. GROVETON PAPERS CO. (ACTION FOR PROPERTY DAMAGES RESULTING FROM FAILURE OF DAM OWNED BY DEFENDANT, RESULTING IN DOWNSTREAM FLOODING OF PLAINTIFF'S PROPERTY).
323 A.2d 906 (N.H. 1974).

Descriptors: *Dam failure, *Flood, *Damages, *Judicial decisions, *Cost allocation, Flood damages, *New Hampshire, Land resources, Property values, Bridges, Streams, Real property, Value, Water law, Water resources development, Bridge failure, Adjudication procedure, Cost repayment, Local governments, Negligence, Legal aspects, Cost analysis, Economics, Evaluation.
Identifiers: Liability(Legal aspects).

Action was brought before the Supreme Court of New Hampshire for property damage resulting from the failure of a dam owned by the defendants. As a result of the failure and the ensuing flood, plaintiffs' properties were inundated. The plaintiff, a Vermont town, alleges that it has the sole obligation to replace the damaged bridges. This obligation gives it a property interest in those structures and a resulting right to recover damages for the cost of repairs made necessary by the negligence of the tort-feasor. Defendants urged that recovery be limited to the extent that the town would not be compensated by the state government for the damages and cost of repairs. The court agreed and limited plaintiff's recovery to the unmitigated portion of its damages. The court also held that landowners whose property was damaged by flooding could recover restoration costs if their properties could be restored without incurring a cost disproportionate to the actual injury. If such restoration was found impracticable, the difference between the value of the property before and after the injury would be the measure of damages. (Proctor-Florida)
W75-06148

LE COMPTE V. STATE (NEW JERSEY) (ACTION SEEKING DECLARATORY JUDGMENT BY PLAINTIFF, APPLICANT FOR PURCHASE OF TIDELANDS CHALLENGING USE AND OCCUPANCY RESTRICTIONS IMPOSED BY NATURAL RESOURCE COUNCIL).
323 A.2d 481 (New Jersey 1974).

Descriptors: *Riparian rights, *Riparian land, *Navigable waters, *Wetlands, Legal aspects, Water law, Water rights, Trespass, Judicial decisions, Remedies, Relative rights, Water resources development, *New Jersey, Administrative agencies, Adjudication procedure, Administrative decisions, Tidal marshes, Water management(Applied), Legal reviews, Compensation, Assessments.

Identifiers: Declaratory judgment, Coastal zone management, State policy, Administrative regulations.

Plaintiff submitted several applications to the Natural Resource Council (NRC) of the Department of Environmental Protection to purchase certain parcels of riparian land from the State of New Jersey. The applications were filed after the plaintiff had occupied the land in question. The NRC gave tentative approval to plaintiff's application, fixed the compensation to be paid, and in addition, imposed on each lot a use and occupancy assessment for the prior use which plaintiff was required to pay before the State would convey title. Plaintiff instituted this declaratory judgment action to test the validity of these assessments. The only issue for determination was whether the NRC could require a use and occupancy assessment in addition to the bargained-for consideration paid for the purchase of riparian lands. The court held that the NRC had no reason to superimpose the assessment as a separate charge. The NRC does have power to fix a total purchase price including both reasonable value and proper compensation for use and occupancy during the prior period of trespass, since the latter is an element of the total consideration. (Proctor-Florida)
W75-06149

NAMED INDIVIDUAL MEMBERS OF THE SAN ANTONIO CONSERVATION SOCIETY, ET AL. V. THE TEXAS HIGHWAY DEPARTMENT (ACTION TO ENJOIN HIGHWAY CONSTRUCTION THROUGH PROTECTED LAND).
496 F.2d 1017 (5th Cir. 1974).

Descriptors: *Judicial decisions, *Environmental effects, *Highway effects, *Regulation, Road construction, Governments, Jurisdiction, Highways, *Texas, Road construction, Financing, Economics, Allotments, Capital, Legal aspects, State governments, Rivers and Harbors Act, Economic aspects, Governmental interrelations, Administrative agencies.
Identifiers: Injunctive relief, State policy, National Environmental Policy Act, Environmental impact statement.

Action was brought by members of a conservation society against the Texas Highway Department and the Federal Department of Transportation to enjoin construction of an expressway which would pass through parklands in the city of San Antonio, Texas. The question for decision was whether the Congressional enactment of the Federal-Aid Highway Act of 1973, severing all federal connection with the expressway in question, eliminates the necessity of compliance with provisions of the National Environmental Policy Act (NEPA). Plaintiffs contend that the State Highway Department must obtain approval from the Army Corps of Engineers for the expressway to cross the San Antonio River and the Olmos Dam and Reservoir area. The reason for this position is the fact that the highway is under federal jurisdiction thus invoking the provisions of the NEPA. The court rejected plaintiffs argument and held that the facts showed the project to be financed with non-federal funds and to serve local needs and concluded that no environmental impact statement was therefore needed. (Proctor-Florida)
W75-06150

COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. V. TRAIN (SUIT CHALLENGING ACCORD FOLLOWED BY EPA AND AEC TO CORRELATION OF THE FWPCA AND THE ATOMIC ENERGY ACT),
373 F. Supp. 991 (D. Colo. 1974).

Descriptors: *Nuclear powerplants, *Nuclear wastes, *Regulations, *Judicial decisions, Disposal, Nuclear engineering, Radioactive wastes, Radioactive waste disposal, Water pollution, Waste treatment, Jurisdiction, Water law, Water resources development, Interagency cooperation, Adjudication procedure, Federal Water Pollution Control Act, *Colorado.
Identifiers: FWPCA Amendments of 1972, Administrative regulations.

The case involves plaintiff's challenge of the accord adopted by the Atomic Energy Commission (AEC) and the Environmental Protection Agency (EPA) regarding the interaction of the Federal Water Pollution Control Act and the Atomic Energy Act. Plaintiffs want the EPA to regulate the discharge of byproduct materials, source materials, and special nuclear materials from a privately owned nuclear electrical generating plant and from a federally owned plant. The EPA and AEC maintain that the regulation of the discharge of these particular materials is under the exclusive jurisdiction of the AEC and not the EPA. The issue before the court is whether all radioactive effluents are subject to regulation pursuant to the Federal Water Pollution Control Act. The Court held that the AEC possesses the sole authority to regulate radiation hazards associated with by-product, source, and special nuclear materials and with production and utilization facilities. (Proctor-Florida).
W75-06151

THE STATE OF TEXAS, ET AL. V. FRI (CHALLENGE OF EXECUTIVE IMPOUNDMENT OF FWPCA FUNDS),
For primary bibliographic entry see Field 5G.
W75-06152

AMERAPORT DEEP DRAFT HARBOR AND TERMINAL COMPACT,
Code of Alabama, Vol. 9, Title 38, Ch. 10, sec 156, p 369-371 (Supp 1973).

Descriptors: *Interstate compacts, *Harbors, *Alabama, *Legislation, *Adoption of practices, Mississippi, Continental shelf, United States, Administrative agencies, Administration, Local governments, State government, Government finance, Research, Planning, Comprehensive planning, Water resources development, Port authorities.
Identifiers: Administrative regulations, Coastal zone management.

The governor of Alabama is authorized to execute an interstate compact to promote the development of a deep draft harbor and terminal to be located on the continental shelf of the United States. The states that are parties to this compact established a joint agency known as the Ameraport Deep Draft Harbor and Terminal Authority. The membership of the authority consists of the governor and five other citizens of each party state to be appointed by the governor. The Authority has power to hold hearings, and conduct studies and surveys of problems, benefits and other matters pertaining to the development of the facility. The Authority will cooperate with other public or private groups, whether local, state, regional, or national, having an interest in the development of deep draft harbors. It will also formulate and execute plans and policies for emphasizing the purpose of this compact before the Congress and other appropriate offices and agencies of the United States. (Sperling-Florida)
W75-06153

AMERAPORT OFFSHORE HARBOR AND TERMINAL COMMISSION,
Code of Alabama, Vol 9, Title 38, Ch 11, secs. 157-182, p 371-376, (Supp 1973).

Descriptors: *Alabama, *Legislation, *State governments, *Offshore platforms, *Coastal structures, Administrative agencies, Resources development, Governmental interrelations, Planning, Ecology, Environment, Environmental effects, Transportation, Water law, Legal aspects, Water policy, Control, Facilities, Harbors, Coasts, Gulf of Mexico, Foreign trade, Economics, Water pollution control, Shore protection, Jurisdiction, Port authorities, Water resources development.
Identifiers: Coastal waters, State policy, Contiguous zone, Territorial seas(Jurisdiction), Coastal zone management, Environmental policy, Water rights(Non-riparians).

The Ameraport Offshore Harbor and Terminal Commission is created to plan, develop, and operate a deep draft harbor and terminal facility for the docking, loading and unloading of vessels carrying liquid or dry bulk and energy cargoes. The Commission is charged with asserting and protecting Alabama's economic, social, and environmental interests in the development of any such facility outside the state where such development may have an impact upon the state. The Commission shall be composed of the Governor, as an ex officio member, and five other members, appointed by the Governor to serve staggered five-year terms. An Executive Director shall be appointed by the Commission to manage the executive and administrative functions and operations of the Commission. The Commission is vested with exclusive and plenary authority to do any and all things necessary or proper to carry out its purpose, including the power to acquire property, enter into contracts, and issue bonds. This Commission shall cease to exist upon the authorization of a bi-state compact by the U.S Congress for essentially the same purposes of this chapter. (Deckert-Florida)
W75-06154

STATE V. REED (ACTION BY STATE TO PREVENT CONSTRUCTION OF DRIVE-WAY THRU WETLANDS, A VIOLATION OF STATUTE),
359 N.Y.S. 2nd 185 (So. Ct. 1974).

Descriptors: *New York, *Judicial decisions, *Law enforcement, *Wetlands, *Preservation, Legislation, Water law, Legal aspects, Marshes, Conservation, Administrative agencies, State jurisdiction, State governments, Permits, Administration, Regulation, Land tenure, Land development, Land management, Management, Land use, Non-structural alternatives, Zoning, Urbanization, Constitutional law, Adjudication procedure.
Identifiers: Coastal zone management, Environmental policy.

The state of New York brought this action to prevent the defendant landowners from constructing a driveway through certain wetlands in Suffolk County. The state alleged that said construction would violate certain provisions of the state Environmental Conservation Law (ECL) which prohibited the altering of any tidal wetland without a permit from the Department of Conservation. In addition to their general denial, the defendants contended that the statue did not apply to wetlands in Suffolk County; that the state was not a proper party; that the provisions of the ECL were unconstitutional as confiscatory; that the state possessed the power of eminent domain and could condemn the property; and that the complaint failed to state a cause of action. A Supreme Court of New York, in a memorandum opinion, rejected the defendants affirmative defenses and held that the statue applied to all tidal wetlands and lands immediately adjacent thereto which the commissioner deems necessary to preserve prior to the effective data of land-use regulations to be adopted by the commissioner. The court further held that the defendants must avail themselves of the procedures set forth in the ECL before they may challenge its constitutionality. (Deckert-Florida)
W75-06155

LICENSES--MOTOR VEHICLE--SUSPENSION FOR DUMPING,
Massachusetts Session Laws, No 1, Ch 39, p 21-22, approved March 15, 1974 (1974).

Descriptors: *Massachusetts, *Legislation, *Water quality control, *Water pollution, *Law enforcement, Water law, Legal aspects, Pollution sources, Administration, Adoption of practices, Local governments, Penalties(Legal), Assessments, Licenses, State governments, Pollution abatement, Disposal, Permits, Regulation.
Identifiers: State policy, Coastal zone management, Non-point sources(Pollution).

The Massachusetts registrar of motor vehicles is authorized to suspend an operator's license or the owner's certificate of registration for using a motor vehicle for certain dumping. Dumping is prohibited in or upon coastal or inland waters or within twenty yards of any such water. If a motor vehicle is used in the dumping, a conviction should be reported by the court to the registrar of motor vehicles. The registrar may suspend the license of the operator of the vehicle for not more than thirty days, and if the person so convicted is the owner of the vehicle its certificate of registration may be suspended for a like period. This section is not applicable to any dumping ground approved by an appropriate public authority. This law will be enforced by natural resources officers, by harbormasters, state police and inspectors of motor vehicles. In Boston there will be additional enforcers, the commissioners of health, housing inspection, and public works. (Sperling-Florida)
W75-06156

STATE OF VERMONT V. STATE OF NEW YORK (ACTION TO ABATE POLLUTION OF INTERSTATE WATERS--CONSENTDECREE),
94 S. Ct 2248 (1974).

Descriptors: *Vermont, *Enforcement, *Judicial decisions, *Adjudication procedure, Water pollution, Water pollution sources, Pollution abatement, Lakes, *New York, Negotiations, Legal aspects, Water resources development, Water law, Effluents, Pollutants, Adoption of practices, Economic aspects, Administration, State governments, Governmental interrelations, cost allocation, Cost sharing.
Identifiers: *Nuisance(Legal aspects), *State policy.

The State of Vermont filed a complaint against the State of New York and the International Paper Company alleging that as a result of the discharge of waste from the paper company's mills, both the company and the state were responsible for the accumulation of sludge beds in Lake Champlain. The plaintiff alleged that the pollution caused by the discharges constituted a public nuisance. The special master presented a proposed consent decree to settle the action to the Supreme Court of the United States. The Supreme Court refused to approve the proposed decree insofar as it provided for the appointment of a lake master who would police the execution of the settlement, and who would pass onto the Court his proposed resolution of the contested issues. The Court held that the proposed resolution of disputes might have no relation to the Court's performance of its judicial power set forth in the Constitution. (Proctor-Florida)
W75-06157

KIRKLAND V. HARDWICKE CHEMICAL CO. (ACTION FOR POLLUTION OF STREAM),
205 S.E. 2nd 831 (S.C. 1974).

Descriptors: *South Carolina, *Water pollution effects, *Legal aspects, *Judicial decisions, Water pollution, Water pollution sources, Negligence, Hazards, Public health, Water law, Fishkill, Effluents, Industrial wastes, Adjudication procedure, Oily water, Riparian land.
Identifiers: *Proximate causation, Evidence, Liabiliiy(Legal aspects).

Action was brought by landowner and tenant against a chemical company for pollution of a stream which bisected the landowner's property. The Common Pleas Court entered judgment in favor of the landowner and tenant, and the chemical company appealed. The appellant contended that the respondents failed to prove that appellant's operation was the proximate cause of their damages. A biological consultant with the South Carolina Pollution Control Authority testified that five and nine months prior to the two fish kills the water in question contained sufficient pollution to kill fish. The Supreme Court of South Carolina held that, in view of testimony that there was no pollution in the stream six months after the second fish kill, the consultant's testimony and other evidence at trial were insufficient to demonstrate negligence of the appellant. The judgment was reversed. (Proctor-Florida)
W75-06158

FIVE MILE RIVER COMMISSION,
Connecticut General Statute Annotated, Title 15, Ch 263, sec. 15-26a, p 15 (Supp 1972).

Descriptors: *Connecticut, *Legislation, *River regulation, *Local governments, *Administrative agencies, Navigation, Governmental interrelations, Rivers, Legal aspects, Water law, Jurisdiction, Watersheds(Basins), River basins, Watershed management, Administration, Harbors, Water quality, Conservation, Water resources development, Water rights, Water utilization, Law enforcement, Non-structural alternatives, Water pollution control, Water policy.
Identifiers: State policy, Coastal zone management, Environmental policy, Water rights(Non-riparians).

There shall be a Five Mile River commission consisting of two electors from each of the towns of Norwalk and Darient. Upon nomination by the legislative bodies of said towns, the members shall be appointed by the Governor for four year terms. The commission shall have regulatory jurisdiction over the use of the Five Mile River and shall concern itself with the navigation, pollution, and conservation of said river and its drainage basin. Said commission shall propose for ratification by the respective legislative bodies such regulations and procedures as it deems necessary for the control of moorings and navigation. The commission shall be responsible for reporting to the appropriate agency all violations of federal, state, or local law brought to its notice which in any way affect the river. The commission shall also appoint a harbor superintendent, with such powers as the commission shall delegate. The superintendent may receive a salary, established and paid by the member town, and the commission may contract for such professional and clerical services as may be necessary to carry out its function. The town of New Canaan may, at any time, become a member of the commission with two electors appointed in the same manner as the existing members. (Deckert-Florida)
W75-06159

PUBLIC WROKS--COUNTIES--EROSION CONTROL (AS AMENDED),
Michigan Legal Service, Vol 3, Public Act No 200, H.B. 5468, p 470-476, approved July 9, 1974, effective immediately (1974).

Descriptors: *Michigan, *Legislation, *Administration agencies, *Erosion control, *Water supply, *Waste water disposal, Government finance, Adoption of practices, Legal aspects, Water requirements, Budget, Economic aspects, State governments, Waste water treatment, Lakes, Water distribution(Applied), Water supply development, Water resources development.
Identifiers: *State policy, *Environmental policy, *Administrative regulations.

In Michigan, a county board of commissioners in a resolution passed by a two thirds vote of its members may establish a department of public works. The legislation also provides for the method of appointment and tenure of members of the department. The county board will provide each year in its annual budget for the expenses of the department of public works. The department of public works has power to acquire a water supply system, a sewage disposal system, a refuse system, an erosion control system, and to make lake improvements, as well as to improve, enlarge, extend, operate, and maintain the improvements. A county operating under this legislation may acquire outside its corporate limits any part of a water supply system which is necessary to secure a source of supply. A county can also acquire parts of a sewage or refuse system. The acquisition of a water supply, sewage disposal or refuse system, or the improvement of an erosion control system may be financed by the issuance of revenue bonds. (Sperling-Florida)
W75-06160

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 4A.
W75-06161

WATERS AND WATERCOURSES--PUBLIC TRUST DOCTRINE--AN ORDINANCE PROVIDING A RESIDENCY--DIFFERENTIATED FEE SCHEDULE FOR USE OF A MUNICIPAL BEACH IS INVALID AS A VIOLATION OF THE PUBLIC TRUST DOCTRINE,
University of Cincinnati Law Review, Vol 42, No 3, p 554-563, 1973. 69 ref.

Descriptors: *Water allocation(Policy), *Recreation, *State governments, *Local governments, *Government finance, Judicial decisions, Economic aspects, Legal aspects, Ordinance, Legislation, Water resources, Social aspects, Land tenure, Public welfare, Oceans, Tidal wetlands, Riparian rights, Water law, Land management, Conservation, Water policy, *New Jersey.
Identifiers: Public trust doctrine, Coastal zone, Coastal zone management, State policy, Rights(Non-riparian).

In 1970 a New Jersey municipality enacted an ordinance requiring non-residents to pay higher beach user fees than residents. This was passed pursuant to a state statute permitting such fees. This ordinance providing for fee differentiation based upon residency was challenged by an adjacent inland municipality. Plaintiffs contended the different fee schedules were violative of the Equal Protection Clause, and that they also abrogated the common law right of public access to the ocean. The Supreme Court of New Jersey reversed the Appellate Division which found no fourteenth amendment violation. The Supreme Court, though, reversed on a different ground. It held that the fee differentiation for beach use based on residency is invalid as a violation of the public trust doctrine. Under this doctrine the state is required to administer tidelands for the benefit of the public. The public trust doctrine as viewed by the court entailed a proscription against the alienation of state-owned, tidal lands, and a dictation of the uses of this land to which the public is entitled. Recreational beach activities are within the class of protected public uses. (Sperling-Florida)
W75-06162

A 50 MILE FISHERIES ZONE FOR OREGON,
Oregon Univ., Eugene. School of Law.
J. L. Jacobson.
Ocean Law Memo, December 10, 1973, 4 p.

Descriptors: *Oregon, *Legislation, *Commercial fishing, *Regulation, *State jurisdiction, Water law, Legal aspects, International law, Jurisdiction, Law of the sea, International waters, Federal government, Constitutional law, Conservation,

Water resources development, Oceans, Fish management, Fish conservation, Governments, Law enforcement, Non-structural alternatives, Water policy, Water rights, Fishing, Marine fisheries, Governmental Interrelations.
Identifiers: Coastal waters, Territorial seas(Jurisdiction), International agreements.

The Oregon Legislature recently passed an act which would have established a 50-mile exclusive fishing zone off the Oregon coast. The act was vetoed by the governor, but had it become law it would have created a 'state' fisheries zone. The validity of such an action in light of the U.S Constitution and internal law is examined. Under current trends in international law, the federal government may be able to extend the exclusive fisheries zone beyond the current 12-mile limit. On the other hand, U.S. constitutional law, while allowing a state to regulate its own citizens beyond its territorial borders, limits a state's regulatory jurisdiction to within the 3-mile territorial limit. Considering the enforcement difficulties experienced by the federal government with its 12-mile boundary it is unlikely that a state could effectively enforce an even broader zone. Attempts by states to establish such zones do attract attention to the need for greater protection of the sea's resources. The upcoming U.N.- sponsored international conference on the Law of the Sea is expected to produce the international cooperation needed to protect the ocean's all-too-limited living resources. (Deckert-Florida)
W75-06163

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
For primary bibliographic entry see Field 5B.
W75-06164

NATIONAL GOALS AND ENVIRONMENTAL LAWS,
Library of Congress, Washington, D.C. Congressional Research Service.
R. A. Carpenter.
Technology Review, Vol 74, No 3, p 58-63, January 1972. 2 photo.

Descriptors: *Legislation, *Federal government, Environment, *Planning, *Natural resources, Water policy, Water law, Ecology, Political aspects, Water resources development, Legal aspects, Institutional constraints, Competing uses, Federal project policy, Non-structural alternatives, Project purposes conservation, Exploitation, Productivity, Environmental effects, Evaluation, Value, Analysis.
Identifiers: *Environmental Policy, National Environmental Policy Act, Refuse Act of 1899, FWPCA Amendments of 1972.

The historical goals of the United States, such as growth, wealth, and consumption, are being challenged by those of the new 'zero' school--zero population growth, zero economic growth, and zero technological change. These historical goals have never been as simplistically exploited as we now think; our laws demonstrate a continuing quest for balance and for optimum resolution between resources and needs. Examination of examples of this country's social legislation, such as the National Park Service Act of 1916 and the Environmental Policy Act of 1969, reveals a consistent desire to 'conserve' and yet 'enjoy' natural resources. This goal is one of 'productive harmony', a framework within which relative values are continually reassessed as science and technology advances. Only by developing and maintaining a social conscience which considers ecological information, can we hope to achieve the maximum productivity we seek. In a democracy, this ethic of environmental quality is the only ultimate basis for progress. (Deckert-Florida)
W75-06165

GEOTHERMAL LEASING PROGRAM, VOLUME 1, PROMULGATION OF LEASING AND OPERATING REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 4B.
W75-06166

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-06182

AN ANALYTICAL APPROACH TO REORGANIZATION OF WATER MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 6B.
W75-06193

THE ROLE OF CITIZEN ADVISORY GROUPS IN WATER RESOURCES PLANNING,
Massachusetts Univ., Amherst. Dept. of Political Science.
For primary bibliographic entry see Field 6B.
W75-06198

WATER RESOURCES DEVELOPMENT IN CENTRAL AMERICA, 1970 TO 1980,
Economic Commission for Latin America (UN), Mexico City.
For primary bibliographic entry see Field 4A.
W75-06270

OBSTACLES TO TAMING CORPORATE POLLUTERS: WATER POLLUTION POLITICS IN GARY, INDIANA,
Hampshire Coll., Amherst, Mass. Dept. of Political Science.
For primary bibliographic entry see Field 5G.
W75-06322

6F. Nonstructural Alternatives

FLOOD MANAGEMENT IN DEVELOPING COUNTRIES,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
M. M. Dandekar.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 375-383. (1973) 1 fig, 4 ref.

Descriptors: *Floods, *Watershed management, *Political aspects, Legislation, Warning systems, Flood plains, Management, River basin development, Training, Institutions.
Identifiers: *India, Developing countries.

The problem of flood management is a socio-economic as well as an engineering problem. It becomes highly complex, particularly in developing countries, due to various reasons. Special features of flood management problems in the developing countries with special reference to India were identified. It was concluded that the following initial steps are necessary as a correct approach towards satisfactory flood management programs in the developing countries: (1) establish the proper level of priority for flood management by a new methodology of evaluation of social goals and objectives; (2) adequately represent engineers and economists in the flood control policy making bodies; (3) develop crash program for the collection of all relevant data; (4) evolve a national water data policy with special stress on data retrieval; (5) facilitate quick change-over to computer methods; (6) enact legislation regarding various aspects of the water resources, particularly flood plain regulations; and (7) train local administration for flood relief operations. (See also W75-05973) (Humphreys-ISWS)
W75-06002

FLOOD WARNING THROUGH A HYDROLOGICAL-CUM-MATHEMATICAL MODEL AND VHF TELEMETRY,
Irrigation and Power Research Station, Poondi (India).
For primary bibliographic entry see Field 4A.
W75-06004

SURVEY AND ANALYSIS OF URBAN DRAINAGE ORDINANCES AND A RECOMMENDED MODEL ORDINANCE,
Georgia Inst. of Technology, Atlanta. School of Civil Engineering.
T. N. Debo.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 817, $8.75 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No. ERC-0475, February 1975. 294 p, 5 fig, 42 ref, 5 append.

Descriptors: *Drainage programs, Drainage systems, Flood control, Urban runoff, *Nonstructural alternatives, Virginia, *Urban drainage, Storm water, Storage, *Legislation, Georgia, Illinois, Sediment control, *Flood plain zoning, Model studies, Erosion control, Florida, Michigan.
Identifiers: Atlanta(Geo), Fairfax County(Va), Chicago(Ill), Ingham County(Mich), Tampa(Fla).

At a time when many communities have adopted ordinances to regulate land development and land use practices that aggravate flood and drainage problems, a sound ordinance requires information on the effectiveness of specific provisions and the problems in administering them. In compiling such information, the drainage programs were intensively studied for the Atlanta Metropolitan Area (City of Atlanta, DeKalb, Fulton, and Clayton Counties); Chicago, Illinois (Chicago Sanitary District); Fairfax County, Virginia; Ingham County, Michigan; and Tampa, Florida. The study included review of all available publications, interviews with a review of the files of the personnel involved in the local drainage program (both from within the outside the governmental structure), review of the local ordinances, and any other available documentation on the drainage program. The resulting written case studies were reviewed by several persons from each community to validate the accuracy of the material presented and used as a data base for developing a model ordinance. The model ordinance is documented by commentaries on why each provision is included and is intended to guide in the drafting of drainage ordinances for specific areas and not to be adopted verbatim without prior review of conditions. In addition, the use of technical information in drainage and erosion control ordinances was investigated, the use of hydrologic computer simulation in an urban drainage program was documented, and the problems associated with achieving community objectives through urban drainage ordinances were discussed. (James-GeoTech)
W75-06076

FLOOD PLAIN INFORMATION: FEMME OSAGE CREEK, ST. CHARLES COUNTY, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06107

FLOOD PLAIN INFORMATION: HINKSON CREEK AND TRIBUTARIES AND BEAR CREEK, COLUMBIA, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06108

FLOOD PLAIN INFORMATION: ROCK CREEK, INDEPENDENCE, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06109

FLOOD PLAIN INFORMATION: ONE HUNDRED AND TWO RIVER, ST. JOSEPH, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06110

THE CASE FOR FLOOD-PLAIN MAPPING IN AUSTRALIA,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 7C.
W75-06114

6G. Ecologic Impact Of Water Development

EFFECTS OF SEDIMENT ON WATER RESOURCE PLANNING,
Corps of Engineers, Omaha, Neb. Missouri River Div.
For primary bibliographic entry see Field 5C.
W75-06056

MANAGING WATER RESOURCE PROJECTS TO MAINTAIN ENVIRONMENTAL BENEFITS,
Bureau of Reclamation, Washington, D.C.
G. G. Stamm.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington, D.C. p 31-39.

Descriptors: *Administration, *Adoption of practices, *Operation and maintenance, *Management, *Environmental effects, *Federal project policy, Operations, Water policy, Environmental engineering, Recreation facilities, Multiple purpose projects, Reclamation, Planning, Natural resources.
Identifiers: *Environmental preservation, *Water project management.

A great deal of opportunity exists for improving water project operations for environmental preservation and enhancement through developing resources for the benefit of the people. A key element for success is the reorientation of philosophies to recognize that retaining or restoring natural appearances, or the blending of man made works with nature, is a full-fledged objective in resource development and use. Reservoirs provide management with considerable opportunity to use imagination and ingenuity for environmental enhancement. Careful attention is given to maintaining optimum water levels within permissible operating levels during spring fish-spawn periods and waterfowl nesting seasons to enhance wildlife propagation. Sediment deposits in reservoir areas which may be uncovered and barren in periods of low water have been treated with vegetation plantings established for soil stabilization, to prevent dust from blowing, and for wildlife enhancement. For water distribution system management, pumping plants may be involved in delivering water into the distribution system, or in conveying water through the system. Means used to achieve improvements in water distribution are automation of the water systems to improve efficiencies, rehabilitation of older water systems to save water, enforcement of safety regulations, consideration of aesthetics reduction of operating costs, and adoption of modernized operational philosophies to foster improved recreational use. Thoughtful management of drainage systems is an important environmental consideration in intensively cultivated areas to improve aesthetics and reduce pollution, health and safety hazards. Responsibility for management's relationships with water users is shared by the industry, the public, and all levels of government. (Poertner)
W75-06066

ENVIRONMENTAL CRITERIA FOR RECLAMATION PROJECTS,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06067

A STUDY OF NATURAL WATER SYSTEMS IN WESTERN MONTANA,
Utah Univ., Salt Lake City. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06082

NATURAL RESOURCES--CONSERVATION RESTRICTIONS.
For primary bibliographic entry see Field 6E.
W75-06145

NAMED INDIVIDUAL MEMBERS OF THE SAN ANTONIO CONSERVATION SOCIETY, ET AL. V. THE TEXAS HIGHWAY DEPARTMENT (ACTION TO ENJOIN HIGHWAY CONSTRUCTION THROUGH PROTECTED LAND).
For primary bibliographic entry see Field 6E.
W75-06150

COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. V. TRAIN (SUIT CHALLENGING ACCORD FOLLOWED BY EPA AND AEC TO CORRELATION OF THE FWPCA AND THE ATOMIC ENERGY ACT),
For primary bibliographic entry see Field 6E.
W75-06151

NATIONAL GOALS AND ENVIRONMENTAL LAWS,
Library of Congress, Washington, D.C. Congressional Research Service.
For primary bibliographic entry see Field 6E.
W75-06165

GEOTHERMAL LEASING PROGRAM, VOLUME 1, PROMULGATION OF LEASING AND OPERATING REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 4B.
W75-06166

CHIPPEWA RESERVOIR PROJECT NO 108, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 4A.
W75-06167

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
For primary bibliographic entry see Field 8A.
W75-06168

DREDGING OF LEWIS AND CLARK CONNECTING CHANNEL, CLATSOP COUNTY, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 4A.
W75-06169

OPERATION AND MAINTENANCE PROGRAM, WISTER LAKE, POTEAU RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06170

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
For primary bibliographic entry see Field 4A.
W75-06171

DEEP FORK LOG-JAM, DEEP FORK RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06172

NORFOLK HARBOR, VIRGINIA (MAINTENANCE DREDGING) (FINAL ENVIRONMENT IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-06173

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 5G.
W75-06174

BUFFALO RIVER WATERSHED PROJECT AMHERST COUNTY, VA. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06175

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 5G.
W75-06176

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
For primary bibliographic entry see Field 5G.
W75-06177

MAJOR DRAINAGE PROJECT, RIVERVIEW VICINITY OF PASCO, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-06178

WATER INTAKE AND PUMP STATION O CITY OF CHESAPEAKE, VIRGINI (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 8C.

W75-06179

BRICEVILLE FLOOD RELIEF PROJECT, TENNESSEE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W75-06180

CITY OF FLORENCE, SOUTH CAROLINA EXTENSION OF WATER AND SEWER SERVICE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Economic Development Administration, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06181

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-06182

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-06183

A LIMNOLOGICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN THE NAVASOTA RIVER, TEXAS, AND A SELECTED FLOODPLAIN,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06242

TRANSLATIONS OF PAPERS PRESENTED AT THE THIRD PANEL ON THE PEACEFUL USES OF NUCLEAR EXPLOSIONS ORGANIZED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY HELD IN VIENNA, AUSTRIA, 27-30 NOVEMBER 1972.
Technical Information Center (AEC), Oak Ridge, Tenn.
Available from National Technical Information Service, Springfield, Va. 22161 as Rept. No. UCRL-Trans-10701. Report UCRL-TRANS-10701. 1972, 240 p.

Descriptors: *Translations, *Nuclear energy, *Beneficial use, *Nuclear explosions, *Cost-benefit theory, *Channels, *Radioactivity, Cavitation, Tunnels, Underground, Air pollution, Water pollution, Soil contamination, Craters, Geophysics, Seismic waves, Dam construction, Activation energy, Economics, Design criteria.
Identifiers: *Peaceful uses of atomic energy, Austria.

English translations are presented of the French, Russian, and Spanish papers presented at the Third IAEP Panel on the Peaceful Uses of Nuclear Explsions held in Vienna, Austria, 27-30 November 1972. The numbers following the title in the Tables of Contents correspond to the numbers assigned to these papers by the IAEA in their Proceedings of the Panel. Translations of papers IAEA-PL/388-3/15, -3/16, and -3/28 were provided by the United Kingdom Atomic Energy Authority. The remainder of the translations was made by Addis Translations International of Woodside, California. (Houser-ORNL)
W75-06349

7. RESOURCES DATA

7A. Network Design

THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAMME,
Commonwealth Scientific and Industrial Organization, Canberra (Australia). Div. of Land Use Research.
P. M. Fleming.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 21-31, 1974. 23 ref.

Descriptors: Hydrology, *Basins, *Data collections, *Assessments, Sampling, Climatic zones, Arid lands, Streamflow, Climates, Precipitation(Atmospheric), Temperature, Humidity, Winds, Solar radiation, *Australia, Data processing, Specifications, Model studies.

The Australian representative basins program, its history, and the influence of the a priori conceptual model on the specifications for data collection and processing were discussed. The Australian representative basins program was initiated with two primary aims: (1) to classify and select from the whole range of hydrological diversity present in Australia, representative basins at a scale significant for water resource development; (2) to select an analysis technique adequate to deal with this diversity, and then ensure that a uniform and appropriate data collection specification was applied to all basins. (Dawes-ISWS)
W75-05953

DESIGN AND ASSEMBLY OF AN AUTOMATIC HYDROLOGIC DATA ACQUISITION SYSTEM,
Massachusetts Univ., Amherst. Water Resources Research Center.
P. N. Turbide, J. M. Colonell, and F. A. Hill.
Available from W.R.R.C., UMass at Amherst for $3.00. Also available from the National Technical Information Service, Springfield, Va 22161 as PB-240 893, $5.75 in paper copy, $2.25 in microfiche. Water Resources Research Center Publication No 44--Special Report, June 1974. 121 p, 50 fig, 29 tab, 4 ref, 2 append. OWRT B-021-MASS(1).

Descriptors: *Hydrologic data, *Design, Automation, *Data processing, Data storage and retrieval, Fabrication, Operations, Data collections.
Identifiers: *Data acquisition system.

The design, fabrication, assembly, and operation are described of an Automatic Hydrologic Data Acquisition System. This system will record the output of eight analogs and eight digital sensors at sample intervals from 30 seconds to four hours. The data are punched on paper tape which is coded in ASC11 format, and is compatible with most teletype input computer systems. A feature of this system is a battery-operated digital electronic clock which can be used as a time reference during the data sampling.
W75-06197

THE REDESIGN OF THE RAINGAUGE NETWORK OF ZAMBIA,
Hydrometeorologicky Ustav, Prague (Czechoslovakia).
M. Cislerova, and P. Hutchinson.
Hydrological Sciences Bulletin, Vol 19, No 4, p 423-434, December 1974. 8 fig, 6 ref.

Descriptors: *Rainfall, *Rain gages, *Network design, Systems analysis, Runoff, Precipitation(Atmospheric), Water resources, Statistical methods, Data processing, Annual.
Identifiers: *Zambia.

Because of an acute shortage of long term discharge records in Zambia, the design of water resource systems depends heavily on the available records from the raingage network. A critical appraisal was therefore made of this network, in which only 116 gages have records of 30 years or more. A basis for the redesign of the raingage network was also provided, which will double the number of gages from 500 to 1000 to bring the density up to the WMO recommended standard. The analysis was based on the application of the statistical characteristics of random fields, i.e., of structure, covariance, and correlation functions, through the criterion of the maximum admissible interpolation error. It was shown that a compromise set of criteria are required to provide a rational and practical design. (Jones-ISWS)
W75-06268

7B. Data Acquisition

PROBLEMS AND TECHNIQUES IN SAMPLING WATER FOR ANALYSIS,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-05931

APPARATUS FOR SAMPLING LIQUIDS,
Dow Chemical Co., Midland, Mich. (assignee)
G. R. Wessels.
U.S. Patent 3,826,144. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1160, July 30, 1974. 1 fig.

Descriptors: *Patents, Liquids, Equipment, *Water sampling.
Identifiers: Containers.

Equipment is described for collecting liquids, particularly water. Included is a platform which supports one or more open-end containers. A rigid bar is positioned upright to the platform and the lower end of the bar is fastened into the platform. A line is used to raise and lower the unit into a liquid body to collect the sample in the containers. As the liquid fills each container, the apparatus is raised to the surface and a hinged closure assembly seals the open end of each container. (Prague-FIRL)
W75-05945

THE TORLESSE STREAM VORTEX-TUBE SEDIMENT TRAP,
Lincoln Coll. (New Zealand). Tussock Grasslands and Mountain Lands Inst.
For primary bibliographic entry see Field 2J.
W75-05954

MEASUREMENTS OF SEDIMENT OXYGEN DEMAND CHARACTERISTICS OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
For primary bibliographic entry see Field 5B.
W75-05972

A METHOD TO DETERMINE THE VECTORS OF THE AVERAGE VELOCITY FIELD IN UNIFORM FLOW,
Karlsruhe Univ. (West Germany), Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 8B.
W75-05974

EXTRAPOLATION OF STAGE-DISCHARGE RELATIONS FOR FLOOD COMPUTATIONS,
Swiss Federal Inst. for Snow and Avalanche Research, Davos-Weissfluhjoch.
For primary bibliographic entry see Field 4A.
W75-05976

SHOALING MEASUREMENTS IN NAVIGABLE WATERS BY THE U.S. ARMY CORPS OF ENGINEERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Div.
For primary bibliographic entry see Field 8B.
W75-05977

PROBLEMS OF NUCLEAR GAUGING OF SUSPENDED SEDIMENT CONCENTRATION,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2J.
W75-05978

NITRIC OXIDE, WATER VAPOR, AND OZONE IN THE ATMOSPHERE AS MEASURED IN SITU FROM AN AIRCRAFT,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W75-06017

PROBLEMS IN MEASURING TURBIDITY AS A WATER QUALITY PARAMETER,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-06022

SAMPLING METHODS FOR MICROBIOLOGICAL ANALYSES,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W75-06037

INSTRUMENTS FOR INVESTIGATION OF FOGS AND CLOUDS AND MEASUREMENT OF HUMIDITY,
For primary bibliographic entry see Field 2B.
W75-06041

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME II - DATA ACQUISITION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06042

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME III - CONTROL NETWORK ESTABLISHMENT.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06043

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME IV - COMPUTER PROGRAM DESCRIPTION AND USERS' GUIDE.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06044

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME V - INFORMATION CORRELATION AND INTERPRETATION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06045

MODIFICATION OF A COMMERCIAL INSTRUMENT FOR LOW TEMPERATURE ABSORPTION,
Auburn Univ., Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-06092

IMPROVED FIELD WATER ANALYSIS TESTS,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 2K.
W75-06122

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W75-06128

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W75-06129

POLAROGRAPHIC OXYGEN SENSORS.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 2K.
W75-06136

SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH,
Nicholls State Univ., Thibodaux, La. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 2L.
W75-06211

MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHZ,
Rockwell International Corp., Downey, Calif. Space Div.
For primary bibliographic entry see Field 2K.
W75-06247

STUDY TO DEFINE POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS IN LIMESTONE AQUIFERS,
Alabama Univ., Huntsville. Center for Environmental Studies.
For primary bibliographic entry see Field 5B.
W75-06251

CORRECTION FOR THE WETTING LOSS OF A HELLMANN PRECIPITATION GAUGE,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
Hydrological Sciences Bulletin, Vol 19, No 4, p 549-559, December 1974. 4 fig, 5 tab, 30 ref.

Descriptors: *Rain gages, *Wetting, Evaporation, Precipitation gages, Measurement, Meteorology, Drying, Hydrologic aspects.
Identifiers: *Wetting losses, *Hellmann gage.

As determined by laboratory and field tests, the average wetting per event for galvanized funnels was 0.15 mm compared to 0.31-0.40 mm for painted and lacquered funnels. The scratching of the inner surface of painted or lacquered gage funnels causes an increase in wetting. After emptying the container, an average of 0.15 mm of water per event rests in the galvanized container as compared with 0.07 mm in the other containers. The total wetting losses of funnel plus container were 2.8% of rain catch for the galvanized gage and 3.8% for the painted and lacquered gages. The differences in catch between the galvanized gage and the painted and lacquered gages were smaller if the wetting losses were accounted for. In the basin of Baye de Montreux the wetting losses over a period of ten years from April to September amounted to 3.1% of the catch or to 0.35 mm per daily measurement of rain. (Jones-ISWS)
W75-06267

MINERAL SLEUTH WILL SCAN OCEAN FLOORS.
Chemical Weeks, Vol 113, No 5, p 33, August, 1973.

Descriptors: *Mineralogy, *Mining, *Oceans, *Sampling, Manganese, Copper, Nickel, Research and development, Instrumentation, Oceanography.

An underwater sled that will locate manganese, nickel and copper in undersea deposits and measure the amounts was discussed. Pulled by a steel cable from a tow slip at three to five knots, the sled glides through the water 6 to 10 feet above the ocean floor. The center-mounted television camera and the directional lamps that pivot with the camera are housed along the entire front panel of the 6 x 10 feet unit. The side-scan sonar units are mounted on the sled's dorsal fin, which stabalizes the sled. On electrical command, the sled dives to the sea floor, releases a bucket from an underside compartment to retrieve a sample and stores the material for later shipboard analysis. (Jernigan-Vanderbilt)
W75-06316

7C. Evaluation, Processing and Publication

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5B.
W75-05911

INTERNATIONAL SYMPOSIUM ON MATHEMATICAL MODELS IN HYDROLOGY, WARSAW, POLAND, JULY 26-31, 1971,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2A.
W75-05934

THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAMME,
Commonwealth Scientific and Industrial Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 7A.
W75-05953

A NONLINEAR TIME VARIANT RAINFALL-RUNOFF MODEL FOR AUGMENTING MONTHLY DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05957

RELIABILITY OF BED-LOAD SAMPLING,
Research Inst. for Water Resources Development, Budapest (Hungary). Dept. of Surface Waters.
For primary bibliographic entry see Field 2J.
W75-05979

ASSESSMENT OF 1966 PEAK DISCHARGE OF THE MEKONG AT VIENTIANE,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 2E.
W75-05987

A SYSTEMS APPROACH TO MARINE POLLUTION MONITORING,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-06024

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME II - DATA ACQUISITION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32796, $3.75 in paper copy, $2.25 in microfiche. Report No. JSC-08638, November 1973. 25 p, 5 fig, 4 tab, 9 ref.

Descriptors: *Information retrieval, *Maps, *Remote sensing, *Satellites(Artificial), Weather data, Data collections, Analytical techniques, Surface waters.
Identifiers: ERTS-1, *Multispectral scanner.

The ERTS-1 multispectral scanner (MSS) provides repetitive coverage of the same area on the earth's surface once each 18 days. In addition, many areas of the United States are covered by a multiplicity of maps varying considerably in scale, reliability, and currency. The computer-aided procedure for detection and location of surface water requires selected data from both these sources--ERTS-1 and maps. Selection of the best data from available sources is critical, because the quality of data used directly affects the accuracy and usability of output from the procedure. Volume II contains a description of the data required and a discussion of where and how these data can be obtained. (See W75-06043 thru W75-06045) (Sims-ISWS)
W75-06042

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME III - CONTROL NETWORK ESTABLISHMENT.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32797, $4.25 in paper copy, $2.25 in microfiche. Report No. JSC-08451, November 1973. 43 p, 18 fig, 9 ref, append.

Descriptors: *Maps, *Remote sensing, *Analytical techniques, Locating, Satellites(Artificial), Surface waters, Data processing, Data collections.
Identifiers: ERTS-1, Multispectral scanner.

The ERTS-1 satellite circles the earth every 103 minutes in a near-polar, sun-synchronous orbit. During each south-bound (daylight) pass, the multispectral scanner (MSS) onboard can produce a digital image of the earth's surface radiance in a continuous swath 185 kilometers (100 nautical miles) wide. The MSS digital data are recorded in a dynamic, scanner-oriented, coordinate system. To allow mapping and direct correlation with information from other sources, MSS data must be transformed into a static, earth-oriented coordinate system. The approximate coefficients for such a transformation may be derived from system measurements of spacecraft orbit and attitude and of scanner geometry. Exact transformation coefficients must be computed from a network of control points for which both scanner and earth-oriented coordinates are known. Volume III contains a description of the steps related to the establishment, measurement, and validation of a control network for use in transforming ERTS-1 data into an earth-oriented reference system. (See also W75-06042) (Sims-ISWS)
W75-06043

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME IV - COMPUTER PROGRAM DESCRIPTION AND USERS' GUIDE.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32798, $7.50 in paper copy, $2.25 in microfiche. Report No. JSC-08452, November 1973. 230 p, 6 fig, 11 ref, 6 append.

Descriptors: *Computer programs, *Remote sensing, *Mapping, Maps, Data processing, Surface waters, Analytical techniques, Satellites(Artificial).
Identifiers: ERTS-1, Multispectral scanner.

The detection and mapping (DAM) computer package was designed to detect and map surface water by using ERTS-1 multispectral scanner data from system-corrected computer compatible tapes. Volume IV contains a detailed description of the computer programs related to the procedure, along with an in-depth discussion of the computer input deck setup associated with each program. Appendixes contain program listings of the main program, subroutines, and test data. (See also W75-06042) (Sims-ISWS)
W75-06044

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME V - INFORMATION CORRELATION AND INTERPRETATION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32799, $3.75 in paper copy, $2.25 in microfiche. Report No. JSC-08639, November 1973. 34 p, 17 fig, 8 ref.

Descriptors: *Mapping, *Surface waters, *Remote sensing, *Analytical techniques, Satellites(Artificial), Maps, Information exchange, Computers.
Identifiers: ERTS-1, Multispectral scanner.

Information correlation and interpretation is the final phase of the computer-aided procedure for detection and location of surface water. This phase consists of the use of the computer-generated output to produce an inventory of surface water. Volume V contains a detailed discussion of the steps involved with the manual processing of the output from the computer programs, a description of the methodology required for correlation of this information to base maps, and a discussion related to the interpretation of the correlated information as it pertains to the national program of inspection of dams. (See also W75-06042) (Sims-ISWS)
W75-06045

FINITE ELEMENT SOLUTIONS FOR THE EQUATIONS OF GROUNDWATER FLOW,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2F.
W75-06083

FLOOD PLAIN INFORMATION: FEMME OSAGE CREEK, ST. CHARLES COUNTY, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06107

FLOOD PLAIN INFORMATION: HINKSON CREEK AND TRIBUTARIES AND BEAR CREEK, COLUMBIA, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06108

FLOOD PLAIN INFORMATION: ROCK CREEK, INDEPENDENCE, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06109

FLOOD PLAIN INFORMATION: ONE HUNDRED AND TWO RIVER, ST. JOSEPH, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06110

THE CASE FOR FLOOD-PLAIN MAPPING IN AUSTRALIA,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. H. Pilgrim, and A. J. Askew.
Water Research Foundation of Australia Report No 43, October 1974. 36 p, 2 fig, 32 ref.

Descriptors: *Flood plains, *Mapping, *Australia, *Flood data, Flood damage, Flood protection, Flood frequency, Project planning, Regional development, Legislation.

The floods of 1973-4 in Australia have emphasized the existence of many valuable areas of the country which are subject to flooding of various frequencies and severities. Measures designed to deal with this risk require large amounts of data, and flood-plain mapping is one of the most effective ways of assembling and processing such data. The system employed in the United States provides a model for a national program for which Australia has the data and expertise. Development of such a program would require complementary State and Federal legislation, and should be accompanied by an active publicity campaign to ensure that potential flooding is always taken account of in planning land development. (CSIRO-Aust)
W75-06114

DETERMINATIONS OF AN OPTIMAL IUH FOR LINEAR, TIME INVARIANT SYSTEMS FROM MULTI-STORM RECORDS,
Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06127

WSP2-WATER SURFACE PROFILE PROGRAM, USER'S GUIDE,
Soil Conservation Service, Washington, D.C.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-233 774, $3.75 in paper copy, $2.25 in microfiche. USDA/DF-73-021a, November 1973. 35 p, 1 fig.

Descriptors: *Flood profiles, *Flow profiles, *Computer programs, Flow, Bridges, Floods, Open channels, Flow rates, Profiles, Data processing, Flood flow, Channel flow.

The computer program WSP2 aids in the determination of flood characteristics for a given set of physical conditions. It can compute water surface profiles in open channels. This job requires a large amount of physical data, such as valley shape, roughness, restrictions, etc., to be described. The program consists of a main program and 61 sub-

programs. With one exception, it was written in Fortran IV programming language and developed on an IBM 360/65 computer. Some agencies have adopted it to other computers. The program requires about 220 kilobytes of core storage. It also requires three temporary data files. Specific information about the data files is on comment cards at the beginning of the program listing. (Dawes-ISWS)
W75-06186

DESIGN AND ASSEMBLY OF AN AUTOMATIC HYDROLOGIC DATA ACQUISITION SYSTEM,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 7A.
W75-06197

PREDREDGING ANALYSIS OF LAKE LANSING, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 2H.
W75-06199

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
Bulletin 130-73, September 1974. 243 p, 5 append.

Descriptors: *Hydrologic data, *Water resources, On-site data collections, On-site investigations, Surveys, Sampling, Documentation, Climatic data, Hydrologic aspects, *California, Climatology, Surface waters, Groundwater, Measurement, Water quality.
Identifiers: San Joaquin Valley(Calif).

Tables showed data on climate, surface water flow, groundwater levels, and surface and groundwater quality in the San Joaquin Valley for the 1972-1973 water year. Figures showed location of climatological, surface water, and surface water quality measurement stations; fluctuation of water levels in selected wells and areas; and electrical conductance at selected stations. Plates showed the piezometric surface for spring 1973, well locations, and geological maps and cross sections. (Jess-ISWS)
W75-06208

COMPARISON OF OBSERVED ESTUARINE TIDE DATA WITH HYDRAULIC MODEL DATA BY USE OF CROSS-SPECTRAL DENSITY FUNCTIONS,
New York City-Rand Inst., N.Y.
For primary bibliographic entry see Field 2L.
W75-06209

VAPORIZATION RESPONSE OF EVAPORATING DROPS WITH FINITE THERMAL CONDUCTIVITY,
Propulsion Sciences, Inc., Melville, N.Y.
For primary bibliographic entry see Field 2D.
W75-06215

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W75-06218

TR-20 PROJECT FORMULATION--HYDROLOGY, COMPUTER PROGRAM USER'S MANUAL,
Soil Conservation Service, Washington, D.C. Engineering Div.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 778, $6.25 in paper copy, $2.25 in microfiche. Technical Release No. 20, (USDA/DF-73-020a), May 1965. 171 p, 4 fig.

Descriptors: *Computer programs, *Hydrology, *Flooding. Drainage, Storms, Hydrographs, Flood routing, Runoff, Rainfall.

The computer program in Fortran II for IBM 7090/7094 equipment was developed for hydrologic processes in project formulation. The program computes surface runoff resulting from any synthetic or natural rainstorm. It will take into account conditions having a bearing on runoff and will route the flow through stream channels and reservoirs. It will combine the routed hydrograph with those from other tributaries and print out the peak discharges, their time of occurrence and the water surface elevation for each at any desired cross section or structure. In addition, it will print out the coordinates of the routed hydrograph together with the corresponding elevation of each if requested. The program provides for the continuous analyses of nine different storms over a watershed under present conditions, and with various combinations of land treatment floodwater-retarding structures and channel improvement. It will perform these routings through as many as 120 reaches and 60 structures in any one continuous run. Input and output data for a run of a sample watershed were included as exhibits. The computer program is available on magnetic tape. (Sims-ISWS)
W75-06219

ECON2, PROJECT FORMULATION--ECONOMICS--COMPUTER PROGRAM USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 780, $3.25 in paper copy, $2.25 in microfiche. Report No. USDA/DF-73-019a, 1973. 22 p.

Descriptors: *Computer programs, *Flood damage, *Flooding, Economics, Floodwater.

The ECON2 Floodwater Damage Program will compute the average annual damages to crops, pastures, other agriculture, roads and bridges, urban areas, etc., where floodwater damages can be related to flood depths or elevations. This is an adaptation of the latest version of the Central Technical Unit's Economics Program (ECON-2, dated 3-14-68) and is limited to (1) the frequency evaluation method, (2) damages related to depth of flooding, and (3) a maximum of 10 flood events. The number of reaches may vary from 1 to 100 and a maximum of 120 cross sections per run. The computer program is available on magnetic tape. (Sims-ISWS)
W75-06220

DAMS2, PROJECT FORMULATION--STRUCTURE SITE ANALYSIS, USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 776, $4.25 in paper copy, $2.25 in microfiche. Technical Release No. 48, (USDA/DF-73-022a), February 1971. 59 p, 6 fig.

Descriptors: *Computer programs, *Hydrology, *Dams, *Damsites, Hydraulics, Analysis, Water storage, Hydrographs, Structures, Spillways, Flood routing.

DAMS2 is a revision of a Fortran IV computer program (DAMS, issued November 1967) that facilitates the hydraulic and hydrologic analyses of floodwater retarding structure sites. The program uses the sites' storage-discharge capacities to floodroute inflow hydrographs through a potential reservoir. Storage and discharge capacity may be computed by the program or loaded as input data. Inflow hydrographs may be actual or developed from any storm rainfall distribution. The program will compute embankment quantities if desired. The input data for a job is printed out as it is loaded and edited for such things as invalid characters in the data fields, missing data required for a run, and unreasonably large or small data values where possible. A liberal amount of user options and program control are provided for greater application flexibility. Sample input and output data were included. The computer program is available on magnetic tape. (Sims-ISWS)
W75-06221

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
For primary bibliographic entry see Field 4B.
W75-06236

DETERMINATION OF SNOW WATER EQUIVALENT AND SNOWMELT WATER BY THICKNESS OF SNOW COVER DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2C.
W75-06272

A COMPACT WATERSHED MODEL SYSTEM,
Aston Univ., Birmingham (England).
For primary bibliographic entry see Field 2A.
W75-06286

CORRELATION ANALYSIS OF THE CELLULAR STRUCTURE OF STORMS OBSERVED BY RAINGAUGES,
Lancaster Univ., Bailrigg (England). Dept. of Environment Sciences.
For primary bibliographic entry see Field 2B.
W75-06293

8. ENGINEERING WORKS

8A. Structures

METHODS AND MACHINES.
For primary bibliographic entry see Field 5E.
W75-05942

HIGHLIGHTS OF FLOOD PROTECTION WORKS DONE ON RIVER NARMADA AT HOSHANGABAD IN MADHYA PRADESH STATE - INDIA,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 4D.
W75-05998

DEVELOPMENT OF A FLOOD CONTROL AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA: SUMMARY OF TECHNICAL REPORTS.
Cook County Flood Control Coordinating Committee, Chicago, Ill.
Metropolitan Sanitary District of Greater Chicago, August 1972. 111 p, 27 fig.

Descriptors: *Water pollution control, *Flood control, *Combined sewers, *Storage, *Urban runoff, *Underground storage, Storm drains, Retention, Tunnel construction, Conveyance structures, Drainage engineering, Alternate planning, Planning, Project planning, Underflow, Surface runoff, Illinois, Hydraulic structures.

Identifiers: *Chicago(Illinois).

After evaluating many alternative plans for alleviation of water pollution and flooding problems in Metropolitan Chicago, the Flood Control Coordinating Committee recommended for implementation the Chicago Underflow Plan. Under this plan, underground facilities would be constructed for temporary storage of surface runoff from rainstorms equivalent to the most severe in recorded history. The plan calls for 120 miles of conveyance tunnels (ranging from 10 feet to 42 feet in diameter) intercepting 640 sewer overflow points in the 375 square mile area served by combined sewers. Most of the conveyance tunnels will be constructed in Silurian Dolomite rock formations 150 to 290 feet below the surface of the waterways. Smaller conveyance tunnels will be constructed in the clay overburden. Excavation for the primary reservoir is to be performed by the quarry method. It will be 330 feet deep, 500 to 1200 feet wide and about 2.5 miles long and divided into three basins having a storage capacity of 57,000 acre-feet. Combined sewer overflow water will remain in storage for up to 50 days for the largest storm periods of record. Most of the storms will be dewatered in from 2 to 10 days. Floating aerators will keep the water in a fresh odorless condition. An underground pumping station will first dewater the tunnel system into the reservoir and then the reservoir to the West-Southwest Treatment Plant, in the post storm period. To remove the sludge, a floating hydraulic dredge will be employed. Sludge pumps in the underground pumping station will discharge to the treatment plant. The total project cost was estimated at $1.22 billion. (Poertner)
W75-06047

CITY OF TORONTO WATER DISTRIBUTION SYSTEM, PROGRESS REPORT NO. 1,
Toronto Dept. of Public Works (Ontario).
R. M. Brenner.
August 1974. 22 p, 10 fig, 11 tab.

Descriptors: *Water distribution(Applied), *Water conveyance, *Water supply development, *Municipal water, *Canada, Urbanization, Planning, Materials engineering, Water supply, Pipelines, Hydraulic conduits, Piping systems.
Identifiers: *Toronto(Ontario), Water meters.

Accomplishments in planning and implementing improvements to the city of Toronto municipal water distribution system are reported for the 5-year period 1968-1972, inclusive. A computer analysis was made of the water system. Apparently, Toronto was the first municipality to analyze an entire water distribution system of this size by computer. Up to the end of 1972, approximately $3,900,000.000 of watermain improvements have been implemented. A total of 9.9 miles of new watermains have been installed and 28.5 miles of existing mains have been cleaned and lined. This program has enabled the City's water system to maintain adequate pressure for both domestic consumption and fire fighting. The computer analysis permitted a microscopic examination of the ability of every part of the water system to supply adequate quantities of water for both domestic service and fire protection. Examination confirmed that the system is basically sound and sufficiently resilient to keep abreast of the City's changing needs. It is recommended that the City Council approve: (a) programmed improvements during 1975 to 1977, inclusive; (b) making reviews of the water system at 5-year intervals; (c) the recommended design and maintenance policy; (d) not extending the high pressure fire fighting system; (e) replacing of obsolete water meters; and (f) other specific measures. (Poertner)
W75-06057

ENVIRONMENTAL CRITERIA FOR RECLAMATION PROJECTS,
Bureau of Reclamation, Washington, D.C.
E. A. Seaman.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington D.C. p 41-46, 5 ref, 1 append.

Descriptors: *Attitudes, *Environmental effects, *Design criteria, *Federal project policy, *Personnel management, *Administration, Water policy, Natural resources, Environmental engineering, Ecology, Psychological aspects, Public benefits, Project purposes, Leadership, Employee relations, Project planning, Social aspects, Education, Training, Water resources development, Motivation, Decision making, Federal government.
Identifiers: *National Environmental Policy Act, Environmental impact statements, Public hearings.

Before enactment of the National Environmental Policy Act of 1969 (NEPA), the Bureau of Reclamation was aware of certain needs for considering the natural environment in water resource development and the management of these resources. Great progress was made by the Bureau by employing a wide variety of professionals to study natural resources. When it came time to implement NEPA, a sound foundation had been prepared for advancing intense treatment in all phases of environmental problems. In the area of implementation, comparisons of environmental impact statements prepared by the Bureau in 1970-71 with those prepared in 1972-73 clearly shows that the extra effort put forth by the Bureau resulted in a quality product. The Bureau has also pioneered in the field of environmental evaluation system analysis. It has staffed an Environmental Specialist in each of its regional offices as well as two key men at the Engineering and Research Center, Denver, to head up the environmental program. A solid example of the Bureau's strength, is its 'handle' on environmental policy which established the new requirement for mandatory public hearings on future environmental statements. As a result of developing new attitudes, the Bureau has made significant adjustments in its funding, staffing, and planning to carry out the environmental program. Management has made significant efforts to acquaint the Bureau's staff with environmental considerations and the development of positive attitudes toward environmental problems. (Poertner)
W75-06067

CONSTRUCTION OF RECLAMATION PROJECTS TO ENHANCE ENVIRONMENT,
Bureau of Reclamation, Washington, D.C.
W. H. Keating.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington, D.C. p 15-29, 7 fig.

Descriptors: *Environmental effects, *Water resources development, *Federal project policy, *Damsites, *Planning, Alternate planning, Project planning, Evaluation, Environmental engineering, Natural resources, Conservation, Water policy, Aesthetics, Land reclamation, Dam construction, Preservation, Fish conservation.
Identifiers: *National Environmental Policy Act.

National policy requires that federal agencies act to include in their construction projects measures to enhance and preserve the natural environment such as prevention and control of air pollutants, landscape preservation, and avoidance of destroying historic sites and recreation areas. New specification provisions dealing with reservoir and right-of-way clearing have also been effective in reducing physical and visual impact of construction activities. Designers of structures must not only provide for operating function, but for aesthetics, accommodations, fish and wildlife management, and preservation of the natural environment and water quality. Providing for fish and wildlife in any water development project is essential. Fish propagation is assured and enhanced by maintaining suitable water quality whenever possible and by providing facilities for migrating fish species. Concern over environmental protection and enhancement is a primary factor in environmental reclamation. Consideration for pleasant surroundings, and for perpetuation of ecosystems has risen sharply on the scale of values by which we evaluate human existence. The Bureau of Reclamation has acted positively to include greater consideration of these factors in all design and construction of its projects. Many aspects of design and construction are aimed at providing water resource projects which are satisfactory in both function and environmental acceptability. Examples are given of several Bureau of Reclamation projects that incorporate environmental features. (Poertner)
W75-06069

CHIPPEWA RESERVOIR PROJECT NO 108, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 4A.
W75-06167

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
Available from the National Technical Information Service, Dept. of Commerce, Springfield, Virginia, 22161, as EIS-NJ-73-0534-F, $4.75 in paper copy, $2.25 in microfiche. March 1973. 78 p, 3 map.

Descriptors: *Environmental effects, *Lateral conveyance structures, *Drainage effects, *New Jersey, Federal government, Discharge(Water), Piping systems(Mechanical), Water management(Applied), Drainage systems, Storm drainage, Urban drainage, Governments, Sewers, Flood control, Drainage water, Water control, Subsurface drainage, Surface waters, Drainage engineering, Surface runoff, Subsurface drains, Highway effects, Adoption of practices.
Identifiers: *Environmental Impact Statements, *Paterson(NJ), Non-point sources(Pollution).

This proposal calls for construction of a sixty-six inch drainage trunk line to serve State Route 20 and Interstate 80 in Paterson, New Jersey. The line will discharge into the Passaic River, eliminating the existing temporary connection which flows into the combined sanitary and storm water sewer system of the City of Paterson. By eliminating this connection, the volume of waste water which must be treated by the Paterson sewage treatment facilities will be reduced. Also, it will reduce overloading of the treatment system by heavy rains and the resulting dumping of untreated waste into the Passaic River. Discharge from the drainage line should not adversely affect the river's biota, and no increase in flood potential of the river is expected. The line will pass through Great Falls Park without any adverse effects. Construction of retention basins and alternative locations for the line were considered unfeasible alternatives. The line will be underground and will not affect the future utilization of any land. There is no significant opposition to this project. (Deckert-Florida)
W75-06168

NORFOLK HARBOR, VIRGINIA (MAINTENANCE DREDGING) (FINAL ENVIRONMENT IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.

W75-06173

BUFFALO RIVER WATERSHED PROJECT, AMHERST COUNTY, VA. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-VA-74-0017-F, $5.75 in paper copy, $2.25 in microfiche. January 2, 1974. 144 p, 18 tab, 3 map.

Descriptors: *Environmental effects, *Virginia, *Watershed management, *Land management, *Federal government, Water management(Applied), Administrative agencies, Governmental interrelations, Watersheds(Basins), Flood control, Flood protection, Water storage, Multiple-purpose structures, Recreation, Watershed Protect and Flood Prevention Act, Water supply development, Erosion control, River basin development, Habitat improvement, Soil management, Soil conservation, Dams, Dam construction, Engineering structures.
Identifiers: *Environmental Impact Statement, *Amherst County(Va).

This project proposes conservation land treatment measures, two single-purpose flood-water retarding structures, and two multiple-purpose structures for storage of flood-water, sediment, and municipal water supply. The project will provide watershed protection and flood prevention for approximately 60,500 acres of predominantly agricultural land and will provide municipal and industrial water supply for Amherst County, Virginia. Floodwater and sediment damages in the watershed will be reduced about 88% and more effective use of 750 acres of flood plain land will be provided. Fish and wildlife habitat improvement will provide additional recreational opportunities. 454 acreas of rural land will be converted to dams, spillways, and reservoirs, 5 miles of potential stream fishery will be inundated, and agricultural use of 290 acres will be intermittently interrupted by floodwaters. A number of different flood prevention and land treatment measures and various combinations thereof were considered as alternatives. This project will not significantly restrict future land use or limit productivity. There appears to be no significant opposition to this project. (Deckert-Florida)
W75-06175

MAJOR DRAINAGE PROJECT, RIVERVIEW, VICINITY OF PASCO, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-06178

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT, PROBLEMS RELATING TO CHANGES IN HYDRAULIC CAPACITY OF THE MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. River Stabilization Branch.
For primary bibliographic entry see Field 8B.
W75-06212

DAMS2, PROJECT FORMULATION--STRUCTURE SITE ANALYSIS, USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06221

POLYMER-IMPREGNATED CONCRETE TUNNEL SUPPORT AND LINING,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8F.
W75-06234

ICE ENGINEERING - QUANTIFICATION OF SUBSURFACE ICE THICKENING TECHNIQUES,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 2C.
W75-06254

FLOATING ICE SHEETS,
Foundation of Canada Engineering Corp. Ltd., Calgary (Alberta). Arctic Div.
For primary bibliographic entry see Field 8G.
W75-06280

8B. Hydraulics

METHODOLOGY FOR IN-STREAM REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Civil Engineering.
T. L. Kelly.
M.S. Thesis, April 1974. 88 p, 36 fig, 3 tab, 35 ref, 3 append. OWRR A-032-IDA(1).

Descriptors: *Sediment transport, *Silting, Degradation(Stream), *Sediment control, Aquatic invertebrates, *Idaho, Streams, Methodology, *Desilting, Hydraulic conductivity, Standpipes, *Drops(Structures).
Identifiers: *Emerald Creek(Ida).

The purpose was to develop methodology for rehabilitating streams where the fishery and other recreational uses have been destroyed or greatly reduced by heavy silting. Using Emerald Creek in northern Idaho as a study stream, two types of in-stream modification structures, flow constrictors and drop structures, were designed, constructred and evaluated. Contour maps and thalweg profiles of the before and after modification conditions are presented for each of the five stream modification sites. Three drop structures were constructed at two sites on the upper reach of Emerald Creek, concentrating the energy of the flow and scouring a hole downstream of the structure. The flow constricting structures were designed to reduce the width and increase the depth of flow during low flow periods to increase the sediment transport capacity of the stream, thus flushing the silts and fine sands from the modified reach leaving cobble and small boulders. Gabion deflectors were used at two sites on the lower reach of Emerald Creek to constrict the flow. A method for measuring the streambed hydraulic conductivity using standpipes is suggested as a means for determining the change in bed characteristics resulting from a deposition of silt. Calibration curves for the standpipes were developed in the laboratory for future testing in the field.
W75-05851

SWELL DAMPER,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France).
J. E. Lamy.
U.S. Patent No. 3,846,988, 4 p, 12 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 491, November 12, 1974.

Descriptors: *Patents, *Shore protection, *Caissons, *Energy dissipation, Equipment, Engineering structures, *Waves(Water).
Identifiers: *Wave energy damping, Swell damping, Wave action.

A device is disclosed for providing protection against swells. A curtain is formed between a volume of water in which the swell develops and a structure or a zone requiring protection. The curtain has its base immersed in the volume of water concerned and its top is located above the crest of the highest waves occurring in the volume of water. The curtain offers, for the passage of water, ducts which have a profile flared towards the structure or zone being protected and with a sufficiently steep gradient in order for the water to break away from the walls of the ducts and produce eddies which dissipate the water energy. (Sinha-OEIS)
W75-05896

INSULATED EMBANKMENT DESIGN TECHNIQUES,
Atlantic Richfield Co., New York. (assignee)
G. R. Burt, A. C. Condo, and G. R. Knight.
U.S. Patent No. 3,846,989, 12 p, 17 fig, 3 tab, 10 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 491, November 12, 1974.

Descriptors: *Patents, *Cold regions, *Water storage, *Reservoir design, *Embankments, *Engineering structures, *Permafrost, Thermal insulation.
Identifiers: *Liquid storage.

A method is described which permits the long term continuous use of a heat emitting liquid storage system. It is comprised of a plurity of liquid storage reservoirs supported upon frozen terrain in polar regions without excessively melting and thereby destroying the support for the reservoirs. The reservoirs are thermally insulated from the frozen terrain by a thermal barrier comprised of a layer of gravel and a layer of synthetic thermal insulation. The method uses each reservoir on a given cycle comprised of an in service period and a refreeze period. The cycles are such that when one of the reservoirs is on the in service period another is on the refreeze period and the system as a whole provides continuous service. (Sinha-OEIS)
W75-05897

FLOATING WAVE BARRIER,
For primary bibliographic entry see Field 2J.
W75-05898

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5B.
W75-05911

VARIATION OF MAINSTREAM LENGTH WITH BASIN AREA IN RIVER NETWORKS,
California Univ., Los Angeles. Dept. of Geology; and California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 2E.
W75-05960

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
For primary bibliographic entry see Field 4A.
W75-05973

A METHOD TO DETERMINE THE VECTORS OF THE AVERAGE VELOCITY FIELD IN UNIFORM FLOW,
Karlsruhe Univ. (West Germany), Theodor-Rehbock Lab. for River Improvement.
W. Siebert, and R. Muser.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 1-12.(1973) 6 fig, 2 tab, 6 ref.

Descriptors: *Flow measurement, *Instrumentation, *Laboratory tests, *Methodology, Anemometers, Velocity, Uniform

flow, Evaluation, Heat transfer, Average, Equations, Theoretical analysis, Current meters, Water, Flow characteristics, Hydraulics, Measurement.
Identifiers: Hot-film anemometry, Velocity vector.

In order to determine the direction and magnitude of the average velocity vectors in stationary water flow by means of hot-film anemometry, anemometer voltages in various positions of the hot-film were measured for each vector. By varying the magnitude and direction variables, the mathematical magnitude and direction functions corresponding to the least square error were obtained for the measurements. It was shown that by using certain types of probes, it was possible to determine three-dimensional velocity vectors by rotating the hot film about only one axis. Experiments showed that the total functions may be expressed as the product of a direction function and a magnitude function. An accuracy of plus or minus 0.7 degree for the direction and plus or minus 2% for the velocity was achieved. (See also W75-05973) (Humphreys-ISWS)
W75-05974

SHOALING MEASUREMENTS IN NAVIGABLE WATERS BY THE U.S. ARMY CORPS OF ENGINEERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Div.
E. D. Hart.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 73-84 (1973) 7 fig, 1 tab.

Descriptors: *On-site investigations, *Navigable waters, *Surveys, *Shoals, Instrumentation, Equipment, Measurement, Channels, Depths, Profiles, Mapping, Sites, Sonar, Fathometers, Electronic equipment, Hydrography, Sounding.

A group was established within the U.S. Army Corps of Engineers to coordinate with the Corps Districts in the development and procurement of modern, efficient hydrographic surveying systems. Objectives and accomplishments of the group to date were discussed. Considerations of automation including tangible and intangible costs were reviewed. System components of the automated hydrographic survey system were described. Features and advantages and disadvantages of each type component were discussed. A recent hydrographic survey conference involving all Corps Districts was summarized. Approximately 50% of the Corps Districts are presently utilizing electronic positioning equipment in their hydrographic surveys. Six Districts have or soon will have fully automated systems. The ultimate objective of hydrographic surveying is to provide an accurate plot of the channel depth. (See also W75-05973) (Humphreys-ISWS)
W75-05977

EFFECT OF DAMS ON FLOOD FREQUENCY,
Papua and New Guinea Inst. of Tech., Lae (New Guinea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05982

MECHANISM OF BED LOAD TRANSPORT IN CHANNEL FLOWS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06010

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06013

MODELLING OF ERODIBLE CHANNELS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06014

CRITERIA FOR USE OF RIPPLE TANKS: REFRACTION SCALE EFFECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
R. W. Whalin, and H. L. Butler.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 270, $3.75 in paper copy, $2.25 in microfiche. Research Report H-74-1, September 1974. 35 p, 16 fig, 2 tab, 6 ref. Project 4A061101A91D.

Descriptors: *Waves(Water), *Hydraulic models, *Theoretical analysis, *Refraction(Water waves), Surface tension, Gravity waves, Topography.
Identifiers: *Ripple tanks, *Scale effects, Ultragravity waves, Capillary waves.

A thorough investigation of scale effects arising from refraction over a variable topography was conducted with the resultant conclusion that sufficient scale effects would be present in a ripple tank to preclude any quantitative investigation of refraction effects. Even qualitative studies can be misleading because of errors in the direction of wave propagation arising from refraction scale effects. A brief discussion of possible ripple tank scales for quantitative studies led to the conclusion that although the topography might be molded to a sufficient accuracy, it would be costly and time-consuming. The measurement of ripple tank wave heights of sufficient accuracy to be useful for design purposes would be extremely difficult, if not impossible. Consequently, it is not feasible to attempt to include topographic effects in a ripple tank. Ripple tanks should only be used for their original intended purpose, namely the qualitative study of diffraction patterns around barriers surrounded by a constant water depth. (Sims-ISWS)
W75-06019

COMPUTER SIMULATION OF SEDIMENT DEPOSIT IN AN ALLUVIAL CHANNEL,
South Dakota State Univ., Brookings.
F. F. M. Chang, D. L. Richards, and Y. H. Tsai.
Preprint No. 1538, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 18 p, 4 fig, 2 append, 15 ref.

Descriptors: *Alluvial channels, *Sedimentation, *Sediment distribution, *Computer simulation, *Analog models, *Model studies, Deposition(Sediments), Sedimentation rates, Distribution patterns, River beds.

Deposition and scouring of sediment in estuaries are complicated phenomena because the sediment movements are associated with transient flow. Much work has been done in recent years to understand the phenomena by theoretical research. The specific objective of this study is to develop a computer solution to show the change in riverbed elevation at transient phases. Three basic equations describing the unsteady flow in alluvial channels can be derived from the equation of motion of sediment laden water, the equation of continuity for sediment, and the equation of continuity for water. In deriving the basic differential equations, the following assumptions are made: the sediment-laden water is substantially homogeneous, the velocity is uniform over the cross section, hydrostatic pressure prevails at any point in the channel, the channel is a wide rectangle in cross-section, and it is assumed to be sufficiently straight in the reach. The riverbed change in its transient stage can be mathematically simulated by solving three basic partial differential equations dealing with continuity of mass (sediment and water) and momentum. The exact solution is not possible but numerical method may be used for obtaining approximate solution. (Poertner)
W75-06051

STUDY OF STRATIFIED OVERFLOWS AND UNDERFLOWS,
Illinois Univ., Urbana. Water Resources Center.
For primary bibliographic entry see Field 5B.
W75-06081

STABILITY OF SINGLE-PEAKED WAVES,
Montreal Engineering Co. Ltd. (Quebec).
For primary bibliographic entry see Field 2E.
W75-06118

A GENERAL THEORY FOR FLOW IN ROUGH CONDUITS,
Washington State Univ., Pullman. Dept. of Civil Engineering.
J. A. Roberson, M. Bajwa, and S. J. Wright.
Journal of Hydraulic Research, Vol 12, No 2, p 223-240, 1974. 3 fig, 1 tab, 11 ref. NSF Grant GK-23317.

Descriptors: *Conduits, *Flow resistance, *Roughness(Hydraulic), *Open channel flow, Natural streams, Turbulent flow, Laminar flow, Viscious flow, Drag, Laboratory tests, Analytical techniques.
Identifiers: Natural roughness, Artificial roughness, *Rough pipes, *Rough channels, Smooth boundaries.

Basic laws of fluid flow such as the drag characteristics of blunt bodies, the viscous resistance of the smooth boundary, and the velocity distribution in a conduit were considered in analytical solutions for flow in rough conduits. The theory was extended for flow with nonuniform roughnesses and also for a natural type of roughness with random spacing. The results of solutions for the natural type of roughness indicated that the relative resistance of the larger roughness elements was much greater than their relative concentrations. The method presented can be utilized for predicting the resistance of natural stream beds if the roughness distribution is known and if the coefficient of drag of the roughness elements can be measured or approximated. (Bhowmik-ISWS)
W75-06120

ON FORCED OSCILLATIONS IN A ROTATING STRATIFIED FLUID,
East Carolina Univ., Greenville, N.C. Dept. of Mathematics.
L. Debnath.
Tellus, Vol 16, No 6, p 652-662, 1974. 8 fig, 13 ref.

Descriptors: *Rotational flow, *Unsteady flow, *Resonance, *Viscosity, *Stratified flow, Mathematical studies, Frequency, Analytical techniques, Model studies, Hydraulics.
Identifiers: Laplace transforms, Hankel transforms, *Oscillations, Disturbance pressure, Periodic solution, Force frequency.

The axisymmetric forced oscillations of an inviscid rotating stratified fluid confined in a finite circular cylinder were studied. An unsteady flow was generated in the fluid by harmonic oscillations of the plane ends of the cylinder. The salient features of the flow phenomena were determined by the relative magnitudes of the angular velocity of

rotation, the forcing frequency of the imposed oscillations, and the Brunt Vaisala frequency. The solution for the disturbance pressure consists of the periodic solution and the normal inertial modes. Both of these solutions are independently modified by the density stratification. The solution has a resonant behavior when the forcing frequency equals one of the resonant frequencies. A qualitative assessment of the possible effects of viscosity on the flow was made. Several interesting features of the rotating stratified flow phenomena were analyzed. The initial value problem was solved by using the joint Laplace and Hankel transformations of the second kind. (Singh-ISWS)
W75-06124

SUBMARINE UPWELLING DUE TO A STEADY THERMAL FRONT IN A VISCID FLUID,
Department of the Environment, Ottawa (Ontario). Marine Sciences Directorate.
For primary bibliographic entry see Field 2L.
W75-06131

THE MATHEMATICAL MODELLING OF RIVERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-06132

THE INFLUENCE OF SURFACE WAVES ON WATER CIRCULATION IN A MID-ATLANTIC CONTINENTAL-SHELF REGION,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 2L.
W75-06137

ANALYSIS OF UNSTEADY FLOW TOWARD AN ARTESIAN WELL BY THREE-DIMENSIONAL FINITE ELEMENTS,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06140

THE TRANSVERSE DISTRIBUTION OF VELOCITY IN ESTUARY FLOW,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-06206

A METHOD OF IMPROVING THE UNIFORMITY OF THE STREAM IN AN OPEN WATER-CHANNEL,
Cambridge Univ. (England). Engineering Lab.
For primary bibliographic entry see Field 2E.
W75-06207

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT, PROBLEMS RELATING TO CHANGES IN HYDRAULIC CAPACITY OF THE MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. River Stabilization Branch.
E. B. Madden.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 532, $3.75 in paper copy, $2.25 in microfiche. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report 12, August 1974. 22 p, 7 fig, 10 ref.

Descriptors: *Potamology, *Mississippi River, *Flood control, Design flood, Hydraulics, Maximum probable flood, River flow, Floodways, Hydraulic structures, Flood routing, Cutoffs, Flood plains, Flood protection, Channel flow, Channel improvement, Channel morphology.
Identifiers: *Hydraulic capacity.

A major flood on the Mississippi River in the spring of 1973 produced stages which made it apparent that the prevailing stage-discharge relationship was several feet higher than the stage-discharge relationship on which the levee grades had been based in the middle portion of the Lower Mississippi River and in the Atchafalaya Basin Floodway. Adjusted flowlines were predicated on adoption of a plan for increasing the height of existing levees in order to maintain the desired degree of protection under conditions of reduced flood-carrying capacity. Raising the levees was adopted as the least costly and physically most feasible plan. This will be done in combination with attempting to develop a more effective and efficient channel. (Sims-ISWS)
W75-06212

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W75-06218

THE DYNAMICS OF INLETS AND BAYS,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W75-06223

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 552, $4.25 in paper copy, $2.25 in microfiche. Miscellaneous Paper No. 4-74, June 1974. 66 p, 47 fig, 3 tab.

Descriptors: *Beaches, *Beach erosion, *Artificial beaches, *Coastal engineering, Deposition(Sediments), Hydraulics, Dunes, Equipment, Hydraulic equipment, Seashores, Shore protection, Coasts, *California.

A project at Los Angeles in 1947 was described; sandhills (relic dunes) were leveled, and the sand was used to widen the beach against erosion. The project extended from El Segundo to Venice. Water, at high pressure, was shot from nozzles onto the hills. The resulting slurry (sand suspended in water) was sluiced down to a sump or low area. An eductor drew in the slurry by siphon, and discharged it by pipeline to a surge pit. Here, the slurry moved through a surge well to a dredge pump suction. The slurry was then moved by a series of pumps and pipelines to the beach. An amount of about 14 million cubic yards was moved; the price was 22.6 cents per cubic yard (1947). The process was described in detail, and photos and drawings of the equipment and work, and aerial progress photos of the area were shown. Recommendations were made for using the method in other areas. (Sims-ISWS)
W75-06225

FLEXIBLE BREAKWATERS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
D. B. Jones.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 369, $4.25 in paper copy, $2.25 in microfiche. Technical Note N-1351, September 1974. 60 p, 6 fig, 1 tab, 24 ref, append.

Descriptors: *Breakwaters, *Energy dissipation, *Attenuation, Waves(Water), Shore protection, Flexibility, Analysis, Floating, Numerical analysis.
Identifiers: Wave height, Viscoelastic materials, Transmission coefficient, Transportable breakwaters.

Logistic advantages of a floating blanket type of transportable breakwater were noted. Thin surface covers were known to be relatively ineffective as wave barriers. To more fully examine the potential of thin flexible barriers, energy dissipation in a viscoelastic solid was investigated for the first time. The linear theory was used to derive a formula which related energy dissipation in an impervious viscoelastic blanket to wave height reduction. Numerical results for a high-damping rubber indicated that energy dissipation in a thin surface cover was not significant for wave periods greater than 2 to 3 seconds. Known data on water-wave damping by shallow-draft barriers of many kinds were reviewed. These data, with relative efficiencies, were reported in an appendix. (Adams-ISWS)
W75-06232

THE APPLICABILITY OF REGIME THEORY TO TIDAL WATERCOURSES,
University of Strathclyde, Glasgow (Scotland). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-06257

THE ANALYSIS OF INFLOW INTO SOME EXPERIMENTAL AGRICULTURAL DRAINS,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 4A.
W75-06273

THE EFFECT OF PERMEABLE SURROUNDS ON THE PERFORMANCE OF CLAY FIELD DRAINAGE PIPES,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
C. W. Dennis, and B. D. Trafford.
Journal of Hydrology, Vol 24, No 3/4, p 239-249, February 1975. 7 fig, 3 tab, 18 ref.

Descriptors: *Tile drains, *Subsurface drains, *Drainage systems, Drainage engineering, *Hydraulic models, Drainage practices, Seepage, Tiles, Clay pipes, Subsurface drainage, Europe, Percolation, Groundwater movement, Model studies, Porous media, Laboratory tests, Sinks, Agriculture.
Identifiers: *Clayware drains, *Permeable surrounds, Sand tank, Drain spacing.

The relative performances of a plain clayware drain and ones with a partial and a complete gravel surround were investigated by measuring the drain discharge rate from each during ponded conditions when installed in a sand tank. From the drain discharge, the effective radius of each drain installation was calculated and these values were used in the hodograph solution of the drainage problem to obtain steady state theoretical relationships between water-table height and drain discharge. Comparison of the values with those observed in experiments in the sand tank revealed reasonable agreement. With the values of effective drain radius for the various drain installations, the drain spacings for representative Western European conditions were calculated by using the hodograph analysis, and the results were expressed as a percentage of the spacing calculated for an 'ideal' drain. This showed that for a deep soil a partial surround, either above or below the drain, would allow an increase in spacing of some 100% as compared with the plain pipe. The corresponding figure for a complete surround is 120%. (Sanderson-ISWS)
W75-06283

8C. Hydraulic Machinery

ANTI-BACKFLOW WATER CONTROL AND SOLUTION PROPORTIONER,
V. Hechler, IV.
U.S. Patent No. 3,862,640, 9 p, 13 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 930, No 4, p 1792, January 28, 1975.

Descriptors: *Patents, *Water supply, *Flow control, Municipal water, Water pressure, Potable water, Facilities.
Identifiers: Solution proportioner.

Ventable chambers in tandem with a valve between them are placed between a source of pressurized municipal water and a flow-control solution-proportioning device. The chambers have movable walls that close vents and open backflow check valves under conventional water pressures, and then open the vents and close the check valves while positive gauge pressure still exists in the water supply but which has dropped to a predetermined low positive gauge pressure or to a pressure inadequate to operate the proportioning device successfully. Resilient means are provided to control the wall movements and the venting and to predetermine the desired positive gauge pressure differential across the vents at which the respective openings and closings will occur. (Sinha-OEIS)
W75-05909

STORM AND COMBINED SEWER RESEARCH AND DEVELOPMENT,
Federal Water Pollution Control Administration, Washington, D.C.
A. Cywin, and W. A. Rosenkranz.
Preprint No. 1039, American Society of Civil Engineers, ASCE Annual and Environmental Meeting, Chicago, Illinois, October 13-17, 1969. 20 p, 9 fig, 28 ref.

Descriptors: *Research and development, *Combined sewers, *Storm runoff, *Wastewater treatment, *Overflow, *Waste storage, Water pollution control, Water quality control, Sewerage, Monitoring, Disinfection, Chlorination.
Identifiers: Sodium hypochlorite, Overflow regulators.

In the United States two basic sewerage systems are in use; the combined storm and sanitary system and the system utilizing separate conveyances for storm and sanitary wastewaters. The 'built-in' inefficiencies of both system types are quickly recognized when we consider the total drainage area waste load, because each type is designed either to exclude all, or to transport only a portion of, the surface drainage. Through federal research and development, attempts are being made to find means of improving system efficiency and minimizing untreated discharges from the systems. Projects within the research and development program can be classified as falling within one of three categories: control, treatment or a combination of the two. Projects in the control category include storage within the system, control of infiltration of surface and groundwater into the system, and new overflow regulators for combined sewer operations. The use of polymers to improve sedimentation rates in connection with combined sewage retention-treatment facilities and the utilization of sodium hypochlorite to disinfect storm flow are two projects evaluating new treatment methods. Results indicate that a combination of both storage and treatment will most likely be required in many combined sewer systems. (Poertner)
W75-06049

AERATION OF FLOW BELOW NAVIGATION DAMS-ST. PAUL DISTRICT,
H. W. Harich.
Preprint No. 1561, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 11 p, 6 fig, 4 tab.

Descriptors: *Dams, *Movable dams, *Dam design, *Dam failure, *Flow control, *Gates, *Aeration, Overflow, Locks, Bulkhead gates, Hydraulic gates, Hydraulic structures, Minnesota.
Identifiers: Navigation dams, St Paul District.

After completion of the nine-foot channel navigation projects on the Mississippi River in the St. Paul District, two operation-related problems developed: namely, keeping the gates movable during the winter-time and preventing fish kill in the side channels. In search of a solution for the above difficulties, experiments were initiated to reduce the number of gate movements required, and to aerate the water in the secondary channels cut off from the flow in the river by earth dams or spillways. Tests were conducted at eight of the thirteen locks and dams in the St. Paul District. The submergible tainter and roller gates, as designed for the navigation dams, were deficient and merely skimmed the ice during the winter months and were not adequate to discharge fluctuating flows during the winter periods. Inserting bulkheads in the gates overcame the deficiency somewhat and accomplished two purposes; it kept the gates comparatively free of ice and aerated the water downstream, benefitting fish and wildlife. The practice has been discontinued because of additional maintenance costs. (Poertner)
W75-06054

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-VA-73-1699-F, $5.75 in paper copy, $2.25 in microfiche. October 25, 1973. 132 p, 14 fig, 4 tab.

Descriptors: *Environmental effects, *Estuarine environment, *Withdrawal, *Virginia, *Rivers, Water supply, Water allocation(Policy), Estuaries, Encroachment, Saline water-freshwater interfaces, Saline water intrusion, Water supply development, Water demand, Water management(Applied), Water policy, Water sources, Water utilization, Water quality control, Comprehensive planning, Water resources development, Sounds, Diversion, Exploitation.
Identifiers: *Environmental Impact Statements, *Chesapeake(Va).

This proposal calls for construction of a water intake and pump station on the Northwest River in the City of Chesapeake, Virginia. The project is a temporary measure designed to supply the water needs of the city's 90,000 people until a regional water supply system is developed. The city is presently dependent upon surplus water from neighboring water systems to meet its water needs. The Northwest River empties into Currituck Sound, which is part of the second largest estuarine complex on the east coast. The project site is located in a low swamp area, heavily vegetated with hardwoods which provide habitat for wildlife. The project will relieve local public health problems and will reduce local water supply costs. Temporary adverse effects will be the denudation of one acre of wildlife habitat and minor destruction of benthic organisms. Protective measures have been incorporated to avoid possible adverse effects upon the ecology of the sound due to removal of part of the freshwater input into the estuarine complex. This project is deemed the only feasible solution to Chesapeake's immediate water supply problem. There is some environmental opposition to the project due to the possible adverse effect upon the estuarine complex. (Deckert-Florida)
W75-06179

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-06183

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 8B.
W75-06225

8D. Soil Mechanics

CHANGED SPOIL DUMP SHAPE INCREASES STABILITY ON CONTOUR STRIP MINES,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5G.
W75-05921

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
For primary bibliographic entry see Field 5G.
W75-06177

EFFECTIVENESS OF BRIDGE PIER RIPRAP PRACTICE IN WASHINGTON STATE,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. E. Nece.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 545, $4.75 in paper copy, $2.25 in microfiche. Final Report, January 1974. 85 p, 56 fig, 10 ref.

Descriptors: *Riprap, *Piers, *Bridges, *Rivers, River beds, On-site investigations, Erosion control, Hydraulics, Erosion, Scour, Stream erosion, Flood damage, Bridge construction, Bridge design, Engineering structures, *Washington.

A field study at seven bridge sites was conducted to evaluate the effectiveness of the current method of riprap protection of bridge piers used in Washington State. The method consists of using protective riprap as a streambed-level scour arrester, with the riprap being dumped into place in an excavation surrounding the pier and with the top of the riprap stone being placed at streambed level. Three solid wall and four single circular cylindrical shaft piers were studied. Field methods were described, and correlation with hydraulic data were included where possible. Generally, the method seems to have worked well, because little loss or subsidence of riprap was noted; however, some of the bridges are fairly new and have not yet been subjected to major floods. On the basis of field observations, a modification was suggested for minimizing possibilities of scour concentrations between piers. Suggestions were included for routine inspection and maintenance of bridge piers and foundations in streams, and for more early attention to hydraulic considerations in pier location. (Sims-ISWS)
W75-06228

LOADS ON BOX CULVERTS UNDER HIGH EMBANKMENTS,
Kentucky Dept. of Highways, Lexington. Div. of Research.
H. F. Girdler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 565, $3.75 in paper copy, $2.25 in microfiche. Report No. 386, April 1974. 32 p, 30 fig, 3 tab, 12 ref. KYHPR-72-68.

Descriptors: *Culverts, *Engineering structures, *Load distribution, *Soil mechanics, Roads, Structures, Strain measurement, Strain gages, Instrumentation, Stress analysis, Loads(Forces), Pressure, Earth pressure, Mechanical properties.
Identifiers: Carlson earth pressure cells.

The structural design of culverts requires a reliable estimate of the earth pressures which will come to bear on the structure during and after construction of the embankment. The actual bearing pressure at a given time and under various conditions of differential settlement may be greater or less than the deadload of the fill or embankment over the structure. The instrumentation and construction was described of three box culverts designed by the imperfect trench method. A total of 42 Carlson earth pressure cells were installed in conjunction with strain gages and settlement measuring devices, including inverted settlement plates and mercury settlement gages. Measurements made during the first few months indicate the imperfect trench has considerably reduced the overburden loads bearing on the structures. (Sims-ISWS)
W75-06230

8E. Rock Mechanics and Geology

EFFECTIVENESS OF BRIDGE PIER RIPRAP PRACTICE IN WASHINGTON STATE,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W75-06228

ROCK STRENGTH FROM FAILURE CASES: LEFT BANK SLOPE STABILITY STUDY - LIBBY DAM AND LAKE KOOCANUSA, MONTANA,
Hamel Geotechnical Consultants, Monroeville, Pa.
J. V. Hamel.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-782 874, $7.50 in paper copy, $2.25 in microfiche. Corps of Engineers, Omaha, Nebraska, Technical Report MRD-1-74, July 1974. 239 p, 35 fig, 11 tab, 46 ref, 3 append. Army Contract DACW45-70-D-0071.

Descriptors: *Dams, *Engineering geology, *Rockslides, Rock mechanics, Dam construction, Landslides, Rock properties, Structural geology, Strength, Shear strength, Mechanical properties, *Montana.

Slope stability problems involving fault and joint bounded rock masses occurred in the left abutment and left bank areas of Libby Dam during recent construction of the dam and related facilities. These problems were investigated and the results were summarized. Emphasis was placed on determination and interpretation of in situ shear strengths for geologic discontinuities in hard rock slopes. It was impossible, from a practical standpoint, to obtain the degree of geologic information needed to reliably evaluate the stability of left bank rock ribs. This was largely because of the size of the ribs and the complexity of their structural geology. Despite this lack of geologic information, several conclusions of practical importance were drawn from the investigation. These conclusions are related to (1) failure conditions for small rock wedges, (2) in situ shear strength parameters for geologic discontinuities, and (3) left bank rib stability. (Sims-ISWS)
W75-06252

8F. Concrete

LOADS ON BOX CULVERTS UNDER HIGH EMBANKMENTS,
Kentucky Dept. of Highways, Lexington. Div. of Research.
For primary bibliographic entry see Field 8D.
W75-06230

POLYMER-IMPREGNATED CONCRETE TUNNEL SUPPORT AND LINING,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
L. R. Carpenter, W. C. Cowan, and R. W. Spencer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 963, $6.25 in paper copy, $2.25 in microfiche. REC-ERC-73-23, December 1973. 162 p, 61 fig, 11 tab, 15 ref, 5 append.

Descriptors: *Precast concrete, *Tunnel design, *Concrete testing, *Concrete technology, Linings, Tunnel linings, Construction, Structural models, Testing, Hazards, Backfill, Materials testing, Economic feasibility, Heat transfer, Polymers, Construction joints.
Identifiers: *Tunnel supports.

The development of precast polymer-impregnated concrete (PIC) tunnel support-liner systems was reported. Investigations included: (1) full-scale tests of conventional concrete and PIC segments with concrete backfill as well as PIC segments with sand backfill; (2) economic studies to compare precast conventional concrete and PIC systems; (3) the effects of joint configuration, elastomeric joint sealer, and segment material on the support-lining system strength determined by laboratory tests and statistical inference; (4) heat transfer analysis employing finite differences to determine temperature distribution in the PIC lining caused by transportation tunnel fires; (5) determination of effects of elevated temperature on the compressive strength and the heat transmission characteristics of PIC; and (6) determination of flame spread, fuel contribution, smoke developed, the combustion gases, and visual damage of PIC resulting from exposure. (Sims-ISWS)
W75-06234

8G. Materials

POROUS POLYETHYLENE IN SEWAGE AND WATER TREATMENT PLANTS.
For primary bibliographic entry see Field 5D.
W75-05943

CRITERIA FOR USE OF RIPPLE TANKS: REFRACTION SCALE EFFECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W75-06019

MECHANISATION OF NEW TYPE OF COPPER CORROSION IN WATER,
Department of Scientific and Industrial Research, Petone (New Zealand). Chemistry Div.
G. G. Page, P. C. A. Bailey, and G. A. Wright.
Australian Corrosion Engineering, Vol 18, No 11/12, p 13-19, November/December, 1974. 5 fig, 1 tab, 32 ref.

Descriptors: *Corrosion, *Copper, *Tubes, *Electrochemistry, Chemical reactions, Silica, Colloids, Gels, Copper compounds, Metal pipes, Anodes, Water properties, Laboratory tests.

A review is presented of investigations into a new type of corrosion found in copper tubing used for conveying soft, potable water. The corrosion form is characterized by anodic areas on the metal surface, covered by a green-blue floc of copper hydroxide. The mechanism was deduced from test rack observations, corrosion potential measurements, decantation of water from test pipes, and cyclic voltametry. Electrophoretic deposition of colloidal silica on the surface cuprous oxide film forms a gel layer which traps corrosion products and generates active anodic sites shielded from the ingress of oxygen. Differential aeration then leads to anodic dissolution of copper, followed by precipitation of amorphous copper hydroxide in the soft, unbuffered water. Necessary conditions for the occurrence of this type of corrosion, and methods of reducing its incidence, are described and discussed. (CSIRO-Aust)
W75-06111

IN-SITU PERMEABILITY ANALYSIS USING BAROMETRIC PRESSURE FLUCTUATIONS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2F.
W75-06241

FLOATING ICE SHEETS,
Foundation of Canada Engineering Corp. Ltd., Calgary (Alberta). Arctic Div.
D. M. Masterson.
The Northern Engineer, Vol 6, No 3, p 11-18, Fall 1974. 14 fig, 3 ref.

Descriptors: *Ice, Civil engineering, *Cold weather construction, *Construction, Structural engineering, Arctic, Mechanical properties, Strength, Bearing strength, Pipelines, Ice loads, Loads(Forces).
Identifiers: *Floating ice sheets.

In arctic regions, the use of natural ice cover as a load support has increased during the past several years. In addition to the roads and airstrips which have traditionally been built on ice, oil companies are now using it to support heavy drilling rigs for offshore exploration. While much scientific data on ice and its mechanical behavior have been gathered over the past years, there is little information available to the practicing engineer who needs safe, reliable, design procedures for placing heavy, long-term loads on floating ice sheets. A simple and proven method for estimating stresses and deflections beneath long-term loads was outlined. Field monitoring procedures during construction, use of flooded ice platforms and cracked ice, and problems encountered in the field were discussed. (Sims-ISWS)
W75-06280

8H. Rapid Excavation

ROCK TUNNELS RECENTLY COMPLETED IN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
J. Irons, and D. Westfall.
Paper presented at Rapid Excavation and Tunneling Conference, American Society of Civil Engineers and the American Institute of Mining, Metallurgical and Petroleum Engineers, Chicago, Illinois, June 5-7, 1972. 14 p, 7 fig.

Descriptors: *Storage, *Underground storage, *Water pollution control, *Sewers, *Combined sewers, *Storm runoff, Illinois, Overflow, Sewerage, Tunnels, Water pollution sources, Water quality control, Urbanization, Lake Michigan.
Identifiers: Combined sewer overflows, Chicago, Rock tunnel storage.

Three rock tunnel sewer systems are under construction in the Chicago area. They are designed to act independently and to eventually become part of the metropolitan area master plan. The tunnel excavation for each of the systems has been completed. The three are similar in that they have the same purpose, the same component parts and their tunnels were constructed in the nigaran limestone using a mechanical mining machine. The purpose of each of the systems is two-fold: first, to provide flood relief for existing inadequate sewer system; and, second, to reduce the pollution

load to the waterways caused by combined sewer overflows. The tunnels were constructed below the water level of the receiving waterway. Small storms are completely contained in the tunnel. Large storms fill the tunnel, then overflow to the waterway. The stored water can be removed from the tunnels in one day by pumping to an interceptor at times when the treatment plant can handle the flow. It is anticipated that the sediment in the tunnel will be flushed to wet wells during the heavier storms. Alternatively, the tunnels can be flushed with dry weather flow or with water from the public water supply. (Poertner)
W75-06061

TRANSLATIONS OF PAPERS PRESENTED AT THE THIRD PANEL ON THE PEACEFUL USES OF NUCLEAR EXPLOSIONS ORGANIZED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY HELD IN VIENNA, AUSTRIA, 27-30 NOVEMBER 1972.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
W75-06349

8I. Fisheries Engineering

SCREENS FOR WATER INTAKE SYSTEMS,
Rex Chainbelt, Inc., Milwaukee, Wis. (assignee)
R. F. Taylor, D. A. Strow, and H. Mansouri.
U.S. Patent No. 3,850,804, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1701, November 26, 1974.

Descriptors: *Patents, *Screens, *Fish barriers, Fishes, Debris, Equipment, Intake structures.
Identifiers: *Fish protection.

A travelling water screen unit comprises an endless series of pivotally interconnected rectangular screens. Each screen comprises a frame having ends which are attached to corresponding links of parallel chains and a screen insert which is separately fabricated and secured by bolts between the central horizontal members of the frame. The debris carried by the flow in a channel is intercepted by the lower, upward moving screens and is removed by backwash sprays from the screens approaching the upper drive and support means. Such units and their intermediate support columns may be set flush and in a straight line so that fish are readily diverted away from the screen. (Sinha-OEIS)
W75-05879

IN-CHANNEL SEDIMENTATION BASINS--A POSSIBLE TOOL FOR TROUT HABITAT MANAGEMENT,
Forest Service (USDA), St. Paul, Minn., North Central Forest Experiment Station.
E. A. Hansen.
The Progressive Fish-Culturist, Vol 35, No 3, p 138-142, July 1973. 2 fig, 24 ref.

Descriptors: *Stream improvement, Basins, *Desilting, *Trap efficiency, Fish management, Bed load, Bottom sediments, *Settling basins, *Trout, Sediment control.
Identifiers: *Fish habitat, *Sediment reduction.

Design and use of sedimentation basins for trout habitat management are discussed. Minimum basin size for trapping bedload sediments is based on Vetter's formula. Basins can remove essentially all moving bedload from a section of stream; whereas traditional 'stream improvement' measures may decrease bedload sediments up to perhaps only 50 percent. Sediment reduction programs using basins will produce the maximum possible change in streambed composition. Basins are effective for trapping sand size and larger sediment and have the advantage that they can be located immediately upstream from critical zones such as spawning areas. (Forest Service)
W75-05937

CONSTRUCTION OF RECLAMATION PROJECTS TO ENHANCE ENVIRONMENT,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06069

THE FAST AND REALIMENTATION IN THE CARP (CYPRINUS CARPIO L.): V. THE EFFECT OF FOUR MODES OF REALIMENTATION ON GLUCIDIC METABOLISM, (IN FRENCH),
Toulouse-3 Univ. (France). Laboratoire d'Ecophysiologie des Animaux.
J.-C. Jurat, J.-P. Parent, and A. Serfaty.
Arch Sci Physiol. Vol 26, No 4, p 349-357. 1972, Illus. English summary.

Descriptors: *Carp, *Fish diets, *Metabolism.
Identifiers: *Realimination.

After 6 mo. of total inanition, young carp, can be fed by industrial granules of special food. This diet produces an increase in muslce glycogen and decrease in blood lactate. A special diet made with casein, is necessary to refeed carp after acute starvation (11 mo.) without mortality. This diet involves decreases in blood glucose and fats and heart, liver and muscle glycogen. A diet with starch gives high levels of blood glucose and lactate without significant increase of tissue glycogen. The same effects are seen after injections of glucose and amino-acids.--Copyright 1974, Biological Abstracts, Inc.
W75-06350

9. MANPOWER, GRANTS AND FACILITIES

9B. Education (In-House)

INSTITUTE FOR WATER RESOURCES (ARMY CORPS OF ENGINEERS), ANNUAL REPORT, 1972.
Institute for Water Resources (Army), Alexandria, Va.
For primary bibliographic entry see Field 6B.
W75-06018

9C. Research Facilities

ENVIRONMENTAL CONTROL LABORATORY DESIGNED FOR THE SPECIFIC NEEDS OF THE INTERN TRAINING CENTER, RED RIVER ARMY DEPOT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5A.
W75-06210

9D. Grants, Contracts, and Research Act Allotments

PROGRAM PLAN FOR ENVIRONMENTAL EFFECTS OF ENERGY,
MITRE Corp., McLean, Va.
R. P. Pikul, and R. Rabin.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 115, $9.25 in paper copy, $2.25 in microfiche. Final Report MTR-6726, July 1974. 314 p, 35 fig, 52 tab, 95 ref. 1700. NSF 74-SP-0827.

Descriptors: *Environmental effects, *Energy, *Fuels, *Planning, Coals, Oil, Solar radiation, Oil shale, Geothermal studies, Research and development, Decision making, Geysers, Faults(Geologic), Hot springs, Social aspects, Economic impact.
Identifiers: *Energy sources, *National Science Foundation, Geothermal energy.

The National Science Foundation's initial Five Year Program plan, effective FY 1975, is basically directed to obtain scientific knowledge to sustain a sound environmental policy, to seek means to minimize adverse environmental, social, economic and cultural impacts of various fuels extraction and conversion, and energy generation and utilization. Major research emphasis is placed on pollutant analysis, pollutant transport and fate, pollutant effects, and systems evaluation, the last emphasizing information for decision-makers to clearly show the consequences of alternative development and environmental management strategies. The problem areas are identified for coal, oil and gas, oil shale, geothermal, and solar energy. Research objectives and tasks for these various energy sources include extraction, processing, transportation, conversion, utilization, and transmission. The distribution of funds for FY 1975, out of the total $47 million for the five-year period, is $2.2 million for preobligated projects, new support projects $1.1 million, program planning and evaluation $0.45 million, geothermal $1.2 million, oil shale $0.77 million, oil $0.73 million, and coal $2.5 million. (Auen-Wisconsin)
W75-05871

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5A.
W75-06039

ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER - AN ECOSYSTEM APPROACH, VOL. 2,
Virginia Inst. for Scientific Research, Richmond.
For primary bibliographic entry see Field 05C.
W75-06298

10F. Preparation Of Reviews

FLOOD ESTIMATION METHODS FOR UNGAGED CATCHMENTS-A REVIEW,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W75-05992

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 05A.
W75-06039

MICROBIOLOGY-DETECTION OF BACTERIAL PATHOGENS AND THEIR OCCURRENCE, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 05A.
W75-06342

WASTE OIL RECOVERY PRACTICES--STATE OF THE ART.
Environmental Quality Systems, Inc., Washington, D.C.
For primary bibliographic entry see Field 05D.
W75-06347

SUBJECT INDEX

2-4-5-T
Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

2-4-D
Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

ABSORPTION
Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

ACTIVATED SLUDGE
Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

Utilization of Activated Sludge (Ispol'zovanie aktivnogo ila),
W75-06344 5D

ADJUDICATION PROCEDURE
State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

ADMINISTRATION
Flood Plain Management,
W75-06063 4A

Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

Environmental Criteria for Reclamation Projects,
W75-06067 8A

Lloyd Harbor Study Group, Inc. v. Diamond (Action Challenging Determination that Water Quality Standards Would not be Contravened by Construction of Nuclear Power Plant).
W75-06143 6E

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

ADMINISTRATION AGENCIES
Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

ADMINISTRATIVE AGENCIES
The State of Texas, Et Al. V. Fri (Challenge of Executive Impoundment of FWPCA Funds),
W75-06152 5G

Five Mile River Commission,
W75-06159 6E

ADMINISTRATIVE DECISIONS
The State of Texas, Et Al. V. Fri (Challenge of Executive Impoundment of FWPCA Funds),
W75-06152 5G

ADMINISTRATIVE REGULATIONS
Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

ADOPTION OF PRACTICES
Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

Ameraport Deep Draft Harbor and Terminal Compact,
W75-06153 6E

Defining Freshwater Wetlands,
W75-06161 4A

AERATION
A Wastewater Treatment System,
W75-05882 5D

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

AESTHETICS
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

AGRICULTURAL CHEMICALS
The Future Role of Chemicals in Forestry,
W75-05935 4C

AGRICULTURAL POLICY
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

AGRICULTURAL RUNOFF
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

AGRICULTURAL WATERSHEDS
Benefit-Estimate of Drainage and Flood-Control Works in Small Watersheds of Semi-Arid Climate,
W75-05997 6B

AGRICULTURE
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

AGROCLIMATOLOGY
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

AIR
Description of Water and Air Movement During Infiltration,
W75-06288 2G

AIR POLLUTION
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

AIR SATURATED POROUS MEDIA
In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

AIR-WATER INTERFACES
Surface Slicks and Films - A Need for Control,
W75-06023 5A

ALABAMA
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

Ameraport Deep Draft Harbor and Terminal Compact,
W75-06153 6E

Ameraport Offshore Harbor and Terminal Commission,
W75-06154 6E

Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

ALGAE
Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

ALLUVIAL CHANNELS
Mechanism of Bed Load Transport in Channel Flows,
W75-06010 2J

Flood Control Measures Leveeing and Bottom Deepening,
W75-06013 4D

Modelling of Erodible Channels,
W75-06014 2J

Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

ALTERNATE PLANNING
Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

ALTERNATIVE COSTS
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

ALTERNATIVE PLANNING
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

ALTERNATIVE PLANNING

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

ALTERNATIVE WATER USE
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

ALUMINUM
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

AMHERST COUNTY (VA)
Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

AMINOTRIAZOLE
Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

ANABAENA VARIABILIS
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

ANAEROBIC CONDITIONS
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

ANAEROBIC TREATMENT
Waste Water Purification System,
W75-05878 5D

ANALOG MODELS
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

ANALYTICAL METHODS
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

ANALYTICAL TECHNIQUES
Estimating the Value and Incidence of Recreation Benefits from a Beach Erosion Control Project,
W75-05859 6C

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

Effect of Dams on Flood Frequency,
W75-05982 4A

Flood Computations for the Hawaiian Islands,
W75-05984 4A

Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

Determination of Metals in Sea Water,
W75-06027 5A

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume III - Control Network Establishment.
W75-06043 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume V - Information Correlation and Interpretation.
W75-06045 7C

Development of a Method for Measuring Dissolved Color in Wastewaters and Receiving Streams,
W75-06086 5A

Improved Field Water Analysis Tests,
W75-06122 2K

Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

Radiometry of Water Turbidity Measurements,
W75-06128 5A

Polarographic Oxygen Sensors.
W75-06136 2K

Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

ANIMAL PHYSIOLOGY
The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

ANION EXCHANGE
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

ANISOTROPY
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

ANNUAL FLOOD
Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

Forecasting of Flood Characteristics of the Nile,
W75-06008 4A

ANTARCTIC
Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

ANTECEDENT PRECIPITATION
Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

ANTIDUNES
Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

ANTIMONY
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

APPALACHIAN MOUNTAIN REGION
The Effect of Herbaceous Vegetation on Survival and Growth of Trees Planted on Coal-Mine Spoils,
W75-05920 4D

Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky,
W75-06334 5B

Establishing Forest on Surface-Mine Land as Related to Fertility and Fertilization,
W75-06337 4D

APPLACHIAN MOUNTAIN REGION
Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

AQUATIC ANIMALS
Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

AQUATIC BACTERIA
Studies on Freshwater Bacteria: The Effect of Enclosure in Large Experimental Tubes,
W75-05875 2H

AQUATIC INSECTS
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

AQUATIC LIFE
Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

AQUATIC MICROORGANISMS
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

AQUATIC POPULATIONS
The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

AQUIFER TESTING
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

AQUIFERS
A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

AREAL HYDROGEOLOGY
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

ARIZONA
Bed Material Size Changes and Sediment Transport,
W75-06281 2J

ARKANSAS
Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

ARSENIC COMPOUNDS
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

ARSENICALS (PESTICIDES)
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

ARTEMIA SALINA
Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

ARTESIAN AQUIFERS
Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

ARTIFICIAL BEACHES
Hydraulic Method Used for Moving Sand at Hyperion Beach Erosion Project, El Segundo, California.
W75-06225 8B

ARTIFICIAL ICE
Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

ASSESSMENTS
The Australian Representative Basins Programme,
W75-05953 7A

Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

ASTORIA (ORE)
Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

ATHABASCA RIVER (CANADA)
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

ATLANTA (GEORGIA)
Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

ATLANTIC OCEAN
Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

ATMOSPHERIC PRESSURE
In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

ATOMIC ABSORPTION SPECTROSCOPY
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

ATTENUATION
Flexible Breakwaters,
W75-06232 8B

ATTITUDES
Environmental Criteria for Reclamation Projects,
W75-06067 8A

Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

AUSTRALIA
The Australian Representative Basins Programme,
W75-05953 7A

Reversed Longitudinal Salinity Profile of a Major River in the South-West of Western Australia,
W75-06112 5B

The Beach Erosion Hazard,
W75-06113 2J

The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

AUTOMATIC IRRIGATION EQUIPMENT
Automatic Irrigation Apparatus,
W75-05901 3F

AUTOMATION
Automation of the Continuous Coagulation Monitor,
W75-06074 5F

BACK WASH CONTROL
Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

BACTERIA
Survival of Viruses and Bacteria in a Simulated Sanitary Landfill,
W75-06231 5B

Red Bacterial Growth (Corynebacterium Rubrum N. Spec.) In Tap-water Systems. (In German),
W75-06340 5C

BANK STABILIZATION
Highlights of Flood Protection Works Done on River Narmada at Hoshangabad in Madhya Pradesh State - India,
W75-05998 4D

BARGE PORTS
Planning Industrial Areas for Barge Ports,
W75-06052 6A

BARGES
Planning Industrial Areas for Barge Ports,
W75-06052 6A

BARRIER ISLANDS
Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

BASINS
The Australian Representative Basins Programme,
W75-05953 7A

BAYESIAN PROBABILITY
Flood Prediction - A Bayesian Approach,
W75-05989 4A

BAYS
Bolinas Lagoon Inlet, California,
W75-06217 2L

The Dynamics of Inlets and Bays,
W75-06223 2L

Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

BEACH CUSPS
Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

BEACH EROSION
Floating Wave Barrier,
W75-05898 2J

BEACH EROSION

The Beach Erosion Hazard,
W75-06113 2J

Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

Hydraulic Method Used for Moving Sand at Hyperion Beach Erosion Project, El Segundo, California.
W75-06225 8B

BEACHES

Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

Hydraulic Method Used for Moving Sand at Hyperion Beach Erosion Project, El Segundo, California.
W75-06225 8B

Form-Process Relationships on Island Coasts,
W75-06229 2L

Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

BEAVER LAKE (ARK-MO)

Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

BED LOAD

Reliability of Bed-Load Sampling,
W75-05979 2J

Mechanism of Bed Load Transport in Channel Flows,
W75-06010 2J

BED LOAD SAMPLERS

The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

BEDROCK FRACTURING

Role of Bedrock in Watershed Management,
W75-05932 4D

BEDROCK WEATHERING

Role of Bedrock in Watershed Management,
W75-05932 4D

BEETS

Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

BENEFICIAL USE

Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

BENEFIT-ASSESSMENT METHOD

Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

BENEFIT-COST RATIO

San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

BENTHIC FAUNA

The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

BENTHIC ORGANISMS

The Indicator Organisms and Their Ecological Variability,
W75-05970 5A

BIBLIOGRAPHIES

A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

BIOASSAY

Biological Problems in Estuarine Monitoring,
W75-06026 5A

Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

BIOCHEMICAL OXYGEN DEMAND

Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

BIOCHEMISTRY

Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

BIOCHROME ANALYSIS

Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

BIOINDICATORS

The Indicator Organisms and Their Ecological Variability,
W75-05970 5A

Biological Problems in Estuarine Monitoring,
W75-06026 5A

The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

BIOLOGICAL TREATMENT

Waste Water Purification System,
W75-05878 5D

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

BIOMASS

The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

BLACK CHERRY

Indexes to Transpiration by Forest Trees,
W75-06336 2D

BODIES OF WATER

On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

BOLINAS BAY (CALIF)

Bolinas Lagoon Inlet, California,
W75-06217 2L

BOTTOM SEDIMENTS

Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

BREAKWATERS

Flexible Breakwaters,
W75-06232 8B

BREWERY WASTES

Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

BRICEWELL (TENN)

Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

BRIDGES

Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

BUBBLES

Air Bubbles in Accreted Ice,
W75-06275 2C

BUDGET

The State of Texas, Et Al. V. Fri (Challenge of Executive Impoundment of FWPCA Funds),
W75-06152 5G

BULK DENSITY

Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

BUOYS

Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

BURNING

Pesticide Pyrolysis Device,
W75-06227 5G

CADMIUM

Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

CAISSONS
Swell Damper,
W75-05896 8B

CALIFORNIA
Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

The Colorado: A Weary River,
W75-06100 4A

City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

Hydrologic Data: 1973; Volume IV: San Joaquin Valley.
W75-06208 7C

An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

Bolinas Lagoon Inlet, California,
W75-06217 2L

Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

Hydraulic Method Used for Moving Sand at Hyperion Beach Erosion Project, El Segundo, California.
W75-06225 8B

Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

CANADA
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

CAPACITY EXPANSION
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

CAPE COD (MASS)
Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

CAPE HATTERAS (NC)
Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

CARBOHYDRATES
Carbohydrates from Lake Sediments,
W75-06125 2H

CARBONACEOUS MATTER
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

CARBONATE ROCKS
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

CARP
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

CATION EXCHANGE
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

CATIONS
The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

CATTLE
Cattle Feedlot Hydrology,
W75-06345 5B

CELERITY
Stability of Single-Peaked Waves,
W75-06118 2E

CEMENT INDUSTRY
Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

CEMENTS
Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

CENTRAL AMERICA
Water Resources Development in Central America, 1970 to 1980,
W75-06270 4A

CENTRAL US
Forest Drainage in North Central United States,
W75-05918 4D

CERTIFICATION
Lloyd Harbor Study Group, Inc. v. Diamond (Action Challenging Determination that Water Quality Standards Would not be Contravened by Construction of Nuclear Power Plant).
W75-06143 6E

CHALK AQUIFER (ENGLAND)
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

CHANNEL IMPROVEMENT
Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

CHANNEL MORPHOLOGY
The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

Some Considerations of Straightness in Channel Form Relating to the Estuary of the Maclennan River, South Otago (New Zealand),
W75-06285 2L

CHANNEL SINUOSITY
Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

CHANNELING
Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

CHANNELS
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

CHARLESTON HARBOR (SC)
The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

CHELATION
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

CHEMCONTROL
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

Automation of the Continuous Coagulation Monitor,
W75-06074 5F

CHEMICAL ANALYSIS
The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

The Mathematical Modelling of Rivers,
W75-06132 2E

CHEMICAL BRUSH CONTROL
Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

CHEMICAL OXYGEN DEMAND
Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

CHEMICAL PRECIPITATION
An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

CHEMICAL SOIL STABILIZERS
Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

CHEMICAL TRACERS
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

CHEMICAL TREATMENT
Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

Automation of the Continuous Coagulation Monitor,
W75-06074 5F

CHEMICALS
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk. Executive Summary.
W75-05858 6B

A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk, Final Report (Revised).
W75-05870 6B

Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

CHESAPEAKE BAY
Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

CHESAPEAKE (VA)
Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

CHEZY EQUATION
Stability of Single-Peaked Waves,
W75-06118 2E

CHICAGO (ILLINOIS)
Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

CHICAGO RIVER
Floodwater Management Plan, North Branch of the Chicago River, Lake and Cook Counties, Illinois.
W75-06048 4A

Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

CHINA SEA
Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

CHINO-RIVERSIDE (CALIF)
Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

CHIPPEWA RESERVOIR (WIS)
Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

CHLORIDES
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

CHLORINATED HYDROCARBON PESTICIDES
Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

CHLORINE
More Life for Diaphragm Cells.
W75-06324 5G

CHROMATOGRAPHY
Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

CIRCULATION
Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

CITIES
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

CITIZEN ADVISORY GROUPS
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

CIVIL ENGINEERING
Ice Engineering - Quantification of Subsurface Ice Thickening Techniques,
W75-06254 2C

CLARIFICATION PLANTS
Method of Introducing Oxygen into a Liquid to be Clarified and Device for Carrying the Method into Effect,
W75-05951 5D

CLASSIFICATION
Defining Freshwater Wetlands,
W75-06161 4A

CLAYWARE DRAINS
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

CLEAR LAKE-GEYSERS
Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

CLOUDS
Instruments for Investigation of Fogs and Clouds and Measurement of Humidity,
W75-06041 2B

COAGULATION
Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

Automation of the Continuous Coagulation Monitor,
W75-06074 5F

An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

COALESCENCE
Process for Electrical Coalescing of Water,
W75-06339 5G

COASTAL ENGINEERING
Hydraulic Method Used for Moving Sand at Hyperion Beach Erosion Project, El Segundo, California.
W75-06225 8B

COASTAL STRUCTURES
Ameraport Offshore Harbor and Terminal Commission,
W75-06154 6E

COASTS
Form-Process Relationships on Island Coasts,
W75-06229 2L

COLD REGIONS
Insulated Embankment Design Techniques,
W75-05897 8B

COLD WEATHER CONSTRUCTION
Floating Ice Sheets,
W75-06280 8G

COLIFORMS
Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

COLOR
Development of a Method for Measuring Dissolved Color in Wastewaters and Receiving Streams,
W75-06086 5A

COLORADO
A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

Colorado Public Interest Research Group, Inc. V. Train (Suit Challenging Accord Followed by EPA and AEC to Correlation of the FWPCA and the Atomic Energy Act),
W75-06151 6E

COLORADO RIVER BASIN
The Colorado: A Weary River,
W75-06100 4A

COLORIMETRY
Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

COLUMBIA RIVER
Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

COMBINED SEWERS
Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

Storm and Combined Sewer Research and Development,
W75-06049 8C

Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

COMMERCIAL FISHING
A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

COMMON ENEMY RULE
Micucci v. White Mountain Trust Co. (Action for Damages and Relief Caused by Runoff Flow from Adjacent Property).
W75-06141 6E

COMPARATIVE COSTS
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk, Final Report (Revised).
W75-05870 6B

COMPREHENSIVE PLANNING
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

Ketchikan Waterfront Development,
W75-06055 6A

COMPUTER MODELS
Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

A Compact Watershed Model System,
W75-06286 2A

A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

COMPUTER PROGRAMS
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume IV - Computer Program Description and Users' Guide.
W75-06044 7C

Finite Element Solutions for the Equations of Groundwater Flow,
W75-06083 2F

Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

WSP2-Water Surface Profile Program, User's Guide,
W75-06186 7C

TR-20 Project Formulation--Hydrology, Computer Program User's Manual,
W75-06219 7C

ECON2, Project Formulation--Economics--Computer Program User's Guide,
W75-06220 7C

DAMS2, Project Formulation--Structure Site Analysis, User's Guide,
W75-06221 7C

COMPUTER SIMULATION
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

COMPUTERS
Development of a Comprehensive TVA Water Resource Management Program.
W75-05874 6A

CONCRETE TECHNOLOGY
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

CONCRETE TESTING
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

CONDENSATION
Water Distillation Apparatus,
W75-05893 5F

CONDUITS
Drip Irrigation,
W75-05902 3F

A General Theory for Flow in Rough Conduits,
W75-06120 8B

CONFERENCES
International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

CONFINED WATER
Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

CONNECTICUT
Five Mile River Commission,
W75-06159 6E

CONSTRUCTION
Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

Ice Engineering - Quantification of Subsurface Ice Thickening Techniques,
W75-06254 2C

Floating Ice Sheets,
W75-06280 8G

CONSTRUCTION MATERIALS
Porous Polyethylene in Sewage and Water Treatment Plants.
W75-05943 5D

CONTINENTAL SHELF
The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

CONTINENTAL SHELF

A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

Deglaciation of the Labrador Continental Shelf,
W75-06279 2C

CONTINUITY EQUATION
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

CONTRACTS
Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

CONTROL SYSTEMS
Automation of the Continuous Coagulation Monitor,
W75-06074 5F

COORDINATION
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

COPPER
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

CORRELATION ANALYSIS
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

CORROSION
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

CORYNEBACTERIUM-RUBRUM
Red Bacterial Growth (Corynebacterium Rubrum N. Spec.) In Tap-water Systems. (In German),
W75-06340 5C

COST ALLOCATION
Moulton v. Groveton Papers Co. (Action for Property Damages Resulting from Failure of Dam Owned by Defendant, Resulting in Downstream Flooding of Plaintiff's Property).
W75-06148 6E

COST ANALYSIS
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

COST-BENEFIT ANALYSIS
An Economic Analysis of the Proposed Water Resources Project for the Upper French Broad River Basin in Western North Carolina,
W75-05857 6B

Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

COST-BENEFIT THEORY
Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

COST COMPARISONS
Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

COST SHARING
Cost Sharing for Shoreline Protection,
W75-05872 6C

COSTS
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk. Executive Summary.
W75-05858 6B

A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

Flood Damage in New Zealand,
W75-06001 4A

CRUSTACEANS
Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

CRYOGENICS
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

CULTIVATION
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

CULVERTS
Loads on Box Culverts under High Embankments,
W75-06230 8D

CURRENTS (WATER)
Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

CYANIDE
Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

CYANOPHYTA
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

CYCLES
Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

CYTOLOGICAL STUDIES
Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

DADE COUNTY (FLA)
Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

DAM CREST ELEVATION
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

DAM DESIGN
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

DAM FAILURE
Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

Moulton v. Groveton Papers Co. (Action for Property Damages Resulting from Failure of Dam Owned by Defendant, Resulting in Downstream Flooding of Plaintiff's Property).
W75-06148 6E

DAMAGES
Moulton v. Groveton Papers Co. (Action for Property Damages Resulting from Failure of Dam Owned by Defendant, Resulting in Downstream Flooding of Plaintiff's Property).
W75-06148 6E

DAMS
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

Effect of Dams on Flood Frequency,
W75-05982 4A

Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

DAMS2, Project Formulation--Structure Site Analysis, User's Guide,
W75-06221 7C

Rock Strength from Failure Cases: Left Bank Slope Stability Study - Libby Dam and Lake Koocanusa, Montana,
W75-06252 8E

DAMSITES
Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

DAMS2, Project Formulation--Structure Site Analysis, User's Guide,
W75-06221 7C

DATA ACQUISITION SYSTEM
Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

DATA COLLECTIONS
The Australian Representative Basins Programme,
W75-05953 7A

DATA PROCESSING
A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

DDD
DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

DDE
DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

DDT
DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

Persistence of Some Chemicals in Pacific Northwest Forests,
W75-06335 5B

DDT DESTRUCTION
Pesticide Pyrolysis Device,
W75-06227 5G

DECIDIOUS TREES
Indexes to Transpiration by Forest Trees,
W75-06336 2D

DECISION MAKING
Ketchikan Waterfront Development,
W75-06055 6A

Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

DELAWARE RIVER BASIN
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

DELTAS
Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

DEMERSAL FISH
Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

DEMINERALIZATION
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

Ion Exchange Waste Water Treatment Process,
W75-05906 5D

DEMONSTRATION WATERSHEDS
Nutrient Budget of a Douglas-Fir Forest on an Experimental Watershed in Western Oregon,
W75-05923 2K

DENITRIFICATION
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

DEPOSITION
Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

DEPOSITION (SEDIMENT)
Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

DEPOSITION (SEDIMENTS)
Structure and Directional Properties of Some Valley Sandur Deposits in Southern Iceland,
W75-06205 2J

Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

DESALINATION
The Desalination of Seawater by the Use of Nuclear Energy,
W75-06224 3A

DESALINATION PROCESSES
The Desalination of Seawater by the Use of Nuclear Energy,
W75-06224 3A

DESERTS
Hydrologic Variations and the Extent of the Holocene Lakes in the Danakil Desert, (In French),
W75-06243 2H

DESIGN
Wastewater Treatment for Small Communities: Part Two - Special Design Considerations,
W75-05944 5D

Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

DESIGN CRITERIA
Environmental Criteria for Reclamation Projects,
W75-06067 8A

DESIGN FLOOD
Computing Flood Frequency in the Humid Eastern USA,
W75-05981 4A

Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

DESILTING
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

DIELECTRIC PROPERTIES
Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

DIETS
Adding Fluorides to the Diet,
W75-06318 5C

DIFFUSION
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

DIMENSIONLESS HYDROGRAPHS
Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

DIODE TEMPERATURE TRANSDUCERS
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

DIOXIN
Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

DISCHARGE MEASUREMENT
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

DISCHARGE (WATER)
State of Ohio v. Republic Steel Corp (Action for Pollution of Waters Without a Valid Permit).
W75-06142 6E

The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

DISEASE
Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

DISPERSION
A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

DISSOLVED OXYGEN
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

The Mathematical Modelling of Rivers,
W75-06132 2E

DISSOLVED SILICA
Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

DISSOLVED SOLIDS
Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

DISTILLATION
Water Distillation Apparatus,
W75-05893 5F

Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

DISTRIBUTION
Trace Metals in Oyster Shells,
W75-06312 5A

Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

DISTRIBUTION PATTERNS
Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

DISTRIBUTION SYSTEMS
Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

DITCHES
Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

Seventeen, Inc. v. Pilot Life Insurance Co. (Action for Injunction to Restrain Diversion of Surface Waters).
W75-06147 6E

The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

DIURNAL DISTRIBUTION
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

DOMESTIC WASTES
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

DOMESTIC WATER
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

DOOR COUNTY (WIS)
The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

DOUGLAS FIR TREES
Nutrient Budget of a Douglas-Fir Forest on an Experimental Watershed in Western Oregon,
W75-05923 2K

Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

DRAINABLE POROSITY
Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

DRAINAGE
Forest Drainage in North Central United States,
W75-05918 4D

Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

DRAINAGE AREA
Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

DRAINAGE EFFECTS
Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

DRAINAGE ENGINEERING
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

DRAINAGE PATTERNS (GEOLOGIC)
Patterns of Variation in a Fluvial System,
W75-05961 2J

DRAINAGE PROGRAMS
Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

DRAINAGE SYSTEMS
The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

DRAINAGE WATER
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

DRAINS
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

DREDGING
Flood Control in the Plain Rivers,
W75-05996 4D

Monitoring Dredge Spoils,
W75-06035 5A

Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

DRIFTING (AQUATIC)
Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

DRILLING FLUIDS
Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

DRIP IRRIGATION
Drip Irrigation Method,
W75-05885 3F

Drip Irrigation,
W75-05902 3F

DROP COLLISIONS
The Water Drop Rebound Problem: Dynamics of Collision,
W75-06278 2B

DROPLET VAPORIZATION
Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

DROPS (FLUIDS)
Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

Freezing Rates of Water Droplets,
W75-06277 2C

The Water Drop Rebound Problem: Dynamics of Collision,
W75-06278 2B

DROPS (STRUCTURES)
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

DUFFIN CREEK (ONTARIO)
Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

DUPUIT-FORCHHEIMER THEORY
Stochastic Analysis of Phreatic Aquifers,
W75-06138 2F

DUWAMISH RIVER (WASH)
Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

DYE RELEASES
Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

EASEMENTS
Seventeen, Inc. v. Pilot Life Insurance Co. (Action for Injunction to Restrain Diversion of Surface Waters).
W75-06147 6E

ECOLOGY
Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

ECONOMETRICS
The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

ECONOMIC EFFICIENCY
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

ECONOMIC IMPACT
The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

Economic Analysis of Effluent Guidelines. The Electroplating Industry, Copper, Nickel, Chromium and Zinc.
W75-05873 6B

Simulation Techniques for Water Project Analyses,
W75-06328 6A

ECONOMIC PREDICTION
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

ECONOMICS
Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

ECOSYSTEMS
Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

EFFLUENTS
Pretreatment Standards for Discharge,
W75-06313 5D

EGLIN AIR FORCE BASE (FLA)
Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

ELECTRIC POWER
Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

ELECTRICAL PROPERTIES
Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

ELECTROCHEMISTRY
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

ELECTROLYTES
Apparatus for Removal of Contaminants from Wastes,
W75-05950 5D

ELECTROPLATING INDUSTRY
Economic Analysis of Effluent Guidelines. The Electroplating Industry, Copper, Nickel, Chromium and Zinc.
W75-05873 6B

ELECTROSTATIC FIELDS
Process for Electrical Coalescing of Water,
W75-06339 5G

EMBANKMENTS
Insulated Embankment Design Techniques,
W75-05897 8B

EMERALD CREEK (IDA)
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

EMERALD CREEK (IDAHO)
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

ENCROACHMENT
Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

ENERGY
Program Plan for Environmental Effects of Energy,
W75-05871 9D

ENERGY DISSIPATION
Swell Damper,
W75-05896 8B

Flexible Breakwaters,
W75-06232 8B

ENERGY SOURCES
Program Plan for Environmental Effects of Energy,
W75-05871 9D

ENFORCEMENT
State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

ENGINEERING GEOLOGY
Rock Strength from Failure Cases: Left Bank Slope Stability Study - Libby Dam and Lake Koocanusa, Montana,
W75-06252 8E

ENGINEERING STRUCTURES
Insulated Embankment Design Techniques,
W75-05897 8B

Loads on Box Culverts under High Embankments,
W75-06230 8D

ENVIRONMENT
Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

ENVIRONMENTAL CONTROL
Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

ENVIRONMENTAL EFFECTS
Program Plan for Environmental Effects of Energy,
W75-05871 9D

Monitoring Dredge Spoils,
W75-06035 5A

Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

Environmental Criteria for Reclamation Projects,
W75-06067 8A

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

Natural Environment and Development, A Planning Background Report.
W75-06105 4B

Named Individual Members of the San Antonio Conservation Society, et al. v. The Texas Highway Department (Action to Enjoin Highway Construction Through Protected Land).
W75-06150 6E

Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

Simulation Techniques for Water Project Analyses,
W75-06328 6A

Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

ENVIRONMENTAL IMPACT STATEMENT
Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

ENVIRONMENTAL IMPACT STATEMENTS
Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

ENVIRONMENTAL POLICY
Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

National Goals and Environmental Laws,
W75-06165 6E

ENVIRONMENTAL PRESERVATION
Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

ENVIRONMENTAL SANITATION
Pesticide Pyrolysis Device,
W75-06227 5G

EPIDEMICS
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

EQUATIONS
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

Finite Element Solutions for the Equations of Groundwater Flow,
W75-06083 2F

Method for Computing Evaporation from the Land Surface,
W75-06185 2D

EQUATIONS OF MOTION
Method for Computing Evaporation from the Land Surface,
W75-06185 2D

EQUILIBRIUM
Trace Element Equilibrium Studies,
W75-06326 5A

EQUIPMENT
Sampling Methods for Microbiological Analyses,
W75-06037 5A

EROSION
Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

EROSION CONTROL
Planting Grass and Pine for Erosion Control,
W75-05917 4D

The Effect of Herbaceous Vegetation on Survival and Growth of Trees Planted on Coal-Mine Spoils,
W75-05920 4D

Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

Effects of Sediment on Water Resource Planning,
W75-06056 5C

Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

EROSION RATES
Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

ERTS-1 IMAGERY
Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

ESTIMATED BENEFITS
Estimating the Value and Incidence of Recreation Benefits from a Beach Erosion Control Project,
W75-05859 6C

Benefit-Estimate of Drainage and Flood-Control Works in Small Watersheds of Semi-Arid Climate,
W75-05997 6B

ESTIMATING
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

Water Resources Development in Central America, 1970 to 1980,
W75-06270 4A

ESTUARIES
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

A Study of Rheologic Properties of Estuarial Sediments,
W75-06222 2L

The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

ESTUARINE ENVIRONMENT
Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

ESTUARINE FISHERIES
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

EUTROPHICATION
Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

EVALUATION
An Economic Analysis of the Proposed Water Resources Project for the Upper French Broad River Basin in Western North Carolina,
W75-05857 6B

Assessment of 1966 Peak Discharge of the Mekong at Vientiane,
W75-05987 2E

EVAPORATION
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

Method for Computing Evaporation from the Land Surface,
W75-06185 2D

Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

Evaporation from Snow Cover,
W75-06271 2D

Potential Evaporation as an Unsteady Process,
W75-06290 2D

EVAPORATION CONTROL
Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

EVAPORATION SUPPRESSION
Conserving Wetland Water by Suppressing Evaporation,
W75-06121 3B

EVAPOTRANSPIRATION
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

Regimes of Streamflow and Their Modification by Logging,
W75-05925 4C

Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

EXCESS WATER (SOILS)
Forest Drainage in North Central United States,
W75-05918 4D

Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

FACILITIES
Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

FAR-FIELD MODEL
A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

FARM LAGOONS
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

FARM WASTES
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

Cattle Feedlot Hydrology,
W75-06345 5B

FEDERAL GOVERNMENT
Flood Plain Management,
W75-06063 4A

National Goals and Environmental Laws,
W75-06165 6E

Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

FEDERAL PROJECT POLICY
Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

Environmental Criteria for Reclamation Projects,
W75-06067 8A

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

FEED LOTS
Cattle Feedlot Hydrology,
W75-06345 5B

FEMME OSAGE CREEK (MO.)
Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

FERNOW WATERSHEDS (W VA)
Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

FERTILIZATION
Planting Grass and Pine for Erosion Control,
W75-05917 4D

Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

FERTILIZERS
Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

FILMS
Surface Slicks and Films - A Need for Control,
W75-06023 5A

FILTERS
Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

Full Flow Fluid Filter,
W75-05948 5D

FILTRATION
Waste Water Purification System,
W75-05878 5D

Filter Systems,
W75-05880 5D

A Wastewater Treatment System,
W75-05882 5D

Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

Full Flow Fluid Filter,
W75-05948 5D

FINANCIAL FEASIBILITY
Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

FINANCING
Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

FINGERGRASS
Planting Grass and Pine for Erosion Control,
W75-05917 4D

FINITE ELEMENT ANALYSIS
Finite Element Solutions for the Equations of Groundwater Flow,
W75-06083 2F

Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

FINLAND
Evaporation from Snow Cover,
W75-06271 2D

FISH BARRIERS
Screens for Water Intake Systems,
W75-05879 8I

FISH DIETS
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

FISH HABITAT
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

FISH PONDS
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

FISH POPULATIONS
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

FISH PROTECTION
Screens for Water Intake Systems,
W75-05879 8I

FISHERIES
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

FISSURE STORAGE
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

FLAME PHOTOMETRY
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

FLAMELESS PHOTOMETRY
The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

FLOATING ICE SHEETS
Floating Ice Sheets,
W75-06280 8G

FLOCCULATION
Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

State of the Art of the Water Preparation Technology in the USSR (Der Gegenwaertige Stand der Wasseraufbereitungs Technologie in der UDSSR),
W75-06346 5D

FLOOD
Moulton v. Groveton Papers Co. (Action for Property Damages Resulting from Failure of Dam Owned by Defendant, Resulting in Downstream Flooding of Plaintiff's Property).
W75-06148 6E

FLOOD CONTROL
Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

Flood Control in the Plain Rivers,
W75-05996 4D

Benefit-Estimate of Drainage and Flood-Control Works in Small Watersheds of Semi-Arid Climate,
W75-05997 6B

A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

Flood Control Measures Leveeing and Bottom Deepening,
W75-06013 4D

Institute for Water Resources (Army Corps of Engineers), Annual Report, 1972.
W75-06018 6B

Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

Floodwater Management Plan, North Branch of the Chicago River, Lake and Cook Counties, Illinois.
W75-06048 4A

Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

Flood Plain Management,
W75-06063 4A

Mississippi River and Tributaries Project, Problems Relating to Changes in Hydraulic Capacity of the Mississippi River,
W75-06212 8B

FLOOD DAMAGE
Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

Norms and Criteria for Initiating Scientific Assessment of Flood Damages in Non-Uniform Conditions in Madhya Pradesh State--India,
W75-06000 2E

Flood Damage in New Zealand,
W75-06001 4A

ECON2, Project Formulation--Economics--Computer Program User's Guide,
W75-06220 7C

FLOOD DATA
The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

FLOOD DISCHARGE
Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Flood Computations for the Hawaiian Islands,
W75-05984 4A

A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

FLOOD FLOW
Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

FLOOD FORECASTING
Flood Prediction - A Bayesian Approach,
W75-05989 4A

Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

Flood Prediction Method of River with Reservoir and Confluence of Tributaries,
W75-06005 2A

Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

Basinwide Flood Forecasting System for the Lower Mekong Basin,
W75-06007 4A

Forecasting of Flood Characteristics of the Nile,
W75-06008 4A

Efficient Gate Operation of the Vaaldam to Minimize Downstream Flood Damage,
W75-06009 4A

The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

FLOOD FREQUENCY

Computing Flood Frequency in the Humid Eastern USA,
W75-05981 4A

Effect of Dams on Flood Frequency,
W75-05982 4A

The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

FLOOD PEAK

A General Formula for Determination of Peak Flood,
W75-05983 4A

Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

FLOOD PLAIN ZONING

Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

FLOOD PLAINS

Flood Plain Management,
W75-06063 4A

Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

FLOOD PROFILES

Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

WSP2-Water Surface Profile Program, User's Guide,
W75-06186 7C

FLOOD PROTECTION

Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

Flood Control in the Plain Rivers,
W75-05996 4D

Highlights of Flood Protection Works Done on River Narmada at Hoshangabad in Madhya Pradesh State - India,
W75-05998 4D

Flood Damage in New Zealand,
W75-06001 4A

Flood Plain Management,
W75-06063 4A

Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

FLOOD ROUTING

Flood Routing Studies of Gandhisagar Dam,
W75-06003 2E

A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

FLOOD WAVES

Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

FLOODING

Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

ECON2, Project Formulation--Economics--Computer Program User's Guide,
W75-06220 7C

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

FLOODING. DRAINAGE

TR-20 Project Formulation--Hydrology, Computer Program User's Manual,
W75-06219 7C

FLOODS

Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Assessment of 1966 Peak Discharge of the Mekong at Vientiane,
W75-05987 2E

Norms and Criteria for Initiating Scientific Assessment of Flood Damages in Non-Uniform Conditions in Madhya Pradesh State--India,
W75-06000 2E

Flood Management in Developing Countries,
W75-06002 6F

Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

FLORENCE (SC)

City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

FLORIDA

Natural Environment and Development, A Planning Background Report.
W75-06105 4B

Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

FLOW CONTROL

Anti-Backflow Water Control and Solution Proportioner,
W75-05909 8C

Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

FLOW MEASUREMENT

A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

FLOW PROFILES
WSP2-Water Surface Profile Program, User's Guide,
W75-06186 7C

FLOW REDUCTION
Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

FLOW RESISTANCE
A General Theory for Flow in Rough Conduits,
W75-06120 8B

FLOW STABILITY
Stability of Single-Peaked Waves,
W75-06118 2E

FLUORIDATION
Adding Fluorides to the Diet,
W75-06318 5C

FLUVIAL MORPHOLOGY
Patterns of Variation in a Fluvial System,
W75-05961 2J

FOOD CHAINS
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

FOOD WEBS
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

FORECASTING
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

Application of Monochromatic Ocean Wave Forecasts to Prediction of Wave-Induced Currents,
W75-06246 2L

Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

FOREST INFLUENCES
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

FOREST MANAGEMENT
Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Forest Drainage in North Central United States,
W75-05918 4D

The Future Role of Chemicals in Forestry,
W75-05935 4C

Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

FOREST MICROCLIMATE
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

FOREST VEGETATION
Herbicides and Water Quality in American Forestry,
W75-06333 5B

FOREST WATERSHEDS
Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

FORESTRY
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

FORESTS
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

FORM-PROCESS RELATIONSHIPS
Form-Process Relationships on Island Coasts,
W75-06229 2L

FOURIER ANALYSIS
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

FRACTURES (GEOLOGIC)
Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

FREEZING
Ice Engineering - Quantification of Subsurface Ice Thickening Techniques,
W75-06254 2C

Freezing Rates of Water Droplets,
W75-06277 2C

FREEZING RATES
Freezing Rates of Water Droplets,
W75-06277 2C

FREQUENCY ANALYSIS
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

FRESHWATER INFLOW
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

FRESNO (CALIF.)
City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

FROUDE NUMBER
A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

FRY
Variation with Chain Length in Acute Toxicity of Alkylhydroxamic Acids to Salmon (Salmo Salar) Fry.
W75-05975 5C

FUELS
Program Plan for Environmental Effects of Energy,
W75-05871 9D

FUNGICIDES
The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

FUNGUS METABOLITES
Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

FUTURE PLANNING
Ketchikan Waterfront Development,
W75-06055 6A

GASTROINTESTINAL DISTURBANCES
Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

GATES
Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

GEOCHEMISTRY
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

GEOHYDROLOGIC UNITS
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

GEOLOGIC INVESTIGATIONS
A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

Natural Environment and Development, A Planning Background Report.
W75-06105 4B

GEOMORPHOLOGY
Patterns of Variation in a Fluvial System,
W75-05961 2J

Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

Some Considerations of Straightness in Channel Form Relating to the Estuary of the Maclennan River, South Otago (New Zealand),
W75-06285 2L

GEOTHERMAL STUDIES
Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

GHANA (TODZIE RIVER BASIN)
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

GLACIAL DRIFT
Deglaciation of the Labrador Continental Shelf,
W75-06279 2C

GLACIERS
Deglaciation of the Labrador Continental Shelf,
W75-06279 2C

GOVERNMENT FINANCE
The State of Texas, Et Al. V. Fri (Challenge of Executive Impoundment of FWPCA Funds),
W75-06152 5G

Waters and Watercourses--Public Trust Doctrine--an Ordinance Providing a Residency--Differentiated Fee Schedule for Use of a Municipal Beach is Invalid as a Violation of the Public Trust Doctrine,
W75-06162 6E

GOVERNMENTAL INTERRELATIONS
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

GRAPHICAL ANALYSIS
Benefit-Estimate of Drainage and Flood-Control Works in Small Watersheds of Semi-Arid Climate,
W75-05997 6B

Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

GRASSES
All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

GRAZING
Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

GREAT BASIN
Surface Runoff Hydrograph Equation,
W75-06139 2A

GREAT LAKES
Recent and Late Quaternary Changes in Water Level,
W75-06260 2H

GREEN-AMPT EQUATION
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

GRINDSTONE (MO.)
Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

GROUND WATER MOVEMENT
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

GROUNDWATER
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

Subsurface Water Data of the Upper Michigan Region, Project Sanguine.
W75-06236 4B

Subsurface Biological Activity in Relation to Ground-Water Pollution,
W75-06238 5B

Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

The Fate of Spilled Oil in the Soil,
W75-06266 5B

GROUNDWATER AVAILABILITY
Subsurface Water Data of the Upper Michigan Region, Project Sanguine.
W75-06236 4B

GROUNDWATER BASINS
Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

GROUNDWATER MOVEMENT
A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

Finite Element Solutions for the Equations of Groundwater Flow,
W75-06083 2F

Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

GROUNDWATER MOVEMENT. *CARBONATE ROCKS
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

GROUNDWATER RECHARGE
Stochastic Analysis of Phreatic Aquifers,
W75-06138 2F

GROUNDWATER RESOURCES
Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

Subsurface Water Data of the Upper Michigan Region, Project Sanguine.
W75-06236 4B

Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

GULF STREAM
Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

GULFS
The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

HAIL
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

Air Bubbles in Accreted Ice,
W75-06275 2C

HALOCLINE
Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

HARBORS
Galveston Harbor: Factors Affecting Pollution and Pollution Monitoring,
W75-06040 5A

Ameraport Deep Draft Harbor and Terminal Compact,
W75-06153 6E

Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

HARDWOOD
Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

HAWAII
Flood Computations for the Hawaiian Islands,
W75-05984 4A

Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

HAZARDOUS SUBSTANCES
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk. Executive Summary.
W75-05858 6B

A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk, Final Report (Revised).
W75-05870 6B

HAZARDS
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk. Executive Summary.
W75-05858 6B

A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk, Final Report (Revised).
W75-05870 6B

HEAT BUDGET
The Mathematical Modelling of Rivers,
W75-06132 2E

HEAT FLOW
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

HEATED WATER
Study of Stratified Overflows and Underflows,
W75-06081 5B

HEAVY METALS
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Philosophy and Methodology of Metallic Waste Treatment,
W75-06320 5D

Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

HELLMANN GAGE
Correction for the Wetting Loss of a Hellmann Precipitation Gauge,
W75-06267 7B

HERBACEOUS VEGETATION
All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

HERBICIDES
The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

Herbicides and Water Quality in American Forestry,
W75-06333 5B

HIGH PRESSURE LIQUID CHROMATOGRAPHY
Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

HIGHWAY EFFECTS
Named Individual Members of the San Antonio Conservation Society, et al. v. The Texas Highway Department (Action to Enjoin Highway Construction Through Protected Land).
W75-06150 6E

HINKSON CREEK (MO.)
Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

HISTORY
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

HODOGRAPH ANALYSIS
The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

HOGS
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

HOMOGENEITY
The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

HUDSON RIVER
An Analysis of Past, Present and Future Hudson River Wastewater Loadings,
W75-06065 5B

HUMAN BEHAVIOR
Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

HUMAN DISEASES
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

HUNGARY
Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

HUNGARY (LAKE BALATON)
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

HYDRAULIC CAPACITY
Mississippi River and Tributaries Project, Problems Relating to Changes in Hydraulic Capacity of the Mississippi River,
W75-06212 8B

HYDRAULIC CONDUCTIVITY
Role of Bedrock in Watershed Management,
W75-05932 4D

HYDRAULIC ENGINEERING
Bolinas Lagoon Inlet, California,
W75-06217 2L

HYDRAULIC FRACTURE GRADIENT
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

HYDRAULIC GEOMETRY
The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

HYDRAULIC MODELS
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

HYDRAULIC SIMILITUDE
Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

HYDRAULIC STRUCTURES
Highlights of Flood Protection Works Done on River Narmada at Hoshangabad in Madhya Pradesh State - India,
W75-05998 4D

HYDRAULICS
A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

HYDROELECTRIC POWER
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

HYDROELECTRIC PROJECT LICENSING
Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

HYDROGEOLOGY
Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

HYDROGRAPH ANALYSIS
Unit Hydrographs and Statistical Density Functions,
W75-05991 2E

Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

Forecasting of Flood Characteristics of the Nile,
W75-06008 4A

A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

Surface Runoff Hydrograph Equation,
W75-06139 2A

Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

HYDROGRAPHS
Flood Routing Studies of Gandhisagar Dam,
W75-06003 2E

Efficient Gate Operation of the Vaaldam to Minimize Downstream Flood Damage,
W75-06009 4A

Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

HYDROLOGIC ASPECTS
Flood Routing Studies of Gandhisagar Dam,
W75-06003 2E

Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

HYDROLOGIC CYCLE
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

HYDROLOGIC DATA
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

Hydrologic Data: 1973; Volume IV: San Joaquin Valley.
W75-06208 7C

Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

HYDROLOGIC SYSTEMS
Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

HYDROLOGY
Surface Runoff Hydrograph Equation,
W75-06139 2A

TR-20 Project Formulation--Hydrology, Computer Program User's Manual,
W75-06219 7C

DAMS2, Project Formulation--Structure Site Analysis, User's Guide,
W75-06221 7C

Cattle Feedlot Hydrology,
W75-06345 5B

ICE
Investigation of Solar Energy for Ice Melting.
W75-06135 2C

Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

Ice Engineering - Quantification of Subsurface Ice Thickening Techniques,
W75-06254 2C

Air Bubbles in Accreted Ice,
W75-06275 2C

Floating Ice Sheets,
W75-06280 8G

ICE CONTROL MATERIALS
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

ICED LAKES
Investigation of Solar Energy for Ice Melting.
W75-06135 2C

ICELAND
Structure and Directional Properties of Some Valley Sandur Deposits in Southern Iceland,
W75-06205 2J

IDAHO
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

ILLINOIS
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

Armstrong Chemcon, Inc. v. Pollution Control Board (Appeal of Board's Action Limiting Discharges of Mercury into Waters).
W75-06144 6E

ILLINOIS RIVER (ILL)
The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

IMMISCIBILITY
Description of Water and Air Movement During Infiltration,
W75-06288 2G

IMPAIRED WATER QUALITY
A Study of Natural Water Systems in Western Montana,
W75-06082 5B

IN-PUT-OUT-PUT ANALYSIS
Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

IN-SITU PERMEABILITY
In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

INCINERATION
Pesticide Pyrolysis Device,
W75-06227 5G

INDIA
Flood Management in Developing Countries,
W75-06002 6F

Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

INDIA (GANDHISAGAR DAM)
Flood Routing Studies of Gandhisagar Dam,
W75-06003 2E

INDIA (NARMADA RIVER)
Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

INDIANA
Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

INDUSTRIAL PLANTS
Planning Industrial Areas for Barge Ports,
W75-06052 6A

INDUSTRIAL WASTES
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

State of Ohio v. Republic Steel Corp (Action for Pollution of Waters Without a Valid Permit).
W75-06142 6E

Characterization of Wastewaters from the Ethical Pharmaceutical Industry,
W75-06244 5A

Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

Pretreatment Standards for Discharge,
W75-06313 5D

Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

More Life for Diaphragm Cells.
W75-06324 5G

INDUSTRIAL WATER
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

INDUSTRIES
Economic Analysis of Effluent Guidelines. The Electroplating Industry, Copper, Nickel, Chromium and Zinc.
W75-05873 6B

INFECTION
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

INFILTRATION
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

Description of Water and Air Movement During Infiltration,
W75-06288 2G

INFLOW
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

INFORMATION RETRIEVAL
Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume II - Data Acquisition.
W75-06042 7C

INJUNCTIVE RELIEF
Seventeen, Inc. v. Pilot Life Insurance Co. (Action for Injunction to Restrain Diversion of Surface Waters).
W75-06147 6E

INLAND WATERWAYS
Planning Industrial Areas for Barge Ports,
W75-06052 6A

INLETS (WATERWAYS)
Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

Bolinas Lagoon Inlet, California,
W75-06217 2L

The Dynamics of Inlets and Bays,
W75-06223 2L

INSTANTANEOUS UNIT HYDROGRAPH
Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

INSTITUTIONAL CONSTRAINTS
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

INSTRUMENTATION
A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

Problems of Nuclear Gauging of Suspended Sediment Concentration,
W75-05978 2J

Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

Instruments for Investigation of Fogs and Clouds and Measurement of Humidity,
W75-06041 2B

Automation of the Continuous Coagulation Monitor,
W75-06074 5F

Radiometry of Water Turbidity Measurements,
W75-06128 5A

Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

Polarographic Oxygen Sensors.
W75-06136 2K

Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

INTEGRAL EQUATION
Description of Water and Air Movement During Infiltration,
W75-06288 2G

INTERCEPTION
Relationships Between Rainfall Parameters and Interception by Tropical Forest,
W75-06291 2B

INTERDISTRIBUTARY BAYS
Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

INTERSTATE COMMISSIONS
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

INTERSTATE COMPACTS
Ameraport Deep Draft Harbor and Terminal Compact,
W75-06153 6E

INTERSTATE RIVERS
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

INTERTIDAL AREAS
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

ION EXCHANGE
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

Ion Exchange Waste Water Treatment Process,
W75-05906 5D

Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

Trace Element Equilibrium Studies,
W75-06326 5A

IRIDIUM
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

IRRIGATION
Simulation Techniques for Water Project Analyses,
W75-06328 6A

IRRIGATION EFFECTS
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

IRRIGATION EFFICIENCY
Automatic Irrigation Apparatus,
W75-05901 3F

IRRIGATION SYSTEM
Drip Irrigation Method,
W75-05885 3F

Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

IRRIGATION SYSTEMS
Irrigation System,
W75-05887 3F

Automatic Irrigation Apparatus,
W75-05901 3F

Drip Irrigation,
W75-05902 3F

IRRIGATION WATER
The Colorado: A Weary River,
W75-06100 4A

ISLANDS
Form-Process Relationships on Island Coasts,
W75-06229 2L

ISOTHERMS
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

ITALY (ARNO RIVER)
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

JAMES RIVER (VA)
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

JAPAN
Flood Prediction Method of River with Reservoir and Confluence of Tributaries,
W75-06005 2A

JUDICIAL DECISIONS
Micucci v. White Mountain Trust Co. (Action for Damages and Relief Caused by Runoff Flow from Adjacent Property).
W75-06141 6E

State of Ohio v. Republic Steel Corp (Action for Pollution of Waters Without a Valid Permit).
W75-06142 6E

Lloyd Harbor Study Group, Inc. v. Diamond (Action Challenging Determination that Water Quality Standards Would not be Contravened by Construction of Nuclear Power Plant).
W75-06143 6E

Armstrong Chemcon, Inc. v. Pollution Control Board (Appeal of Board's Action Limiting Discharges of Mercury into Waters).
W75-06144 6E

Seventeen, Inc. v. Pilot Life Insurance Co. (Action for Injunction to Restrain Diversion of Surface Waters).
W75-06147 6E

Moulton v. Groveton Papers Co. (Action for Property Damages Resulting from Failure of Dam Owned by Defendant, Resulting in Downstream Flooding of Plaintiff's Property).
W75-06148 6E

Named Individual Members of the San Antonio Conservation Society, et al. v. The Texas Highway Department (Action to Enjoin Highway Construction Through Protected Land).
W75-06150 6E

Colorado Public Interest Research Group, Inc. V. Train (Suit Challenging Accord Followed by

EPA and AEC to Correlation of the FWPCA and the Atomic Energy Act),
W75-06151 6E

The State of Texas, Et Al. V. Fri (Challenge of Executive Impoundment of FWPCA Funds),
W75-06152 5G

State v. Reed (Action by State to Prevent Construction of Drive-Way thru Wetlands, A Violation of Statute),
W75-06155 6E

State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

Kirkland v. Hardwicke Chemical Co. (Action for Pollution of Stream),
W75-06158 6E

KAOLINITE
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite.,
W75-06284 2F

KARST HYDROLOGY
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

KENTUCKY
Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

KERNEL FUNCTIONS
Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

KETCHIKAN (ALASKA)
Ketchikan Waterfront Development,
W75-06055 6A

LABORATORIES
Environmental Control Laboratory Designed for the Specific Needs of the Intern Training Center, Red River Army Depot,
W75-06210 5A

LABORATORY EQUIPMENT
Environmental Control Laboratory Designed for the Specific Needs of the Intern Training Center, Red River Army Depot,
W75-06210 5A

LABORATORY TESTS
A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

LABRADOR SHELF
Deglaciation of the Labrador Continental Shelf,
W75-06279 2C

LAGOONS
Bolinas Lagoon Inlet, California,
W75-06217 2L

LAKE GEORGE (NEW YORK)
Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

LAKE ICE
Investigation of Solar Energy for Ice Melting.
W75-06135 2C

LAKE LANSING (MICH)
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

LAKE MORPHOLOGY
Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

LAKE MORPHOMETRY
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

LAKE SEDIMENTS
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

Carbohydrates from Lake Sediments,
W75-06125 2H

LAKE STAGES
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

LAKES
Determination of Water Temperature in Shallow Water Bodies,
W75-05969 2H

Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

Carbohydrates from Lake Sediments,
W75-06125 2H

Hydrologic Variations and the Extent of the Holocene Lakes in the Danakil Desert, (In French),
W75-06243 2H

The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

LAND MANAGEMENT
A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

LAND USE
A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

LANDFILLS
Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

Survival of Viruses and Bacteria in a Simulated Sanitary Landfill,
W75-06231 5B

LANDSLIDES
Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

LARGE WATERSHEDS
Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

LARVAL ZOOPLANKTON
The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

LATERAL CONVEYANCE STRUCTURES
Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

LAUREL LAKE (MASS)
Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

LAW ENFORCEMENT
State v. Reed (Action by State to Prevent Construction of Drive-Way thru Wetlands, A Violation of Statute),
W75-06155 6E

Licenses--Motor Vehicle--Suspension for Dumping,
W75-06156 6E

LEAD
Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

LEAST-COST ANALYSES
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

LEGAL ASPECTS
Micucci v. White Mountain Trust Co. (Action for Damages and Relief Caused by Runoff Flow from Adjacent Property).
W75-06141 6E

Kirkland v. Hardwicke Chemical Co. (Action for Pollution of Stream),
W75-06158 6E

Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

LEGISLATION
Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

Natural Resources--Conservation Restrictions.
W75-06145 6E

Lower St. Louis River Basin--Sanitary Sewers (As Amended).
W75-06146 6E

Ameraport Deep Draft Harbor and Terminal Compact,
W75-06153 6E

Ameraport Offshore Harbor and Terminal Commission,
W75-06154 6E

Licenses--Motor Vehicle--Suspension for Dumping,
W75-06156 6E

Five Mile River Commission,
W75-06159 6E

Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

Defining Freshwater Wetlands,
W75-06161 4A

A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

National Goals and Environmental Laws,
W75-06165 6E

An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

LIGHT ABSORPTION
Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

LIGHT PENETRATION
Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

LIGHT SCATTERING
Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

LIGNINS
Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

LIMNOLOGY
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

LINEAR PROGRAMMING
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

LIQUID STORAGE
Insulated Embankment Design Techniques,
W75-05897 8B

LITHOLOGY
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

LITTER
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

LITTLE MIAMI RIVER (OHIO)
Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

LOAD DISTRIBUTION
Loads on Box Culverts under High Embankments,
W75-06230 8D

LOBLOLLY PINE TREES
Planting Grass and Pine for Erosion Control,
W75-05917 4D

LOCAL GOVERNMENTS
Five Mile River Commission,
W75-06159 6E

Waters and Watercourses--Public Trust Doctrine--an Ordinance Providing a Residency--Differentiated Fee Schedule for Use of a Municipal Beach is Invalid as a Violation of the Public Trust Doctrine,
W75-06162 6E

LONG ISLAND (NY)
Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

LONG LAKE (WASH.)
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

LONG-TERM PLANNING
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

LOS ANGELES HARBOR (CALIF)
Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

LOUISIANA
Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

LOVEGRASS
Planting Grass and Pine for Erosion Control,
W75-05917 4D

LOW-FLOW AUGMENTATION
Effects of Sediment on Water Resource Planning,
W75-06056 5C

LOW TEMPERATURE ABSORPTION
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

LOWER MEKONG BASIN
Basinwide Flood Forecasting System for the Lower Mekong Basin,
W75-06007 4A

LUMBERING
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Regimes of Streamflow and Their Modification by Logging,
W75-05925 4C

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

LYSIMETERS
Survival of Viruses and Bacteria in a Simulated Sanitary Landfill,
W75-06231 5B

MACROBENTHOS
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

MAHALAPSHWE WATERSHED (BOTSWANA)
A Compact Watershed Model System,
W75-06286 2A

MALAYSIA (TEMENGOR RESERVOIR)
A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

MANAGEMENT
Development of a Comprehensive TVA Water Resource Management Program.
W75-05874 6A

Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

MAPPING
Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume IV - Computer Program Description and Users' Guide.
W75-06044 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume V - Information Correlation and Interpretation.
W75-06045 7C

The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

MAPS
Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume II - Data Acquisition.
W75-06042 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume III - Control Network Establishment.
W75-06043 7C

MARINE MICROORGANISMS
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

MARYLAND
Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

MASS SPECTROMETRY
Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

MASS TRANSFER
Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

MASSACHUSETTS
Licenses--Motor Vehicle--Suspension for Dumping,
W75-06156 6E

Defining Freshwater Wetlands,
W75-06161 4A

Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

Preliminary Observations on the Biogeochemical Cycle of Silica in Stockbridge Bowl (Lake),
W75-06191 5C

Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

MATHEMATICAL MODELS
International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

Flood Prediction Method of River with Reservoir and Confluence of Tributaries,
W75-06005 2A

Mathematical Modeling as a Framework for Coastal Monitoring,
W75-06021 5B

A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

Water Management in Livestock Waste Handling Systems,
W75-06087 5D

The Mathematical Modelling of Rivers,
W75-06132 2E

Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

Simultaneous Pumping of Fresh and Salt Water from a Coastal Aquifer,
W75-06296 4B

MATHEMATICAL STUDIES
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

MEASUREMENT
Problems of Nuclear Gauging of Suspended Sediment Concentration,
W75-05978 2J

Instruments for Investigation of Fogs and Clouds and Measurement of Humidity,
W75-06041 2B

MECHANICAL PROPERTIES
A Study of Rheologic Properties of Estuarial Sediments,
W75-06222 2L

MEDITERRANEAN SEA
Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

MEKONG RIVER
Assessment of 1966 Peak Discharge of the Mekong at Vientiane,
W75-05987 2E

MERCURY
Armstrong Chemcon, Inc. v. Pollution Control Board (Appeal of Board's Action Limiting Discharges of Mercury into Waters).
W75-06144 6E

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

MEROMIXIS
Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

METABOLISM
Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

METALS
Economic Analysis of Effluent Guidelines. The Electroplating Industry, Copper, Nickel, Chromium and Zinc.
W75-05873 6B

Determination of Metals in Sea Water,
W75-06027 5A

Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

METALS

A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

Trace Metals in Oyster Shells,
W75-06312 5A

METEOROLOGICAL DATA
Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

METEOROLOGY
The Water Drop Rebound Problem: Dynamics of Collision,
W75-06278 2B

METHIONINE
Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

METHODOLOGY
A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

A General Formula for Determination of Peak Flood,
W75-05983 4A

Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

Method for Computing Evaporation from the Land Surface,
W75-06185 2D

METHYLMERCURY
Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

MEXICO
Flood Control in the Plain Rivers,
W75-05996 4D

MICHIGAN
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

MICROBIOLOGY
Sampling Methods for Microbiological Analyses,
W75-06037 5A

Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

MICROORGANISMS
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Slime Control Compositions and Their Use,
W75-05907 5D

Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

MINE RECLAMATION
Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

MINERALOGY
Mineral Sleuth Will Scan Ocean Floors.
W75-06316 7B

MINING
Methods and Machines.
W75-05942 5E

Mineral Sleuth Will Scan Ocean Floors.
W75-06316 7B

MINNESOTA
Economics of Small Watershed Planning in Minnesota,
W75-05866 6B

Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

Natural Resources--Conservation Restrictions.
W75-06145 6E

Lower St. Louis River Basin--Sanitary Sewers (As Amended).
W75-06146 6E

MISSISSIPPI
Planting Grass and Pine for Erosion Control,
W75-05917 4D

Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

MISSISSIPPI RIVER
Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

Mississippi River and Tributaries Project, Problems Relating to Changes in Hydraulic Capacity of the Mississippi River,
W75-06212 8B

MISSOURI
Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

MISSOURI RIVER
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

MIXTURES
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

MOBILE (ALA)
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

MODEL STUDIES
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

Modelling of Erodible Channels,
W75-06014 2J

A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

The Mathematical Modelling of Rivers,
W75-06132 2E

A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

A Compact Watershed Model System,
W75-06286 2A

Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

MOLLUSKS
The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

MOMENTUM EQUATION
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

MONILIFORMIN
Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

MONITORING
Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

Mathematical Modeling as a Framework for Coastal Monitoring,
W75-06021 5B

A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

Biological Problems in Estuarine Monitoring,
W75-06026 5A

Monitoring Seawater for Radionuclides,
W75-06031 5A

Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

Monitoring Dredge Spoils,
W75-06035 5A

Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

Galveston Harbor: Factors Affecting Pollution and Pollution Monitoring,
W75-06040 5A

Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

MONTANA
A Study of Natural Water Systems in Western Montana,
W75-06082 5B

Rock Strength from Failure Cases: Left Bank Slope Stability Study - Libby Dam and Lake Koocanusa, Montana,
W75-06252 8E

MONTE CARLO METHOD
Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

MOSSES
The Pulvinate Moss Vegetation in the Karadj-Valley (Elburs Mountains, Iran), (In German),
W75-05966 2A

MOUNTAIN FORESTS
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

MOVABLE DAMS
Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

MULCHING
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

MULTIPLE-PURPOSE PROJECTS
Simulation Techniques for Water Project Analyses,
W75-06328 6A

MULTIPLE-PURPOSE RESERVOIRS
Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

MULTISPECTRAL SCANNER
Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume II - Data Acquisition.
W75-06042 7C

MUNICIPAL WATER
City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

NARGE CREEK (KY)
Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

NATIONAL ENVIRONMENTAL POLICY ACT
Environmental Criteria for Reclamation Projects,
W75-06067 8A

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

NATIONAL SCIENCE FOUNDATION
Program Plan for Environmental Effects of Energy,
W75-05871 9D

NATURAL RESOURCES
National Goals and Environmental Laws,
W75-06165 6E

NAVASOTA RIVER (TEX)
A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

NAVIGABLE WATERS
Shoaling Measurements in Navigable Waters by the U.S. Army Corps of Engineers,
W75-05977 8B

Le Compte v. State (New Jersey) (Action Seeking Declaratory Judgment by Plaintiff, Applicant for Purchase of Tidelands Challenging Use and Occupancy Restrictions Imposed by Natural Resource Council).
W75-06149 6E

NAVIGATION OBSTRUCTIONS
Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

NERITIC
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

NETWORK DESIGN
The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

NEVADA
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

NEW HAMPSHIRE
Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

Micucci v. White Mountain Trust Co. (Action for Damages and Relief Caused by Runoff Flow from Adjacent Property).
W75-06141 6E

Moulton v. Groveton Papers Co. (Action for Property Damages Resulting from Failure of Dam Owned by Defendant, Resulting in Downstream Flooding of Plaintiff's Property).
W75-06148 6E

NEW JERSEY
Le Compte v. State (New Jersey) (Action Seeking Declaratory Judgment by Plaintiff, Applicant for Purchase of Tidelands Challenging Use

and Occupancy Restrictions Imposed by Natural Resource Council).
W75-06149 6E

Waters and Watercourses--Public Trust Doctrine--an Ordinance Providing a Residency--Differentiated Fee Schedule for Use of a Municipal Beach is Invalid as a Violation of the Public Trust Doctrine,
W75-06162 6E

Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

NEW YORK
A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

Lloyd Harbor Study Group, Inc. v. Diamond (Action Challenging Determination that Water Quality Standards Would not be Contravened by Construction of Nuclear Power Plant).
W75-06143 6E

State v. Reed (Action by State to Prevent Construction of Drive-Way thru Wetlands, A Violation of Statute),
W75-06155 6E

State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

NEW YORK BIGHT
Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

NEW ZEALAND
Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

Flood Damage in New Zealand,
W75-06001 4A

NEW ZEALAND (MACLENNAN RIVER)
Some Considerations of Straightness in Channel Form Relating to the Estuary of the Maclennan River, South Otago (New Zealand),
W75-06285 2L

NEW ZEALAND (TORLESSE STREAM)
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

NICKEL
Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

NILE RIVER
Forecasting of Flood Characteristics of the Nile,
W75-06008 4A

NITRIC OXIDE
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

NITROGEN
Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

NITROGENOUS MATTER
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

NON-UNIFORM FLOW
Stability of Single-Peaked Waves,
W75-06118 2E

NONSTRUCTURAL ALTERNATIVES
Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

NORFOLK HARBOR (VA)
Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

NORTH CAROLINA
An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

NORTH SASKATCHEWAN RIVER (CANADA)
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

NUCLEAR ENERGY
Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

NUCLEAR EXPLOSIONS
Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

NUCLEAR POWERPLANTS
Colorado Public Interest Research Group, Inc. V. Train (Suit Challenging Accord Followed by EPA and AEC to Correlation of the FWPCA and the Atomic Energy Act),
W75-06151 6E

The Desalination of Seawater by the Use of Nuclear Energy,
W75-06224 3A

NUCLEAR WASTES
Colorado Public Interest Research Group, Inc. V. Train (Suit Challenging Accord Followed by EPA and AEC to Correlation of the FWPCA and the Atomic Energy Act),
W75-06151 6E

NUISANCE (LEGAL ASPECTS)
State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

NUMERICAL ANALYSIS
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

NUTRIENT REMOVAL
Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

NUTRIENT REQUIREMENTS
Nutrient Budget of a Douglas-Fir Forest on an Experimental Watershed in Western Oregon,
W75-05923 2K

NUTRIENTS
Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

OBSTRUCTION TO FLOW
Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

OCEAN CIRCULATION
Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

OCEAN CURRENTS
Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

Application of Monochromatic Ocean Wave Forecasts to Prediction of Wave-Induced Currents,
W75-06246 2L

OCEAN WAVES
The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

Application of Monochromatic Ocean Wave Forecasts to Prediction of Wave-Induced Currents,
W75-06246 2L

OCEANOGRAPHY
Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

Monitoring Seawater for Radionuclides,
W75-06031 5A

Sampling Methods for Microbiological Analyses,
W75-06037 5A

Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

OCEANS
Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

Recent and Late Quaternary Changes in Water Level,
W75-06260 2H

Mineral Sleuth Will Scan Ocean Floors.
W75-06316 7B

OFFSHORE DRILLING
Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

OFFSHORE PLATFORMS
Ameraport Offshore Harbor and Terminal Commission,
W75-06154 6E

OHIO
State of Ohio v. Republic Steel Corp (Action for Pollution of Waters Without a Valid Permit).
W75-06142 6E

Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

OIL POLLUTION
System for Removing Floating Oil from Water,
W75-05881 5G

Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

Oil Slick Skimmer,
W75-05905 5G

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

OIL SPILLS
System for Removing Floating Oil from Water,
W75-05881 5G

Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

Oil Slick Skimmer,
W75-05905 5G

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

The Fate of Spilled Oil in the Soil,
W75-06266 5B

OIL WASTES
Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

OKLAHOMA
Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

ON-SITE DATA COLLECTIONS
Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

ON-SITE INVESTIGATIONS
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

Shoaling Measurements in Navigable Waters by the U.S. Army Corps of Engineers,
W75-05977 8B

Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

ON-SITE TESTS
Improved Field Water Analysis Tests,
W75-06122 2K

ONE HUNDRED AND TWO RIVER (MO.)
Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

OPEN CHANNEL FLOW
A General Theory for Flow in Rough Conduits,
W75-06120 8B

OPERATION AND MAINTENANCE
Wastewater Treatment for Small Communities: Part Two - Special Design Considerations,
W75-05944 5D

Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

OPTICAL PROPERTIES
Radiometry of Water Turbidity Measurements,
W75-06128 5A

OPTIMIZATION
Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

OPTIMUM DEVELOPMENT PLANS
A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

OPTIMUM FORECAST
Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

OREGON
Nutrient Budget of a Douglas-Fir Forest on an Experimental Watershed in Western Oregon,
W75-05923 2K

DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

ORGANIC COMPOUNDS
Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

ORGANIC SOILS
Forest Drainage in North Central United States,
W75-05918 4D

The Hydrologic Characteristics of Undrained Organic Soils in the Lake States,
W75-05924 2G

Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

ORGANOCHLORINE
Biological Problems in Estuarine Monitoring,
W75-06026 5A

ORTHOPHOSPHATES
Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

OSCILLATIONS
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

OSMOTIC PRESSURE
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

OVERFLOW
Storm and Combined Sewer Research and Development,
W75-06049 8C

Study of Stratified Overflows and Underflows,
W75-06081 5B

OXIDATION
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

OXYGEN
Method of Introducing Oxygen into a Liquid to be Clarified and Device for Carrying the Method into Effect,
W75-05951 5D

Polarographic Oxygen Sensors.
W75-06136 2K

OXYGEN DEMAND
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

OXYGEN REQUIREMENTS
Polarographic Oxygen Sensors.
W75-06136 2K

OYSTERS
Trace Metals in Oyster Shells,
W75-06312 5A

PACIFIC OCEAN
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

PAINTS
Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

PASCO (WASH)
Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

PATENTS
Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

Waste Water Purification System,
W75-05878 5D

Screens for Water Intake Systems,
W75-05879 8I

Filter Systems,
W75-05880 5D

System for Removing Floating Oil from Water,
W75-05881 5G

A Wastewater Treatment System,
W75-05882 5D

Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

Drip Irrigation Method,
W75-05885 3F

Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

Irrigation System,
W75-05887 3F

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Reverse Osmosis Water Purifying System for Household Use,
W75-05891 5F

Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

Water Distillation Apparatus,
W75-05893 5F

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Swell Damper,
W75-05896 8B

Insulated Embankment Design Techniques,
W75-05897 8B

Floating Wave Barrier,
W75-05898 2J

Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

Automatic Irrigation Apparatus,
W75-05901 3F

Drip Irrigation,
W75-05902 3F

Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

Oil Slick Skimmer,
W75-05905 5G

Ion Exchange Waste Water Treatment Process,
W75-05906 5D

Slime Control Compositions and Their Use,
W75-05907 5D

Liquid Suspension Purifying Unit,
W75-05908 5D

Anti-Backflow Water Control and Solution Proportioner,
W75-05909 8C

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

Apparatus for Sampling Liquids,
W75-05945 7B

Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

Full Flow Fluid Filter,
W75-05948 5D

Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

Apparatus for Removal of Contaminants from Wastes,
W75-05950 5D

Method of Introducing Oxygen into a Liquid to be Clarified and Device for Carrying the Method into Effect,
W75-05951 5D

Process for Electrical Coalescing of Water,
W75-06339 5G

PATERSON (NJ)
Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

PATH OF POLLUTANTS
The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

The Fate of Spilled Oil in the Soil,
W75-06266 5B

Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

Persistence of Some Chemicals in Pacific Northwest Forests,
W75-06335 5B

The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

PATHOGENIC BACTERIA
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

PEACEFUL USES OF ATOMIC ENERGY
Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

PEAK DISCHARGE
Assessment of 1966 Peak Discharge of the Mekong at Vientiane,
W75-05987 2E

The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

Surface Runoff Hydrograph Equation,
W75-06139 2A

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

PEAT
The Hydrologic Characteristics of Undrained Organic Soils in the Lake States,
W75-05924 2G

PECATONICA RIVER BASIN (WIS)
Patterns of Variation in a Fluvial System,
W75-05961 2J

PENETRATION
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

PENNSYLVANIA
Computing Flood Frequency in the Humid Eastern USA,
W75-05981 4A

An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

The Effects of Physiography and Climate on Unit Hydrographs,
W75-06196 2A

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

PERFORMANCE
Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

PERIPHYTON
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

PERMAFROST
Insulated Embankment Design Techniques,
W75-05897 8B

PERMEABILITY
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

PERMEABLE SURROUNDS
The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

PERSISTENCE
Persistence of Some Chemicals in Pacific Northwest Forests,
W75-06335 5B

PERSONNEL MANAGEMENT
Environmental Criteria for Reclamation Projects,
W75-06067 8A

PESTICIDE PYROLYSIS
Pesticide Pyrolysis Device,
W75-06227 5G

PESTICIDE RESIDUES
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

Pesticide Pyrolysis Device,
W75-06227 5G

Herbicides and Water Quality in American Forestry,
W75-06333 5B

Persistence of Some Chemicals in Pacific Northwest Forests,
W75-06335 5B

PESTICIDES
Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

The Future Role of Chemicals in Forestry,
W75-05935 4C

Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

PHARMACEUTICALS
Characterization of Wastewaters from the Ethical Pharmaceutical Industry,
W75-06244 5A

PHENOLIC PESTICIDES
Herbicides and Water Quality in American Forestry,
W75-06333 5B

PHOSPHATES
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

PHOSPHORUS
Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

PHOTOMETRY
Development of a Method for Measuring Dissolved Color in Wastewaters and Receiving Streams,
W75-06086 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

PHRAGMITES-COMMUNIS
The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

PHREATIC AQUIFERS
Stochastic Analysis of Phreatic Aquifers,
W75-06138 2F

PHYSICAL-CHEMICAL TREATMENT
An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

PHYSICAL PROPERTIES
The Effects of Physiography and Climate on Unit Hydrographs,
W75-06196 2A

PHYTOPLANKTON
Studies on the Phytoplankton in Lake Keurusselka; Finnish Lake District,
W75-05853 2H

Phytoplankton Primary Production and Its Main Associated Variables in Catedral Branch, Mascardi Lake, (In Spanish),
W75-05968 2I

Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

Spokane River, Cooperative Water Quality Study,
W75-06103 5B

PIEDMONT REGION (VA)
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

PIERS
Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

PIGMENTS
Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

PIPE FLOW
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

PIPELINES
Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

PIPING SYSTEMS (MECHANICAL)
Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

PLANKTON
Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

PLANNING
Program Plan for Environmental Effects of Energy,
W75-05871 9D

Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Floodwater Management Plan, North Branch of the Chicago River, Lake and Cook Counties, Illinois.
W75-06048 4A

Planning Industrial Areas for Barge Ports,
W75-06052 6A

Effects of Sediment on Water Resource Planning,
W75-06056 5C

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

Natural Environment and Development, A Planning Background Report.
W75-06105 4B

National Goals and Environmental Laws,
W75-06165 6E

The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

Simulation Techniques for Water Project Analyses,
W75-06328 6A

PLANNING *DECISION MAKING
A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

PLANT GROWTH
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

PLANT POPULATIONS
The Climatic Adaptation of Populations of Cocksfoot (Dactylis Glomerata L.) from Southern France,
W75-06098 2G

PLANTING MANAGEMENT
All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

PLASTIC DRAINS
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

PLASTICS
Porous Polyethylene in Sewage and Water Treatment Plants.
W75-05943 5D

PLATINUM
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

POISSON PROBABILITY
Flood Prediction - A Bayesian Approach,
W75-05989 4A

POLAROGRAPHIC ANALYSIS
Polarographic Oxygen Sensors.
W75-06136 2K

POLITICAL ASPECTS
Flood Management in Developing Countries,
W75-06002 6F

Power Plant Siting-Social/Political Considerations,
W75-06050 6B

Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

POLLUTANT IDENTIFICATION
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

Mathematical Modeling as a Framework for Coastal Monitoring,
W75-06021 5B

Biological Problems in Estuarine Monitoring,
W75-06026 5A

Determination of Metals in Sea Water,
W75-06027 5A

Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

Monitoring Seawater for Radionuclides,
W75-06031 5A

Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

The Properties and Composition of Sludges,
W75-06033 5A

Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

Monitoring Dredge Spoils,
W75-06035 5A

Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

Sampling Methods for Microbiological Analyses,
W75-06037 5A

Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

Galveston Harbor: Factors Affecting Pollution and Pollution Monitoring,
W75-06040 5A

Development of a Method for Measuring Dissolved Color in Wastewaters and Receiving Streams,
W75-06086 5A

Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

Environmental Control Laboratory Designed for the Specific Needs of the Intern Training Center, Red River Army Depot,
W75-06210 5A

Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

Trace Metals in Oyster Shells,
W75-06312 5A

Trace Element Equilibrium Studies,
W75-06326 5A

POLLUTANTS
Surface Slicks and Films - A Need for Control,
W75-06023 5A

POLLUTION ABATEMENT
Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

Economic Analysis of Effluent Guidelines. The Electroplating Industry, Copper, Nickel, Chromium and Zinc.
W75-05873 6B

Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

Waste Water Purification System,
W75-05878 5D

Filter Systems,
W75-05880 5D

System for Removing Floating Oil from Water,
W75-05881 5G

A Wastewater Treatment System,
W75-05882 5D

Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

POLLUTION ABATEMENT

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

Oil Slick Skimmer,
W75-05905 5G

Ion Exchange Waste Water Treatment Process,
W75-05906 5D

Liquid Suspension Purifying Unit,
W75-05908 5D

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

More Life for Diaphragm Cells.
W75-06324 5G

POLLUTION PREVENTION

Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

Filter Systems,
W75-05880 5D

System for Removing Floating Oil from Water,
W75-05881 5G

A Wastewater Treatment System,
W75-05882 5D

Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

PONDS

Determination of Water Temperature in Shallow Water Bodies,
W75-05969 2H

Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

POPULATION GROWTH EFFECTS

Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

POROSITY

Role of Bedrock in Watershed Management,
W75-05932 4D

Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

POROUS MEDIA

In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

PORTS

Planning Industrial Areas for Barge Ports,
W75-06052 6A

POTABLE WATER

Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

Red Bacterial Growth (Corynebacterium Rubrum N. Spec.) In Tap-water Systems. (In German),
W75-06340 5C

State of the Art of the Water Preparation Technology in the USSR (Der Gegenwaertige Stand der Wasseraufbereitungs Technologie in der UDSSR),
W75-06346 5D

POTAMOLOGY

Mississippi River and Tributaries Project, Problems Relating to Changes in Hydraulic Capacity of the Mississippi River,
W75-06212 8B

POTENTIAL EVAPORATION RATE

Potential Evaporation as an Unsteady Process,
W75-06290 2D

POTENTIAL EVAPOTRANSPIRATION

Potential Evaporation as an Unsteady Process,
W75-06290 2D

POWER SYSTEMS OPERATION

Power Plant Siting-Social/Political Considerations,
W75-06050 6B

POWERPLANTS

Power Plant Siting-Social/Political Considerations,
W75-06050 6B

PRE-TREATMENT (WATER)

Pretreatment Standards for Discharge,
W75-06313 5D

PRECAST CONCRETE

Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

PRECIPITATION (ATMOSPHERIC)

Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

Regimes of Streamflow and Their Modification by Logging,
W75-05925 4C

Instruments for Investigation of Fogs and Clouds and Measurement of Humidity,
W75-06041 2B

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

The Water Balance of an Exceptionally Wet Catchment Area in West Africa,
W75-06292 2A

Correlation Analysis of the Cellular Structure of Storms Observed by Raingauges,
W75-06293 2B

PREDREDGING SURVEYS

Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

PRESERVATION

Natural Resources--Conservation Restrictions.
W75-06145 6E

State v. Reed (Action by State to Prevent Construction of Drive-Way thru Wetlands, A Violation of Statute),
W75-06155 6E

PRESSURE FRACTURING

Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

PRESSURE WAVE PROPAGATION

In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

PRIMARY PRODUCTIVITY

Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

PRIMARY TREATMENT

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

PROBABILITY

Flood Prediction - A Bayesian Approach,
W75-05989 4A

Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

PROBABILITY DISTRIBUTION FUNCTIONS

Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

PROJECT PLANNING
Economics of Small Watershed Planning in Minnesota,
W75-05866 6B

A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

Ketchikan Waterfront Development,
W75-06055 6A

PROJECTS
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

Institute for Water Resources (Army Corps of Engineers), Annual Report, 1972.
W75-06018 6B

PROTEINS
Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

PROXIMATE CAUSATION
Kirkland v. Hardwicke Chemical Co. (Action for Pollution of Stream),
W75-06158 6E

PSYCHOLOGICAL ASPECTS
Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

PUBLIC ACCEPTANCE
Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

PUBLIC HEALTH
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

A Study of Natural Water Systems in Western Montana,
W75-06082 5B

Adding Fluorides to the Diet,
W75-06318 5C

The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

PUERTO RICO
Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

PULP WASTES
Slime Control Compositions and Their Use,
W75-05907 5D

Liquid Suspension Purifying Unit,
W75-05908 5D

PYRAMID LAKE (NEV)
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

RADIOACTIVITY
Monitoring Seawater for Radionuclides,
W75-06031 5A

Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

RADIOMETRY
Radiometry of Water Turbidity Measurements,
W75-06128 5A

RAIN GAGES
Correction for the Wetting Loss of a Hellmann Precipitation Gauge,
W75-06267 7B

The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

Correlation Analysis of the Cellular Structure of Storms Observed by Raingauges,
W75-06293 2B

RAINBOW TROUT
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

RAINFALL
The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

Relationships Between Rainfall Parameters and Interception by Tropical Forest,
W75-06291 2B

RAINFALL INTENSITY
Correlation Analysis of the Cellular Structure of Storms Observed by Raingauges,
W75-06293 2B

RAINFALL-RUNOFF RELATIONSHIPS
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

Recent Research in Runoff Estimates from Samll Rural Watersheds,
W75-05980 2A

A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

RATING CURVES
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

REALIMINATION
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

RECESSION CURVES
Surface Runoff Hydrograph Equation,
W75-06139 2A

RECLAIMED WATER
Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

RECLAMATION
Filter Systems,
W75-05880 5D

RECREATION
Estimating the Value and Incidence of Recreation Benefits from a Beach Erosion Control Project,
W75-05859 6C

A Study of Natural Water Systems in Western Montana,
W75-06082 5B

A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

Waters and Watercourses--Public Trust Doctrine--an Ordinance Providing a Residency--Differentiated Fee Schedule for Use of a Municipal Beach is Invalid as a Violation of the Public Trust Doctrine,
W75-06162 6E

RED SEA
Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

REFRACTION (WATER WAVES)
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

REGIME THEORY
The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

REGIONAL ANALYSIS
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

REGIONAL DEVELOPMENT
Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

Natural Environment and Development, A Planning Background Report.
W75-06105 4B

REGRESSION ANALYSIS
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

REGULATION
Armstrong Chemcon, Inc. v. Pollution Control Board (Appeal of Board's Action Limiting Discharges of Mercury into Waters).
W75-06144 6E

Named Individual Members of the San Antonio Conservation Society, et al. v. The Texas Highway Department (Action to Enjoin Highway Construction Through Protected Land).
W75-06150 6E

A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

REGULATIONS
Colorado Public Interest Research Group, Inc. V. Train (Suit Challenging Accord Followed by EPA and AEC to Correlation of the FWPCA and the Atomic Energy Act),
W75-06151 6E

Philosophy and Methodology of Metallic Waste Treatment,
W75-06320 5D

REHABILITATION
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

RELIABILITY
Reliability of Bed-Load Sampling,
W75-05979 2J

REMOTE SENSING
Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume II - Data Acquisition.
W75-06042 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume III - Control Network Establishment.
W75-06043 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume IV - Computer Program Description and Users' Guide.
W75-06044 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume V - Information Correlation and Interpretation.
W75-06045 7C

Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

REPULSION (LEGAL ASPECTS)
Micucci v. White Mountain Trust Co. (Action for Damages and Relief Caused by Runoff Flow from Adjacent Property).
W75-06141 6E

RESEARCH AND DEVELOPMENT
Storm and Combined Sewer Research and Development,
W75-06049 8C

More Life for Diaphragm Cells.
W75-06324 5G

RESEARCH FACILITIES
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

RESEARCH PRIORITIES
Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

RESERVOIR DESIGN
Insulated Embankment Design Techniques,
W75-05897 8B

RESERVOIR OPERATION
Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

Efficient Gate Operation of the Vaaldam to Minimize Downstream Flood Damage,
W75-06009 4A

Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

RESERVOIR SILTING
Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

Effects of Sediment on Water Resource Planning,
W75-06056 5C

RESERVOIR STAGES
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

RESERVOIRS
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

RESINS
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

Trace Element Equilibrium Studies,
W75-06326 5A

RESONANCE
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

RETARDANTS
Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

RETURN FLOW
Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

REVERSE OSMOSIS
Reverse Osmosis Water Purifying System for Household Use,
W75-05891 5F

REVIEWS
International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

Herbicides and Water Quality in American Forestry,
W75-06333 5B

Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

RHODIUM
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

RIPARIAN LAND
Le Compte v. State (New Jersey) (Action Seeking Declaratory Judgment by Plaintiff, Applicant for Purchase of Tidelands Challenging Use and Occupancy Restrictions Imposed by Natural Resource Council).
W75-06149 6E

RIPARIAN RIGHTS
Le Compte v. State (New Jersey) (Action Seeking Declaratory Judgment by Plaintiff, Applicant for Purchase of Tidelands Challenging Use and Occupancy Restrictions Imposed by Natural Resource Council).
W75-06149 6E

RIPPLE TANKS
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

RIPRAP
Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

RISK ANALYSIS
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

RISKS
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

RIVER BASIN DEVELOPMENT
An Economic Analysis of the Proposed Water Resources Project for the Upper French Broad River Basin in Western North Carolina,
W75-05857 6B

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

Floodwater Management Plan, North Branch of the Chicago River, Lake and Cook Counties, Illinois.
W75-06048 4A

An Analysis of Past, Present and Future Hudson River Wastewater Loadings,
W75-06065 5B

RIVER BASINS
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

Patterns of Variation in a Fluvial System,
W75-05961 2J

RIVER BEDS
Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

RIVER FLOW
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

The Mathematical Modelling of Rivers,
W75-06132 2E

Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

RIVER FORECASTING
Flood Prediction Method of River with Reservoir and Confluence of Tributaries,
W75-06005 2A

RIVER MECHANICS
Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Mechanism of Bed Load Transport in Channel Flows,
W75-06010 2J

Flood Control Measures Leveeing and Bottom Deepening,
W75-06013 4D

RIVER REGULATION
Five Mile River Commission,
W75-06159 6E

RIVER SYSTEMS
Reversed Longitudinal Salinity Profile of a Major River in the South-West of Western Australia,
W75-06112 5B

RIVERS
Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

ROAD SALT
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

ROCK CREEK (MO.)
Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

ROCKCASTLE CREEK (KENT)
Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

ROCKSLIDES
Rock Strength from Failure Cases: Left Bank Slope Stability Study - Libby Dam and Lake Koocanusa, Montana,
W75-06252 8E

ROCKY MOUNTAIN REGION
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

RODENTS
Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

ROOT DISTRIBUTION
Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

ROOT SINK
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

ROOT SYSTEMS
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

ROTATIONAL FLOW
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

ROTATIONS
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

ROUGH CHANNELS
A General Theory for Flow in Rough Conduits,
W75-06120 8B

ROUGH PIPES
A General Theory for Flow in Rough Conduits,
W75-06120 8B

ROUGHNESS (HYDRAULIC)
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

A General Theory for Flow in Rough Conduits,
W75-06120 8B

The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

RUNOFF
A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

Surface Runoff Hydrograph Equation,
W75-06139 2A

The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

Cattle Feedlot Hydrology,
W75-06345 5B

RUNOFF FORECASTING
Recent Research in Runoff Estimates from Samll Rural Watersheds,
W75-05980 2A

A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

RURAL ROADS
Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

SACCHARIDES
Carbohydrates from Lake Sediments,
W75-06125 2H

SALINE LAKES
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

SALINE WATER-FRESH-WATER INTERFACES
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

SALINE WATER-FRESHWATER INTERFACES
Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

SALINE WATER INTRUSION
Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

Simultaneous Pumping of Fresh and Salt Water from a Coastal Aquifer,
W75-06296 4B

SALINE WATERS
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

SALINITY
The Colorado: A Weary River,
W75-06100 4A

Reversed Longitudinal Salinity Profile of a Major River in the South-West of Western Australia,
W75-06112 5B

Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

SALMON
Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

Variation with Chain Length in Acute Toxicity of Alkylhydroxamic Acids to Salmon (Salmo Salar) Fry.
W75-05975 5C

SALMONELLA
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

SALT ICE
Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

SALT STOCKPILES
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

SALT-WATER WELLS
Simultaneous Pumping of Fresh and Salt Water from a Coastal Aquifer,
W75-06296 4B

SALT WEDGES
Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

SAMPLING
Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Problems of Nuclear Gauging of Suspended Sediment Concentration,
W75-05978 2J

Reliability of Bed-Load Sampling,
W75-05979 2J

A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

Sampling Methods for Microbiological Analyses,
W75-06037 5A

Mineral Sleuth Will Scan Ocean Floors.
W75-06316 7B

SAN JUAN RIVER (COLOMBIA)
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

SAND BARS
Structure and Directional Properties of Some Valley Sandur Deposits in Southern Iceland,
W75-06205 2J

SATELLITES (ARTIFICIAL)
Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume II - Data Acquisition.
W75-06042 7C

SCALE EFFECTS
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

SCENIC EASEMENTS
Natural Resources--Conservation Restrictions.
W75-06145 6E

SCHEDULING
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

SCOOPS
Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

SCREENS
Screens for Water Intake Systems,
W75-05879 8I

SEA ICE
Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

SEA LEVEL
Recent and Late Quaternary Changes in Water Level,
W75-06260 2H

SEA WATER
Determination of Metals in Sea Water,
W75-06027 5A

Monitoring Seawater for Radionuclides,
W75-06031 5A

Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

SEASONAL
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

SEAWATER
Trace Element Equilibrium Studies,
W75-06326 5A

SECONDARY TREATMENT
Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

SEDIMENT CONTROL
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

Flood Control Measures Leveeing and Bottom Deepening,
W75-06013 4D

Effects of Sediment on Water Resource Planning,
W75-06056 5C

Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

SEDIMENT DISCHARGE
Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Mechanism of Bed Load Transport in Channel Flows,
W75-06010 2J

Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

Bed Material Size Changes and Sediment Transport,
W75-06281 2J

SEDIMENT DISTRIBUTION
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

SEDIMENT LOAD
Bed Material Size Changes and Sediment Transport,
W75-06281 2J

SEDIMENT REDUCTION
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

SEDIMENT TRANSPORT
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

Bed Material Size Changes and Sediment Transport,
W75-06281 2J

SEDIMENT YIELD
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

SEDIMENTATION
Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

SEDIMENTOLOGY
Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

Structure and Directional Properties of Some Valley Sandur Deposits in Southern Iceland,
W75-06205 2J

A Study of Rheologic Properties of Estuarial Sediments,
W75-06222 2L

Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

Bed Material Size Changes and Sediment Transport,
W75-06281 2J

SEDIMENTS
Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

Carbohydrates from Lake Sediments,
W75-06125 2H

A Study of Rheologic Properties of Estuarial Sediments,
W75-06222 2L

Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

SELENASTRUM
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

SEPARATION TECHNIQUES
Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

Oil Slick Skimmer,
W75-05905 5G

Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

Apparatus for Removal of Contaminants from Wastes,
W75-05950 5D

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

SEPATATION TECHNIQUES
The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

SETTLING BASINS
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

SETTLING TANKS
Method and Apparatus for Treating Waste Material,
W75-05894 5D

SEWAGE
City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

SEWAGE BACTERIA
A Study of Natural Water Systems in Western Montana,
W75-06082 5B

SEWAGE DISPOSAL
Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

Lower St. Louis River Basin--Sanitary Sewers (As Amended).
W75-06146 6E

City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

SEWAGE DISTRICTS
City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

SEWAGE EFFLUENTS
The Properties and Composition of Sludges,
W75-06033 5A

SEWAGE SLUDGE
Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

SEWAGE TREATMENT
Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

Waste Water Purification System,
W75-05878 5D

The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

Porous Polyethylene in Sewage and Water Treatment Plants.
W75-05943 5D

The Properties and Composition of Sludges,
W75-06033 5A

Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

SEWERS
Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

SHOALS
Shoaling Measurements in Navigable Waters by the U.S. Army Corps of Engineers,
W75-05977 8B

SHORE PROTECTION
Estimating the Value and Incidence of Recreation Benefits from a Beach Erosion Control Project,
W75-05859 6C

Cost Sharing for Shoreline Protection,
W75-05872 6C

Swell Damper,
W75-05896 8B

Floating Wave Barrier,
W75-05898 2J

The Beach Erosion Hazard,
W75-06113 2J

SHORES
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

SILICA
Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

Preliminary Observations on the Biogeochemical Cycle of Silica in Stockbridge Bowl (Lake),
W75-06191 5C

SILTING
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

SILTS
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

SILVICULTURE
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

SIMULATED RAINFALL
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

SIMULATION ANALYSIS
International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

A Compact Watershed Model System,
W75-06286 2A

Simulation Techniques for Water Project Analyses,
W75-06328 6A

SINGLE-RESPONSIBILITY CONTRACTORS
Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

SINUSOIDAL WAVES
A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

SITES
Power Plant Siting-Social/Political Considerations,
W75-06050 6B

SKIMMING
Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Oil Slick Skimmer,
W75-05905 5G

SLIME
Slime Control Compositions and Their Use,
W75-05907 5D

SLOPE STABILIZATION
Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

SLUDGE
The Properties and Composition of Sludges,
W75-06033 5A

Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

SLUDGE DISPOSAL
Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

Utilization of Activated Sludge (Ispol'zovanie aktivnogo ila),
W75-06344 5D

SLUDGE TREATMENT
An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

SMALL WATERSHEDS
Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

Recent Research in Runoff Estimates from Samll Rural Watersheds,
W75-05980 2A

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

SNOW COVER
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

Evaporation from Snow Cover,
W75-06271 2D

SNOW MANAGEMENT
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

SNOWMELT
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

SNOWPACKS
Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

SOCIAL ASPECTS
Power Plant Siting-Social/Political Considerations,
W75-06050 6B

Ketchikan Waterfront Development,
W75-06055 6A

Simulation Techniques for Water Project Analyses,
W75-06328 6A

SOCIAL CHANGE
An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

SOCIAL FUNCTION
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

SOCIAL PARTICIPATION
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

SOCIAL PERCEPTIONS
An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

SOCIAL VALUES
Power Plant Siting-Social/Political Considerations,
W75-06050 6B

SOCKEYE SALMON
Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

SODIUM CHLORIDE
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

SOIL BACTERIA
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

SOIL CHEMICAL PROPERTIES
Establishing Forest on Surface-Mine Land as Related to Fertility and Fertilization,
W75-06337 4D

SOIL CONSERVATION
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

SOIL CONTAMINATION
The Fate of Spilled Oil in the Soil,
W75-06266 5B

SOIL DENSITY
Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

SOIL EROSION
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

SOIL MANAGEMENT
Irrigation System,
W75-05887 3F

SOIL MECHANICS
Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

Loads on Box Culverts under High Embankments,
W75-06230 8D

SOIL MOISTURE
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

SOIL PHYSICAL PROPERTIES
Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

The Hydrologic Characteristics of Undrained Organic Soils in the Lake States,
W75-05924 2G

Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

SOIL PHYSICS
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

SOIL STABILITY
The Effect of Herbaceous Vegetation on Survival and Growth of Trees Planted on Coal-Mine Spoils,
W75-05920 4D

SOIL STABILIZATION
Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

SOIL TEMPERATURE
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

SOIL TYPES
Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

SOIL WATER
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

SOIL WATER MOVEMENT
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

SOIL-WATER-PLANT RELATIONSHIPS
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

SOILS
The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

SOLUBILITY
Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

SOLVENT EXTRACTION
Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

SOLVENTS
Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

SOUTH CAROLINA
Kirkland v. Hardwicke Chemical Co. (Action for Pollution of Stream),
W75-06158 6E

City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

SOUTH SAN FRANCISCO (CALIFORNIA)
The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

SOUTHERN CALIFORNIA
Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

SOYBEANS
Performance of Soybeans (Glycine Max (L.) Merrill) in the Wet Tropics as Affected by N, P and K,
W75-05955 2I

SPACE CABIN ATMOSPHERES
Polarographic Oxygen Sensors.
W75-06136 2K

SPECTROMETERS
Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

SPECTROSCOPY
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

SPOKANE RIVER (WASH.)
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

SPORT FISH
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

ST. JOSEPH (MO.)
Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

ST. LOUIS (MO)
A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

STABILITY
Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

STAGE-DISCHARGE RELATIONS
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

STAGE EXTRAPOLATION
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

STANDARDS
Pretreatment Standards for Discharge,
W75-06313 5D

STATE GOVERNMENTS
Natural Resources--Conservation Restrictions.
W75-06145 6E

Ameraport Offshore Harbor and Terminal Commission,
W75-06154 6E

Waters and Watercourses--Public Trust Doctrine--an Ordinance Providing a Residency--Differentiated Fee Schedule for Use of a Municipal Beach is Invalid as a Violation of the Public Trust Doctrine,
W75-06162 6E

STATE JURISDICTION
A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

STATE POLICY
State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

STATISTICAL METHODS
Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

Reliability of Bed-Load Sampling,
W75-05979 2J

STATISTICAL METHODS

Flood Prediction - A Bayesian Approach,
W75-05989 4A

Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

Unit Hydrographs and Statistical Density Functions,
W75-05991 2E

STATISTICAL MODELS
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

STEEL
Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

STERILIZATION
Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

STOCHASTIC PROCESSES
Stochastic Analysis of Phreatic Aquifers,
W75-06138 2F

STOCKBRIDGE BOWL (MASS)
Preliminary Observations on the Biogeochemical Cycle of Silica in Stockbridge Bowl (Lake),
W75-06191 5C

STORAGE
Role of Bedrock in Watershed Management,
W75-05932 4D

Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

STORAGE COEFFICIENT
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

STORM DRAINS
Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

STORM RUNOFF
Storm and Combined Sewer Research and Development,
W75-06049 8C

Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

STORM SIZE
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

STORMS
Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

STRATIFICATION
Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

STRATIFIED FLOW
Study of Stratified Overflows and Underflows,
W75-06081 5B

On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

STREAM IMPROVEMENT
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

STREAMFLOW
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

The Hydrologic Characteristics of Undrained Organic Soils in the Lake States,
W75-05924 2G

Regimes of Streamflow and Their Modification by Logging,
W75-05925 4C

Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky,
W75-06334 5B

Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

STREAMFLOW FORECASTING
Basinwide Flood Forecasting System for the Lower Mekong Basin,
W75-06007 4A

STREAMS
Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

STRIP MINES
The Effect of Herbaceous Vegetation on Survival and Growth of Trees Planted on Coal-Mine Spoils,
W75-05920 4D

Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky,
W75-06334 5B

Establishing Forest on Surface-Mine Land as Related to Fertility and Fertilization,
W75-06337 4D

STRUCTURAL PARAMETER METHOD
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

SUBSURFACE DRAINAGE
Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

SUBSURFACE DRAINS
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

SUBSURFACE IRRIGATION
Irrigation System,
W75-05887 3F

SUBSURFACE WATERS
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

Subsurface Water Data of the Upper Michigan Region, Project Sanguine.
W75-06236 4B

SUGAR BEETS
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

SUNFISHES
The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

SURFACE-GROUNDWATER RELATIONSHIPS
Natural Environment and Development, A Planning Background Report.
W75-06105 4B

SURFACE IRRIGATION
Automatic Irrigation Apparatus,
W75-05901 3F

SURFACE RUNOFF
Floodwater Management Plan, North Branch of the Chicago River, Lake and Cook Counties, Illinois.
W75-06048 4A

Micucci v. White Mountain Trust Co. (Action for Damages and Relief Caused by Runoff Flow from Adjacent Property).
W75-06141 6E

Seventeen, Inc. v. Pilot Life Insurance Co. (Action for Injunction to Restrain Diversion of Surface Waters).
W75-06147 6E

SURFACE WATERS
Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume V - Information Correlation and Interpretation.
W75-06045 7C

SURVEYS
Shoaling Measurements in Navigable Waters by the U.S. Army Corps of Engineers,
W75-05977 8B

SUSPENDED LOAD
Full Flow Fluid Filter,
W75-05948 5D

Problems of Nuclear Gauging of Suspended Sediment Concentration,
W75-05978 2J

SUSPENDED SEDIMENT
Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

SUSPENDED SOLIDS
Full Flow Fluid Filter,
W75-05948 5D

Application of Statistical Methods to the Distribution of Fall Diameter and Flow Turbidity,
W75-06011 2J

Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

SWELLS
The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

SYNTHETIC HYDROLOGY
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

SYSTEMS ANALYSIS
Development of a Comprehensive TVA Water Resource Management Program.
W75-05874 6A

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

TAIWAN
A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

TAMPA (FLA.)
Natural Environment and Development, A Planning Background Report.
W75-06105 4B

TANZANIA
Relationships Between Rainfall Parameters and Interception by Tropical Forest,
W75-06291 2B

TEMAGAMI LAKE (CAN.)
A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

TEMPERATURE
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

TENNESSEE
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

TENNESSEE RIVER
Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

TENNESSEE RIVER (TENN)
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

TENNESSEE VALLEY AUTHORITY
Development of a Comprehensive TVA Water Resource Management Program.
W75-05874 6A

Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

TERTIARY TREATMENT
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

TESTING PROCEDURES
Improved Field Water Analysis Tests,
W75-06122 2K

TEXAS
Named Individual Members of the San Antonio Conservation Society, et al. v. The Texas Highway Department (Action to Enjoin Highway Construction Through Protected Land).
W75-06150 6E

The State of Texas, Et Al. V. Fri (Challenge of Executive Impoundment of FWPCA Funds),
W75-06152 5G

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

THAILAND
Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

THEORETICAL ANALYSIS
Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

Modelling of Erodible Channels,
W75-06014 2J

Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

THERMAL BUDGET METHOD
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

THERMAL POLLUTION
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

Study of Stratified Overflows and Underflows,
W75-06081 5B

Lloyd Harbor Study Group, Inc. v. Diamond (Action Challenging Determination that Water Quality Standards Would not be Contravened by Construction of Nuclear Power Plant).
W75-06143 6E

Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

THERMAL STRATIFICATION
Studies on Freshwater Bacteria: The Effect of Enclosure in Large Experimental Tubes,
W75-05875 2H

On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

Study of Stratified Overflows and Underflows,
W75-06081 5B

THERMO-OSMOSIS
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

THERMOCOUPLE PSYCHROMETERS
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

THERMODYNAMICS
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

TIDAL EFFECTS
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

TIDAL STREAMS
The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

TIDAL WATERS
The Dynamics of Inlets and Bays,
W75-06223 2L

TILE DRAINS
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

TOCKS ISLAND REGION
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

TORONTO (ONTARIO)
City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

TOURISM
The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

TOXICITY
Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

Adding Fluorides to the Diet,
W75-06318 5C

Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

TRACE CONTAMINANTES
Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

TRACE ELEMENTS
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Trace Metals in Oyster Shells,
W75-06312 5A

Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

Trace Element Equilibrium Studies,
W75-06326 5A

TRACERS
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

TRACTIVE FORCES
Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

TRAINING
Institute for Water Resources (Army Corps of Engineers), Annual Report, 1972.
W75-06018 6B

TRANSIENT FLOW
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

TRANSLATIONS
Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

TRANSPIRATION
Indexes to Transpiration by Forest Trees,
W75-06336 2D

TRANSPORTATION
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk. Executive Summary.
W75-05858 6B

A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk, Final Report (Revised).
W75-05870 6B

Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

TRAP EFFICIENCY
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

TRAP EFFICIENCY (RESERVOIRS)
Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

TRAPPING
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

TREATMENT FACILITIES
The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

TREES
Indexes to Transpiration by Forest Trees,
W75-06336 2D

TRICKLING FILTERS
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

TROPICAL REGIONS
Relationships Between Rainfall Parameters and Interception by Tropical Forest,
W75-06291 2B

TROUT
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

TUBES
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

TUNNEL DESIGN
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

TUNNEL SUPPORTS
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

TURBIDITY
Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

Application of Statistical Methods to the Distribution of Fall Diameter and Flow Turbidity,
W75-06011 2J

Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

Radiometry of Water Turbidity Measurements,
W75-06128 5A

TURBULENCE
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

TURBULENT FLOW
Drip Irrigation,
W75-05902 3F

TYPHOID
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

TYPHOONS
A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

UNDERFLOW
Study of Stratified Overflows and Underflows,
W75-06081 5B

UNDERGROUND RESERVOIRS
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

UNDERGROUND STORAGE
Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

UNGAGED WATERSHEDS
Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

UNIT HYDROGRAPHS
Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

Unit Hydrographs and Statistical Density Functions,
W75-05991 2E

A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

The Effects of Physiography and Climate on Unit Hydrographs,
W75-06196 2A

UNSATURATED FLOW
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

Description of Water and Air Movement During Infiltration,
W75-06288 2G

A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

UNSTEADY FLOW
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

UPWELLING
Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

URBAN DRAINAGE
Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

URBAN HYDROLOGY
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

URBAN RUNOFF
Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

URBANIZATION
City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

UREAS
Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

URINE
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

USSR
Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

VEDERNIKOV NUMBER
Stability of Single-Peaked Waves,
W75-06118 2E

VEGETABLE CROPS
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

VEGETATION
The Pulvinate Moss Vegetation in the Karadj-Valley (Elburs Mountains, Iran), (In German),
W75-05966 2A

VEGETATION ESTABLISHMENT
Planting Grass and Pine for Erosion Control,
W75-05917 4D

Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

VELOCITY
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

VERMONT
State of Vermont v. State of New York (Action to Abate Pollution of Interstate Waters--ConsentDecree),
W75-06157 6E

VERTICAL FLOW
A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

VERTICAL PERMEABILITY
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

VERTICAL POROUS COLUMNS
Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

VIRGINIA
Seventeen, Inc. v. Pilot Life Insurance Co. (Action for Injunction to Restrain Diversion of Surface Waters).
W75-06147 6E

Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

VIRUSES
Survival of Viruses and Bacteria in a Simulated Sanitary Landfill,
W75-06231 5B

VISCOSITY
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

VOLUMETRIC ANALYSIS
An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

VORTICES
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

WALNUT GULCH WATERSHED (ARIZ)
Bed Material Size Changes and Sediment Transport,
W75-06281 2J

WARNING SYSTEMS
Proceedings of the International Association for Hydraulic Research, International Symposium on River Mechanics, Flood Investigation, Volume 2,
W75-05973 4A

Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

WASHINGTON
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

WASTE DISPOSAL
Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

Lower St. Louis River Basin--Sanitary Sewers (As Amended).
W75-06146 6E

Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

Pesticide Pyrolysis Device,
W75-06227 5G

WASTE DISPOSAL WELLS
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

WASTE MANAGEMENT SYSTEMS
A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

WASTE OIL PRODUCTION
Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

WASTE OIL RE-REFINING
Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

WASTE REMOVAL
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

WASTE STORAGE
Storm and Combined Sewer Research and Development,
W75-06049 8C

WASTE TREATMENT
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

Pretreatment Standards for Discharge,
W75-06313 5D

Philosophy and Methodology of Metallic Waste Treatment,
W75-06320 5D

WASTE WATER DISPOSAL
Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

An Analysis of Past, Present and Future Hudson River Wastewater Loadings,
W75-06065 5B

City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

WASTE WATER LOADINGS
An Analysis of Past, Present and Future Hudson River Wastewater Loadings,
W75-06065 5B

WASTE WATER (POLLUTION)
Characterization of Wastewaters from the Ethical Pharmaceutical Industry,
W75-06244 5A

WASTE WATER TREATMENT
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

Waste Water Purification System,
W75-05878 5D

A Wastewater Treatment System,
W75-05882 5D

Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

Ion Exchange Waste Water Treatment Process,
W75-05906 5D

Liquid Suspension Purifying Unit,
W75-05908 5D

The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

Methods and Machines.
W75-05942 5E

Porous Polyethylene in Sewage and Water Treatment Plants.
W75-05943 5D

Wastewater Treatment for Small Communities: Part Two - Special Design Considerations,
W75-05944 5D

Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

Full Flow Fluid Filter,
W75-05948 5D

Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

Apparatus for Removal of Contaminants from Wastes,
W75-05950 5D

Method of Introducing Oxygen into a Liquid to be Clarified and Device for Carrying the Method into Effect,
W75-05951 5D

The Properties and Composition of Sludges,
W75-06033 5A

Automation of the Continuous Coagulation Monitor,
W75-06074 5F

Water Management in Livestock Waste Handling Systems,
W75-06087 5D

An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

WASTEWATER TREATMENT
Storm and Combined Sewer Research and Development,
W75-06049 8C

Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

WATER ALLOCATION (POLICY)
Waters and Watercourses--Public Trust Doctrine--an Ordinance Providing a Residency--Differentiated Fee Schedule for Use of a Municipal Beach is Invalid as a Violation of the Public Trust Doctrine,
W75-06162 6E

WATER ANALYSIS
Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Improved Field Water Analysis Tests,
W75-06122 2K

WATER BALANCE
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

The Water Balance of an Exceptionally Wet Catchment Area in West Africa,
W75-06292 2A

WATER BUDGET
Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

WATER CHEMISTRY
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

WATER CIRCULATION
The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

WATER CONSERVATION
Filter Systems,
W75-05880 5D

Drip Irrigation Method,
W75-05885 3F

The Colorado: A Weary River,
W75-06100 4A

WATER CONSUMPTION
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

WATER CONVEYANCE
City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

WATER DEMAND
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

WATER DISTRIBUTION (APPLIED)
Drip Irrigation Method,
W75-05885 3F

City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

WATER DROPLETS
Process for Electrical Coalescing of Water,
W75-06339 5G

WATER FLOW
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

WATER FLUX
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

WATER LAW
An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

WATER LEVEL FLUCTUATIONS
Recent and Late Quaternary Changes in Water Level,
W75-06260 2H

WATER LEVELS
Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

WATER LOSS
Indexes to Transpiration by Forest Trees,
W75-06336 2D

WATER MANAGEMENT (APPLIED)
Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

Simulation Techniques for Water Project Analyses,
W75-06328 6A

WATER POLICY
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

WATER POLLUTION
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

Galveston Harbor: Factors Affecting Pollution and Pollution Monitoring,
W75-06040 5A

A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

Spokane River, Cooperative Water Quality Study,
W75-06103 5B

Licenses--Motor Vehicle--Suspension for Dumping,
W75-06156 6E

Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

Philosophy and Methodology of Metallic Waste Treatment,
W75-06320 5D

Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

WATER POLLUTION CONTROL
Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

Methods and Machines.
W75-05942 5E

Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

Effects of Sediment on Water Resource Planning,
W75-06056 5C

Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

State of Ohio v. Republic Steel Corp (Action for Pollution of Waters Without a Valid Permit).
W75-06142 6E

Lower St. Louis River Basin--Sanitary Sewers (As Amended).
W75-06146 6E

Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

WATER POLLUTION EFFECTS

Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

Kirkland v. Hardwicke Chemical Co. (Action for Pollution of Stream),
W75-06158 6E

WATER POLLUTION SOURCES

Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

Armstrong Chemcon, Inc. v. Pollution Control Board (Appeal of Board's Action Limiting Discharges of Mercury into Waters).
W75-06144 6E

Subsurface Biological Activity in Relation to Ground-Water Pollution,
W75-06238 5B

A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

Characterization of Wastewaters from the Ethical Pharmaceutical Industry,
W75-06244 5A

WATER PROJECT MANAGEMENT

Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

WATER PROPERTIES

Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

WATER PURIFICATION

Irrigation System,
W75-05887 3F

Reverse Osmosis Water Purifying System for Household Use,
W75-05891 5F

Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

Liquid Suspension Purifying Unit,
W75-05908 5D

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

WATER QUALITY

The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

Spokane River, Cooperative Water Quality Study,
W75-06103 5B

Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

Subsurface Biological Activity in Relation to Ground-Water Pollution,
W75-06238 5B

Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

Herbicides and Water Quality in American Forestry,
W75-06333 5B

Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky,
W75-06334 5B

Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

WATER QUALITY CONTROL

Filter Systems,
W75-05880 5D

System for Removing Floating Oil from Water,
W75-05881 5G

A Wastewater Treatment System,
W75-05882 5D

Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Reverse Osmosis Water Purifying System for Household Use,
W75-05891 5F

Water Distillation Apparatus,
W75-05893 5F

Method and Apparatus for Treating Waste Material,
W75-05894 5D

Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

Licenses--Motor Vehicle--Suspension for Dumping,
W75-06156 6E

Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

WATER QUALITY STANDARDS
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

Lloyd Harbor Study Group, Inc. v. Diamond (Action Challenging Determination that Water Quality Standards Would not be Contravened by Construction of Nuclear Power Plant).
W75-06143 6E

WATER RESOURCES
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

Hydrologic Data: 1973; Volume IV: San Joaquin Valley.
W75-06208 7C

WATER RESOURCES DEVELOPMENT
An Economic Analysis of the Proposed Water Resources Project for the Upper French Broad River Basin in Western North Carolina,
W75-05857 6B

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

Natural Environment and Development, A Planning Background Report.
W75-06105 4B

Water Resources Development in Central America, 1970 to 1980,
W75-06270 4A

WATER RESOURCES INSTITUTE
Institute for Water Resources (Army Corps of Engineers), Annual Report, 1972.
W75-06018 6B

WATER RESOURCES PLANNING
Ketchikan Waterfront Development,
W75-06055 6A

WATER REUSE
Filter Systems,
W75-05880 5D

Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

Water Management in Livestock Waste Handling Systems,
W75-06087 5D

WATER SAMPLING
Apparatus for Sampling Liquids,
W75-05945 7B

Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

WATER SHORTAGE
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

WATER SOURCES
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

WATER STORAGE
Insulated Embankment Design Techniques,
W75-05897 8B

WATER SUPPLY
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

Anti-Backflow Water Control and Solution Proportioner,
W75-05909 8C

History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

Public Wroks--Counties--Erosion Control (As Amended),
W75-06160 6E

Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

WATER SUPPLY DEVELOPMENT
City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

The Colorado: A Weary River,
W75-06100 4A

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

WATER TABLE
The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

WATER TABLE AQUIFERS
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

WATER TEMPERATURE
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

Determination of Water Temperature in Shallow Water Bodies,
W75-05969 2H

The Annual Temperature Cycle of Lough Neagh,
W75-06016 2H

Study of Stratified Overflows and Underflows,
W75-06081 5B

Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

WATER TREATMENT
Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

A Wastewater Treatment System,
W75-05882 5D

Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

Reverse Osmosis Water Purifying System for Household Use,
W75-05891 5F

Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

Water Distillation Apparatus,
W75-05893 5F

Slime Control Compositions and Their Use,
W75-05907 5D

Porous Polyethylene in Sewage and Water Treatment Plants.
W75-05943 5D

Automation of the Continuous Coagulation Monitor,
W75-06074 5F

WATER UPTAKE
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

WATER USERS
Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

WATER UTILIZATION
Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

WATER VAPOR
Water Distillation Apparatus,
W75-05893 5F

WATER WELLS
Simultaneous Pumping of Fresh and Salt Water from a Coastal Aquifer,
W75-06296 4B

WATER YIELD IMPROVEMENT
Conserving Wetland Water by Suppressing Evaporation,
W75-06121 3B

WATERFRONT DEVELOPMENT
Ketchikan Waterfront Development,
W75-06055 6A

WATERSHED MANAGEMENT
Economics of Small Watershed Planning in Minnesota,
W75-05866 6B

Proceedings of the Joint FAO/U.S.S.R. International Symposium in Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970.
W75-05912 4D

Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

Role of Bedrock in Watershed Management,
W75-05932 4D

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

Flood Management in Developing Countries,
W75-06002 6F

Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

WATERSHED PROTECT. AND FLOOD PREV. ACT
Economics of Small Watershed Planning in Minnesota,
W75-05866 6B

WATERSHEDS (BASINS)
A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

Computing Flood Frequency in the Humid Eastern USA,
W75-05981 4A

Effect of Dams on Flood Frequency,
W75-05982 4A

A General Formula for Determination of Peak Flood,
W75-05983 4A

Flood Computations for the Hawaiian Islands,
W75-05984 4A

A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

Basinwide Flood Forecasting System for the Lower Mekong Basin,
W75-06007 4A

A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

The Effects of Physiography and Climate on Unit Hydrographs,
W75-06196 2A

Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

The Water Balance of an Exceptionally Wet Catchment Area in West Africa,
W75-06292 2A

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

WAVE DAMPING
Floating Wave Barrier,
W75-05898 2J

WAVE ENERGY DAMPING
Swell Damper,
W75-05896 8B

WAVES (WATER)
Swell Damper,
W75-05896 8B

Floating Wave Barrier,
W75-05898 2J

Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

Stability of Single-Peaked Waves,
W75-06118 2E

The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

WEATHER
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

WEATHER FORECASTING
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

WEATHER MODIFICATION
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

WELLS
Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

WEST AFRICA (SIERRA LEONE)
The Water Balance of an Exceptionally Wet Catchment Area in West Africa,
W75-06292 2A

WEST VIRGINIA
Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

WETLANDS
Forest Drainage in North Central United States,
W75-05918 4D

Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

Conserving Wetland Water by Suppressing Evaporation,
W75-06121 3B

Le Compte v. State (New Jersey) (Action Seeking Declaratory Judgment by Plaintiff, Applicant for Purchase of Tidelands Challenging Use and Occupancy Restrictions Imposed by Natural Resource Council).
W75-06149 6E

State v. Reed (Action by State to Prevent Construction of Drive-Way thru Wetlands, A Violation of Statute),
W75-06155 6E

Defining Freshwater Wetlands,
W75-06161 4A

WETTING
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

Correction for the Wetting Loss of a Hellmann Precipitation Gauge,
W75-06267 7B

WETTING FRONTS
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

WETTING LOSSES
Correction for the Wetting Loss of a Hellmann Precipitation Gauge,
W75-06267 7B

WHEAT
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

WILD RIVER ACT
Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

WILLIAMSBURG (VA)
Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

WINDS
Application of Monochromatic Ocean Wave Forecasts to Prediction of Wave-Induced Currents,
W75-06246 2L

WISCONSIN
Patterns of Variation in a Fluvial System,
W75-05961 2J

Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

WITHDRAWAL
Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

WYOMING
A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

YAQUINA BAY (ORE)
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

YEASTS
Utilization of Activated Sludge (Ispol'zovanie aktivnogo ila),
W75-06344 5D

ZAMBIA
The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

ZINC
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

AUTHOR INDEX

ABBOTT, P. L.
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

ABERNATHY, A. R.
Development of a Method for Measuring Dissolved Color in Wastewaters and Receiving Streams,
W75-06086 5A

ADDISON, R. F.
Variation with Chain Length in Acute Toxicity of Alkylhydroxamic Acids to Salmon (Salmo Salar) Fry.
W75-05975 5C

ADRIAENSSENS, E.
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

ADVANI, R. M.
Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

AGOSTA, V. D.
Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

ALEXANDER, G. N.
Unit Hydrographs and Statistical Density Functions,
W75-05991 2E

ALLARD, J.
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

ALLEN, L. E.
A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

ALLEN, M. J.
Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

ALLEN, M. W.
Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

ANDERSON, H. W.
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

ANDERSON, J. R.
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

ARMSTRONG, A.
Filter Systems,
W75-05880 5D

ARMSTRONG, D. E.
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

ASKEW, A. J.
The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

AUBERT, M.
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

AUBERTIN, G. M.
Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

AUE, A. I.
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

AUSTIN, R. W.
Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

AVASTHI, P. K.
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

BABADZHANOVA, S. G. BA
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

BAGOZKIJ, J. B.
State of the Art of the Water Preparation Technology in the USSR (Der Gegenwaertige Stand der Wasseraufbereitungs Technologie in der UDSSR),
W75-06346 5D

BAHR, T. G.
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

BAILEY, P. C. A.
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

BAJWA, M.
A General Theory for Flow in Rough Conduits,
W75-06120 8B

BALACHANDRAN, G.
Potential Evaporation as an Unsteady Process,
W75-06290 2D

BANKS, P. A.
A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

BARNARD, J.
Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

BARNES, G. D.
Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

BARRETT, K. A.
The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

BARRETT, W. J.
Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

BARTH, C. L.
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

BARTHELEMY, J. L.
Ice Engineering - Quantification of Subsurface Ice Thickening Techniques,
W75-06254 2C

BARTISHVILI, I. T.
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

BAUER, L.
Red Bacterial Growth (Corynebacterium Rubrum N. Spec.) In Tap-water Systems. (In German),
W75-06340 5C

BAUER, S. W.
A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

BAUMANN, D. D.
Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

BAUMGARDNER, M. F.
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

BEATY, E. R.
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

BECKER, J. D.
A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

BELCHER, R.
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

BERBECEL, O.
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

BINNIE, A. M.
A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

BISHOP, R. A.
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

BITTEL, R.
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

BLUCK, B. J.
Structure and Directional Properties of Some Valley Sandur Deposits in Southern Iceland,
W75-06205 2J

BODIE, J. G.
Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

BOELTER, D. H.
Forest Drainage in North Central United States,
W75-05918 4D

The Hydrologic Characteristics of Undrained Organic Soils in the Lake States,
W75-05924 2G

Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

BOGARDI, I.
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

BOGDANSKI, S. L.
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

BOHNENBLUST, K. E.
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

BOLLEN, W. B.
DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

BOND, J. H.
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

BONEH, A.
Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

BOWLEY, W. W.
Floating Wave Barrier,
W75-05898 2J

BOX, J. E. JR.
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

BOYD, C. E.
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

BRENNER, R. M.
City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

BRESLER, E.
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

BREZENSKI, F. T.
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

BRIEHL, D.
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

BRINK, R. H. JR.
Slime Control Compositions and Their Use,
W75-05907 5D

BRINKMAN, E. A.
Planning Industrial Areas for Barge Ports,
W75-06052 6A

BROCK, A. J.
Drip Irrigation Method,
W75-05885 3F

BROCKWAY, C. E.
Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

BROWN, C. H.
Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

BROWNELL, L. E.
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

BRUSTKERN, R. L.
Description of Water and Air Movement During Infiltration,
W75-06288 2G

BRUSVEN, M. A.
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

BUCK, J. D.
A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

BUCK, W.
Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

BUCKNEY, R. T.
Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

BURT, G. R.
Insulated Embankment Design Techniques,
W75-05897 8B

BUTCHBAKER, A. F.
Cattle Feedlot Hydrology,
W75-06345 5B

BUTLER, H. L.
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

BUTLER, P. A.
Biological Problems in Estuarine Monitoring,
W75-06026 5A

BUTTS, T. A.
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

BYERS, G. L.
Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

Conserving Wetland Water by Suppressing Evaporation,
W75-06121 3B

CABELLI, V. J.
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

CALLAWAY, R. J.
Mathematical Modeling as a Framework for Coastal Monitoring,
W75-06021 5B

CAPENER, H. R.
A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

CAPLINGER, J.
Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

CARPENTER, L. R.
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

CARPENTER, R. A.
National Goals and Environmental Laws,
W75-06165 6E

CARRAS, J. N.
Air Bubbles in Accreted Ice,
W75-06275 2C

CARREKER, J. R.
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

CARVILLE, T. E.
Trace Metals in Oyster Shells,
W75-06312 5A

CHANDER, S.
Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

CHANG, F. F. M.
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

CHANTLER, A. G.
The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

CHASTAN-BAGNIS, L.
Scoop for Collecting a Layer of Polluting Material on Water Surfaces,
W75-05903 5G

CHATURVEDI, M. C.
Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

CHEN, B. H. H.
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

CHENG, R. T-S.
A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

CHESNEY, H. A. D.
Performance of Soybeans (Glycine Max (L.) Merrill) in the Wet Tropics as Affected by N, P and K,
W75-05955 2I

CHI, M.
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

CHIDLEY, T. R. E.
A Compact Watershed Model System,
W75-06286 2A

CIOVICA, N.
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

CISLEROVA, M.
The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

CLARK, K. K.
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

CLARKSON, R. J.
Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

CLOSE, G. E.
Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

COHEN, Y.
Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

COLE, R. J.
Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

COLONELL, J. M.
Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

COLWELL, R. R.
Sampling Methods for Microbiological Analyses,
W75-06037 5A

CONDO, A. C.
Insulated Embankment Design Techniques,
W75-05897 8B

COOLEY, R. L.
Finite Element Solutions for the Equations of Groundwater Flow,
W75-06083 2F

CORBETT, E. S.
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

COSTA, E. N.
Drip Irrigation,
W75-05902 3F

COTE, R. P.
Variation with Chain Length in Acute Toxicity of Alkylhydroxamic Acids to Salmon (Salmo Salar) Fry.
W75-05975 5C

COWAN, W. C.
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

COX, G. F. N.
Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

COX, L. M.
Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

COX, R. E.
Flood Plain Management,
W75-06063 4A

CSOMA, J.
Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

Reliability of Bed-Load Sampling,
W75-05979 2J

CURRY, N. A.
Philosophy and Methodology of Metallic Waste Treatment,
W75-06320 5D

CURTIS, W. R.
Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky,
W75-06334 5B

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

CUTSHALL, N.
Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

CYWIN, A.
Storm and Combined Sewer Research and Development,
W75-06049 8C

CZAPOWSKYJ, M. M.
Establishing Forest on Surface-Mine Land as Related to Fertility and Fertilization,
W75-06337 4D

DALL, B. V.
An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

DANDEKAR, M. M.
Flood Management in Developing Countries,
W75-06002 6F

DAVES, T. E.
Economics of Small Watershed Planning in Minnesota,
W75-05866 6B

DAWSON, R. N.
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

DEAN, R. B.
The Properties and Composition of Sludges,
W75-06033 5A

DEBEN, W. A.
Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

DEBNATH, L.
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

DEBO, T. N.
Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

DECOURSEY, P. J.
The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

DEMORY, D.
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

DENBOEF, G.
An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

DENNIS, C. W.
The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

DISKIN, M. H.
Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

DIXSON, D. L.
Ion Exchange Waste Water Treatment Process,
W75-05906 5D

DOLZHENKO, A. P.
Utilization of Activated Sludge (Ispol'zovanie aktivnogo ila),
W75-06344 5D

DONNIER, B.
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

DORNEY, R. S.
Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

DOSS, R. C.
Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

DOUGLASS, C. B.
Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

DOYLE, F. L.
Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

DRAKE, J. J.
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

DRAYCOTT, A. P.
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

DUANE, D. B.
Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

DUCE, R. A.
Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

DUCKSTEIN, L.
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

DUFFY, P. D.
Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

Planting Grass and Pine for Erosion Control,
W75-05917 4D

DUFOUR, A. P.
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

DUNLAP, W. J.
Subsurface Biological Activity in Relation to Ground-Water Pollution,
W75-06238 5B

DURRANT, M. J.
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

EFTIMESCU, M.
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

EGGERS, H.
Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

EISLER, E.
Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

ELLIOTT, T.
Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

ELORANTA, P.
Studies on the Phytoplankton in Lake Keurusselka; Finnish Lake District,
W75-05853 2H

EMERY, K. O.
Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

ENGELBRECHT, R. S.
Survival of Viruses and Bacteria in a Simulated Sanitary Landfill,
W75-06231 5B

ERICKSON, L. E.
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

ERTEL, M. O.
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

FAIRCHILD, W. D.
Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

FAN, L-T.
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

FARRELL, D. A.
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

FEDDES, R. A.
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

FELGATE, D. G.
Correlation Analysis of the Cellular Structure of Storms Observed by Raingauges,
W75-06293 2B

FERRELL, R. E.
Trace Metals in Oyster Shells,
W75-06312 5A

FILLON, R. H.
Deglaciation of the Labrador Continental Shelf,
W75-06279 2C

FISHER, F.
Adding Fluorides to the Diet,
W75-06318 5C

FISHER, J. S.
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

FLEMING, P. M.
The Australian Representative Basins Programme,
W75-05953 7A

FOK, Y.-S.
Flood Computations for the Hawaiian Islands,
W75-05984 4A

FONTES, J. C.
Hydrologic Variations and the Extent of the Holocene Lakes in the Danakil Desert, (In French),
W75-06243 2H

FOOTE, G. B.
The Water Drop Rebound Problem: Dynamics of Collision,
W75-06278 2B

FORD, D. C.
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

FORESTER, J.
Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

FOSTER, D. N.
The Beach Erosion Hazard,
W75-06113 2J

FOSTER, S. S. D.
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

FREDRIKSEN, R. L.
Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

Nutrient Budget of a Douglas-Fir Forest on an Experimental Watershed in Western Oregon,
W75-05923 2K

FREY, W.
The Pulvinate Moss Vegetation in the Karadj-Valley (Elburs Mountains, Iran), (In German),
W75-05966 2A

FROLUNDS, B.
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

FULTON, D. W.
Drip Irrigation Method,
W75-05885 3F

GALLAHER, W. B.
A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

GARCIA, M. O.
Phytoplankton Primary Production and Its Main Associated Variables in Catedral Branch, Mascardi Lake, (In Spanish),
W75-05968 2I

GARRY, J. A.
The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

GARTON, A.
The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

GASSAWAY, J. D.
Trace Element Equilibrium Studies,
W75-06326 5A

GASSE, F.
Hydrologic Variations and the Extent of the Holocene Lakes in the Danakil Desert, (In French),
W75-06243 2H

GAUFIN, A. L.
A Study of Natural Water Systems in Western Montana,
W75-06082 5B

GAUMER, T.
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

GAYVORONSKIY, I. I.
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

GAZZIER, C. A.
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

GEL'DYEV, B. G.
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

GELDREICH, E. E.
Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

GELHAR, L. W.
Stochastic Analysis of Phreatic Aquifers,
W75-06138 2F

GERARD, R. D.
Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

GHONAIM, S. A.
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

GIBNEY, L. C.
Pretreatment Standards for Discharge,
W75-06313 5D

GIBSON, C. E.
The Annual Temperature Cycle of Lough Neagh,
W75-06016 2H

GILLETT, B. E.
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

GIRDLER, H. F.
Loads on Box Culverts under High Embankments,
W75-06230 8D

GLADNEY, E. S.
Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

GOODWILL, I. M.
A Compact Watershed Model System,
W75-06286 2A

GORDON, A. L.
Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

GORE, P. H.
A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

GRAEF, W.
Red Bacterial Growth (Corynebacterium Rubrum N. Spec.) In Tap-water Systems. (In German),
W75-06340 5C

GRANT, R. A. JR.
The Colorado: A Weary River,
W75-06100 4A

GRATKOWSKI, H. J.
The Future Role of Chemicals in Forestry,
W75-05935 4C

GRECO, F.
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

GREER, E.
Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

GRIMMETT, E.
Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

GUILBE, A.
Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

GUINASSO, N. L. JR.
Galveston Harbor: Factors Affecting Pollution and Pollution Monitoring,
W75-06040 5A

GUL'MURADOV, A. G.
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

GUPTA, C. B.
Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

GUPTA, S. R. L.
A General Formula for Determination of Peak Flood,
W75-05983 4A

GUPTA, V. L.
Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

Surface Runoff Hydrograph Equation,
W75-06139 2A

GUSTAFSSON, K.
The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

HAGLER, R.
Full Flow Fluid Filter,
W75-05948 5D

HAIMES, Y. Y.
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

HALL, T. D.
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

HAMEL, J. V.
Rock Strength from Failure Cases: Left Bank Slope Stability Study - Libby Dam and Lake Koocanusa, Montana,
W75-06252 8E

HAMMER, S. S.
Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

HANBY, K. P.
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

HANDA, N.
Carbohydrates from Lake Sediments,
W75-06125 2H

HANKS, J. J.
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

HANNEMA, U.
An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

HANSEN, E. A.
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

HARDIN, J. D.
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

HARICH, H. W.
Aeration of Flow Below Navigation Dams-St. Paul District,
W75-06054 8C

HARLEMAN, D. R. F.
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

HARRIS, R. F.
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

HART, E. D.
Shoaling Measurements in Navigable Waters by the U.S. Army Corps of Engineers,
W75-05977 8B

HAWKES, C. L.
Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

HAYNES, C. D.
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

HAYWARD, J. A.
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

HAZEL, F.
Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

HECHLER, V. IV.
Anti-Backflow Water Control and Solution Proportioner,
W75-05909 8C

HEERDEGAN, R. G.
The Effects of Physiography and Climate on Unit Hydrographs,
W75-06196 2A

HERMAN, S. T.
Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

HERNANDEZ-AVILA, M. L.
Form-Process Relationships on Island Coasts,
W75-06229 2L

HETLING, L. J.
An Analysis of Past, Present and Future Hudson River Wastewater Loadings,
W75-06065 5B

Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

HICKMAN, K. C. D.
Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

HILER, E. A.
Optimization of Water Use Efficiency Through Trickle Irrigation and the Stress Day Index,
W75-06089 3F

HILL, F. A.
Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

HILSENRATH, E.
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

HINES, N. W.
Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

HINO, M.
Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

HO, W. W.
Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

HOERMANN, W.
A Wastewater Treatment System,
W75-05882 5D

HOLLEY, E. R.
Study of Stratified Overflows and Underflows,
W75-06081 5B

HOLLOWAY, M. L.
Simulation Techniques for Water Project Analyses,
W75-06328 6A

HOLTON, R.
Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

HONJO, S.
Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

HORST, R. J.
Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

HOWARD, R. K.
Flood Damage in New Zealand,
W75-06001 4A

HOWELL, T. A.
Optimization of Water Use Efficiency Through Trickle Irrigation and the Stress Day Index,
W75-06089 3F

HSIEH, J. J. C.
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

HSUEH, Y.
A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

HUANG, Y. H.
Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

HUAT, T. Y.
A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

HUNTER, L.
Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

HURTT, W.
The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

HUTCHINSON, P.
The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

IBAD-ZADE, J. A.
Flood Control Measures Leveeing and Bottom Deepening,
W75-06013 4D

Modelling of Erodible Channels,
W75-06014 2J

IBAD-ZADE, Y. A.
Application of Statistical Methods to the Distribution of Fall Diameter and Flow Turbidity,
W75-06011 2J

Mechanism of Bed Load Transport in Channel Flows,
W75-06010 2J

Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

IRONS, J.
Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

ITO, T.
Flood Prediction Method of River with Reservoir and Confluence of Tributaries,
W75-06005 2A

JAAKSON, R.
A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

JACKSON, I. J.
Relationships Between Rainfall Parameters and Interception by Tropical Forest,
W75-06291 2B

JACKSON, R. D.
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

JACOBSON, J. L.
A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

JAHN, L. A.
The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

JAKUBEK, P.
Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

JAMES, W. R.
Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

JAMSEN, F. W.
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

JAMSEN, G. C.
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

JENKS, W. N.
Some Considerations of Straightness in Channel Form Relating to the Estuary of the Maclennan River, South Otago (New Zealand),
W75-06285 2L

JETTMAR, R. U.
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

JOHNSON, J. W.
Bolinas Lagoon Inlet, California,
W75-06217 2L

JOHNSON, R. K.
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

JOLLY, J. P.
Stability of Single-Peaked Waves,
W75-06118 2E

JONES, D. B.
Flexible Breakwaters,
W75-06232 8B

JONES, J. G.
Studies on Freshwater Bacteria: The Effect of Enclosure in Large Experimental Tubes,
W75-05875 2H

JONES, L. W.
System for Removing Floating Oil from Water,
W75-05881 5G

JONES, S. B.
Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

JONES, T. C.
Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

JOVEL, J. R.
Water Resources Development in Central America, 1970 to 1980,
W75-06270 4A

JURACSKI, T.
Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

JURAT, J.-C.
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

KAELIN, J.
Method of Introducing Oxygen into a Liquid to be Clarified and Device for Carrying the Method into Effect,
W75-05951 5D

KAHN, B.
Monitoring Seawater for Radionuclides,
W75-06031 5A

KALAN, E. B.
Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

KAMPBELL, D. H.
Determination of Metals in Sea Water,
W75-06027 5A

KARTSIVADZE, A. I.
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

KASPERSON, R. E.
Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

KEATING, W. H.
Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

KELLER, O.
Full Flow Fluid Filter,
W75-05948 5D

KELLEY, J. C.
A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

KELLEY, T. I.
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

KELLY, T. L.
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

KHOPKAR, S. M.
Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

KIEFER, W.
Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

KIM, Y. S.
The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

KIMBALL, B. A.
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

KING, D. B. JR.
The Dynamics of Inlets and Bays,
W75-06223 2L

KING, D. M.
Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

KING, P. H.
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

KING, W. D.
Freezing Rates of Water Droplets,
W75-06277 2C

KINORI, B. Z.
Benefit-Estimate of Drainage and Flood-Control Works in Small Watersheds of Semi-Arid Climate,
W75-05997 6B

KIRKSEY, J. W.
Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

KISIEL, C. C.
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

KISSILL, G. W.
Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

KLEMES, V.
Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

KNIGHT, G. R.
Insulated Embankment Design Techniques,
W75-05897 8B

KNIGHT, R.
The Climatic Adaptation of Populations of Cocksfoot (Dactylis Glomerata L.) from Southern France,
W75-06098 2G

KNIGHT, R. K.
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

KNOOP, P.
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

KOBERG, D.
Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

KOCHENDERFER, J.
Indexes to Transpiration by Forest Trees,
W75-06336 2D

KOCHENDERFER, J. N.
Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

KOLLER, L. D.
Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

KOLP, B. J.
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

KOVACIC, S.
Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

KOVACS, G.
Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

KRAWCZYK, D. F.
Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

KRONE, R. B.
A Study of Rheologic Properties of Estuarial Sediments,
W75-06222 2L

KROSZYNSKI, U.
Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

KROUSE, M. R.
Estimating the Value and Incidence of Recreation Benefits from a Beach Erosion Control Project,
W75-05859 6C

KRUMBEIN, W. C.
Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

KUMAR, N.
Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

KUMARASWAMY, E. P.
Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

KUUSISTO, E.
Evaporation from Snow Cover,
W75-06271 2D

KYCEK, R. V.
Ketchikan Waterfront Development,
W75-06055 6A

LABADIE, J. W.
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

LAMB, G. M.
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

LAMONT, P.
Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

LAMY, J. E.
Swell Damper,
W75-05896 8B

LANSDEN, J. A.
Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

LARSEN, B. V.
The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

LARSON, J. S.
Defining Freshwater Wetlands,
W75-06161 4A

LATTANZI, A. R.
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

LAU, L. S.
Flood Computations for the Hawaiian Islands,
W75-05984 4A

LAUMOND, F.
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

LAURENSON, E. M.
Effect of Dams on Flood Frequency,
W75-05982 4A

LEDGER, D. C.
The Water Balance of an Exceptionally Wet Catchment Area in West Africa,
W75-06292 2A

LEDOKHOVICH, A. A.
Instruments for Investigation of Fogs and Clouds and Measurement of Humidity,
W75-06041 2B

LEE, B-H.
A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

LEE, R.
Indexes to Transpiration by Forest Trees,
W75-06336 2D

LEE, R. A.
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

LEENDERTSE, J. J.
Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

LEFEBVRE, E. E.
Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

LEMKE, A. A.
Method and Apparatus for Treating Waste Material,
W75-05894 5D

LEMMELA, R.
Evaporation from Snow Cover,
W75-06271 2D

LEUDTKE, R.
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

LEVEQUE, C.
The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

LEVIN, M. A.
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

LIN, C-Y
Study of Stratified Overflows and Underflows,
W75-06081 5B

LIRA, M. A. F.
Flood Control in the Plain Rivers,
W75-05996 4D

LIU, S-K.
Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

LONG, L. L.
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

LONG, R. R.
Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

LOPER, B. R.
DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

LOVE, A. W.
Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

LUBINSKI, K. S.
The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

LUDLAM, S. D.
Preliminary Observations on the Biogeochemical Cycle of Silica in Stockbridge Bowl (Lake),
W75-06191 5C

LUDWIG, C. H.
Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

LUND, W.
The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

LYNCH, J. A.
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

MACKLIN, W. C.
Air Bubbles in Accreted Ice,
W75-06275 2C

MACLAY, R. E.
DAMS2, Project Formulation--Structure Site Analysis, User's Guide,
W75-06221 7C

ECON2, Project Formulation--Economics--Computer Program User's Guide,
W75-06220 7C

TR-20 Project Formulation--Hydrology, Computer Program User's Manual,
W75-06219 7C

WSP2-Water Surface Profile Program, User's Guide,
W75-06186 7C

MADDEN, E. B.
Mississippi River and Tributaries Project, Problems Relating to Changes in Hydraulic Capacity of the Mississippi River,
W75-06212 8B

MAGLIANESI, R. E.
Phytoplankton Primary Production and Its Main Associated Variables in Catedral Branch, Mascardi Lake, (In Spanish),
W75-05968 2I

MALINS, D. C.
Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

MANGER, M. C.
Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

MANJIKIAN, S.
Reverse Osmosis Water Purifying System for Household Use,
W75-05891 5F

MANSOURI, H.
Screens for Water Intake Systems,
W75-05879 8I

MARCOTTE, N.
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

MARKLAND, R. E.
A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

MARSHALL, H. E.
Cost Sharing for Shoreline Protection,
W75-05872 6C

MARTINEC, J.
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

MARTINEZ, J. D.
Trace Metals in Oyster Shells,
W75-06312 5A

MARZOLF, G. R.
Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

MASHAW, L. H.
Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

MASTERSON, D. M.
Floating Ice Sheets,
W75-06280 8G

MATHUR, B. S.
Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

MAXWELL, W. H. C.
Study of Stratified Overflows and Underflows,
W75-06081 5B

MAYES, J. H.
Characterization of Wastewaters from the Ethical Pharmaceutical Industry,
W75-06244 5A

MAZA ALVAREZ, J. A.
Flood Control in the Plain Rivers,
W75-05996 4D

MCAVOY, R. S.
A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

MCCLUNEY, W. R.
Radiometry of Water Turbidity Measurements,
W75-06128 5A

MCCLURKIN, D. C.
Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

MCERLEAN, A. J.
Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

MCGINNIS, R. S.
Power Plant Siting-Social/Political Considerations,
W75-06050 6B

MCNABB, J. F.
Subsurface Biological Activity in Relation to Ground-Water Pollution,
W75-06238 5B

MEGAHAN, W. F.
Role of Bedrock in Watershed Management,
W75-05932 4D

MEIN, R. G.
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

MESSEM, A. B.
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

MEYER, L. D.
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

MEYER, R. L.
Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

MIDGLEY, D. C.
A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

MILLER, R. A.
Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

MILLER, T. K.
Patterns of Variation in a Fluvial System,
W75-05961 2J

MILLER, W. E.
Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

MILTON, V. A.
The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

MISHRA, P. N.
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

MITCHELL, D.
Automation of the Continuous Coagulation Monitor,
W75-06074 5F

MITSUDA, E.
Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

MIZUNO, K.
Carbohydrates from Lake Sediments,
W75-06125 2H

MOIN, S. A.
Surface Runoff Hydrograph Equation,
W75-06139 2A

MOIN, S. M. A.
Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

MOLNAR, G.
Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

MONTGOMERY, D. M.
Monitoring Seawater for Radionuclides,
W75-06031 5A

MOORE, D. G.
DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

MOREL-SEYTOUX, H. J.
Description of Water and Air Movement During Infiltration,
W75-06288 2G

MORNEAU, G. A.
Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

MORRISSY, N. M.
Reversed Longitudinal Salinity Profile of a Major River in the South-West of Western Australia,
W75-06112 5B

MOSONYI, E.
Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

MULAMOOTTIL, G.
Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

MULYE, R. R.
Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

MURTY, T. S.
Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

MUSER, R.
A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

NADEAU, R. J.
Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

NAINIS, W. S.
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

NAKAYAMA, F. S.
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

NAVON, D. I.
Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

NEAL, E.
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

NECE, R. E.
Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

NEELY, W. C.
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

NELSON, V. A.
Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

NEUMAN, S. P.
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

NICOL, S. M.
Efficient Gate Operation of the Vaaldam to Minimize Downstream Flood Damage,
W75-06009 4A

NIEDERWEMMER, P.
Irrigation System,
W75-05887 3F

NORRIS, L. A.
Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

NRIAGU, J. O.
Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

NURIEV, C. G.
Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

OKUBO, K.
Apparatus for Removal of Contaminants from Wastes,
W75-05950 5D

OLIVER, A. E.
Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

ONESTI, L. J.
Patterns of Variation in a Fluvial System,
W75-05961 2J

OSIS, L.
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

OSKOWIS, J. J.
Automation of the Continuous Coagulation Monitor,
W75-06074 5F

PAGE, G. G.
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

PAINTAL, A. S.
Flood Prediction - A Bayesian Approach,
W75-05989 4A

PALM, D. J.
Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

PANATTONI, L.
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

PANJWANI, L. A.
Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

PARENT, J.-P.
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

PARKER, G.
Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

PARKS, R. W.
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

PASTALOVE, B. J.
Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

PATRIC, J. H.
Herbicides and Water Quality in American Forestry,
W75-06333 5B

Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

PAVLOU, S. P.
A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

PEARSON, P. J.
Waste Water Purification System,
W75-05878 5D

PEMBERTON, G.
Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

PENG, C-Y.
A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

PEREZ, A. I.
Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

PERHAC, R. M.
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

PIERCE, J. M.
Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

PIKUL, R. P.
Program Plan for Environmental Effects of Energy,
W75-05871 9D

PILGRIM, D. H.
The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

PLASS, W. T.
Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

PLATT, E. A.
Automatic Irrigation Apparatus,
W75-05901 3F

PLETAN, R. A.
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

POOLE, L. R.
Application of Monochromatic Ocean Wave Forecasts to Prediction of Wave-Induced Currents,
W75-06246 2L

PORATH, H.
Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

POUW, T. J. M.
An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

POWELL, J. W.
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

PRATHER, E. E.
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

PRESTRIDGE, F. L.
Process for Electrical Coalescing of Water,
W75-06339 5G

PREUS, P.
Inflatable Barrier for Substances Floating on Water,
W75-05886 5G

PRIVAL, M. J.
Adding Fluorides to the Diet,
W75-06318 5C

PROBST, W.
The Pulvinate Moss Vegetation in the Karadj-Valley (Elburs Mountains, Iran), (In German),
W75-05966 2A

RABIN, R.
Program Plan for Environmental Effects of Energy,
W75-05871 9D

RADICI, M. S.
Phytoplankton Primary Production and Its Main Associated Variables in Catedral Branch, Mascardi Lake, (In Spanish),
W75-05968 2I

RAGHAVAN, R.
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

RAHAU, L.
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

RAHMAN, M.
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

RAKOCZI, L.
Problems of Nuclear Gauging of Suspended Sediment Concentration,
W75-05978 2J

RANDALL, C. W.
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

RAO, G. V.
Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

RATTRAY, M. JR.
Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

READ, D. G.
Correlation Analysis of the Cellular Structure of Storms Observed by Raingauges,
W75-06293 2B

REASONER, D. J.
Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

REES, S. D.
Deep-Well Injection: Future Panacea for Wastes Disposal,
W75-06164 5B

REGINATO, R. J.
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

REICH, B. M.
Computing Flood Frequency in the Humid Eastern USA,
W75-05981 4A

REICHERT, W. L.
Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

REINHARDT, H.
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

REISENAUER, A. E.
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

RENARD, K. G.
Bed Material Size Changes and Sediment Transport,
W75-06281 2J

RICCIO, J. F.
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

RICHARDS, D. L.
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

RICHARDSON, P. L.
Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

RICHARDSON, W. S.
Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

RIDLEY, B. A.
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

RISSING, S. W.
Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

RITTALL, W. F.
Surface Slicks and Films - A Need for Control,
W75-06023 5A

ROBERSON, J. A.
A General Theory for Flow in Rough Conduits,
W75-06120 8B

ROBERTS, H. H.
Form-Process Relationships on Island Coasts,
W75-06229 2L

ROBINSON, K. R. W.
Liquid Suspension Purifying Unit,
W75-05908 5D

ROBINSON, K. S.
Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

ROBISCH, G.
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

ROCHE, B. A.
Ion Exchange Waste Water Treatment Process,
W75-05906 5D

ROCHESTER, H. JR.
Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

RODEN, J. J. III.
Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

ROEHRKASSE, G. P.
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

ROGNON, P.
Hydrologic Variations and the Extent of the Holocene Lakes in the Danakil Desert, (In French),
W75-06243 2H

ROMEO, M.
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

ROSEN, H.
Improved Field Water Analysis Tests,
W75-06122 2K

ROSEN, H. H.
Pesticide Pyrolysis Device,
W75-06227 5G

ROSENKRANZ, W. A.
Storm and Combined Sewer Research and Development,
W75-06049 8C

ROTHACHER, J.
Regimes of Streamflow and Their Modification by Logging,
W75-05925 4C

RUCKSTUHL, R. C.
Water Distillation Apparatus,
W75-05893 5F

RUTHERFORD, R. J.
Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

Conserving Wetland Water by Suppressing Evaporation,
W75-06121 3B

RYCKMAN, J. R.
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

RYDBERG, J. H. A.
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

SACKETT, R. G.
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

SAGHER, A.
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

SAMAR, P.
An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

SANDERS, J. E.
Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

SANDS, M. B.
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

SANGSNIT, S.
Basinwide Flood Forecasting System for the Lower Mekong Basin,
W75-06007 4A

SANIFORD, B. B.
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

SCARBROUGH, L.
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

SCHAFFER, S.
Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

SCHELL, W. R.
Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

SCHIFF, H. I.
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

SCHUKNECHT, B.
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

SEAMAN, E. A.
Environmental Criteria for Reclamation Projects,
W75-06067 8A

SEE, R. M.
The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

SEITZ, W. D.
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

SELF, R. P.
Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

SELLERS, J.
An Economic Analysis of the Proposed Water Resources Project for the Upper French Broad River Basin in Western North Carolina,
W75-05857 6B

SEMROD, P.
Ketchikan Waterfront Development,
W75-06055 6A

SERFATY, A.
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

SEVRUK, B.
Correction for the Wetting Loss of a Hellmann Precipitation Gauge,
W75-06267 7B

SEYMOUR, A. H.
Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

SHEEHAN, M. C.
Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

SHEMA, B. F.
Slime Control Compositions and Their Use,
W75-05907 5D

SHERMAN, F.
Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

SHERWOOD, A. E.
In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

SHONTING, D. H.
Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

SHREVE, R. L.
Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

SIEBERT, W.
A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

SIEGEL, S. M.
Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

SIKKA, D. R.
Highlights of Flood Protection Works Done on River Narmada at Hoshangabad in Madhya Pradesh State - India,
W75-05998 4D

Norms and Criteria for Initiating Scientific Assessment of Flood Damages in Non-Uniform Conditions in Madhya Pradesh State--India,
W75-06000 2E

SIMAN-TOV, M.
A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

SIMS, J. H.
Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

SINGH, A.
Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

SINHA, D. S.
Flood Routing Studies of Gandhisagar Dam,
W75-06003 2E

SKJUTARE, L.
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

SLOTTA, L. S.
Monitoring Dredge Spoils,
W75-06035 5A

SMALL, L. C.
Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

SMITH, D. W.
Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

SMITH, J. E. JR.
The Properties and Composition of Sludges,
W75-06033 5A

SMITH, L. D.
A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

SODERSTROM, B.
The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

SOLOMON, S. I.
Potential Evaporation as an Unsteady Process,
W75-06290 2D

SOMERS, J. A.
The Fate of Spilled Oil in the Soil,
W75-06266 5B

SONNENFELD, S. L.
Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

SOPPER, W. E.
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

SOUKUP, M.
Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

SPALDING, D. B.
The Mathematical Modelling of Rivers,
W75-06132 2E

SPARKS, R. E.
The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

SPECHT, D. T.
Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

SPENCER, R. W.
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

SPITZE, G. F.
Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

SRIVASTAVA, R. C.
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

STAMM, G. G.
Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

STEWART, D. A.
The Annual Temperature Cycle of Lough Neagh,
W75-06016 2H

STOREY, D. A.
Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

STRANG, W. A.
The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

STROW, D. A.
Screens for Water Intake Systems,
W75-05879 8I

STUFT, W. A.
Effects of Sediment on Water Resource Planning,
W75-06056 5C

SULAKVELIDZE, G. K.
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

SULLIVAN, R. A.
Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

SUMER, B. M.
A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

SUTHERLAND, A. J.
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

SWARTZ, R. C.
Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

SZALAY, M.
Forecasting of Flood Characteristics of the Nile,
W75-06008 4A

SZIGYARTO, Z.
Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

SZPRENGIER, T.
The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

SZUMIEC, M.
Determination of Water Temperature in Shallow Water Bodies,
W75-05969 2H

TALAY, T. A.
The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

TANDON, S. N.
Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

TANG, N-H.
Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

TARRANT, R. F.
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

The Future Role of Chemicals in Forestry,
W75-05935 4C

Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

Persistence of Some Chemicals in Pacific Northwest Forests,
W75-06335 5B

TAYLOR, R. E. L.
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

TAYLOR, R. F.
Screens for Water Intake Systems,
W75-05879 8I

TAYLOR, R. S.
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

TCHOBANOGLOUS, G.
Wastewater Treatment for Small Communities: Part Two - Special Design Considerations,
W75-05944 5D

TEAGUE, L. P.
Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

TEKELI, S.
Study of Stratified Overflows and Underflows,
W75-06081 5B

TELLECK, D. A.
Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

TEODOROIU, P. B.
Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

THAMMONGKOL, T.
Assessment of 1966 Peak Discharge of the Mekong at Vientiane,
W75-05987 2E

THATCHER, M. L.
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

THONGCHAREON, V.
Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

TIERNEY, G. F.
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

TISCHLER, L. F.
Simulation Techniques for Water Project Analyses,
W75-06328 6A

TORPEY, W. N.
Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

TOWNSHEND, A.
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

TRAFFORD, B. D.
The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

TRIER, N. H.
Environmental Control Laboratory Designed for the Specific Needs of the Intern Training Center, Red River Army Depot,
W75-06210 5A

TRIMBLE, G. R. JR.
Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

TRONSON, K.
The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

TROPPER, P.
Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

TROTH, L.
Full Flow Fluid Filter,
W75-05948 5D

TSAI, Y. H.
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

TUFFUOR, S.
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

TULUMELLO, A. C.
Apparatus for Separating Oil from Water and Measuring the Amount of Oil so Separated,
W75-05910 5G

TURBIDE, P. N.
Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

TUROBOYSKI, L.
The Indicator Organisms and Their Ecological Variability,
W75-05970 5A

TYLER, P. A.
Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

UENO, A.
Apparatus for Removal of Contaminants from Wastes,
W75-05950 5D

UHLEMANN, E.
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

UNNY, T. E.
Potential Evaporation as an Unsteady Process,
W75-06290 2D

VAN DOORNE, W.
A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

VAN LOON, J. C.
Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

VAN MELLE, M. J.
Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

VANDENBERG, A.
Simultaneous Pumping of Fresh and Salt Water from a Coastal Aquifer,
W75-06296 4B

VASIL'EVA, A. V.
Clinical Characteristics of Typhoid Fever in Children in Epidemic Water-Borne Infection,
W75-06130 5C

VERMA, R. D.
Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

VERNBERG, W. B.
The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

VERSHININ, A. P.
Method for Computing Evaporation from the Land Surface,
W75-06185 2D

VOGEL, W. G.
All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

The Effect of Herbaceous Vegetation on Survival and Growth of Trees Planted on Coal-Mine Spoils,
W75-05920 4D

WALCOTT, R. I.
Recent and Late Quaternary Changes in Water Level,
W75-06260 2H

WALLENTINUS, H.-G.
The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

WALSH, J. J.
A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

WALTERS, C.
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

WALTERS, T. M.
Liquid Filter System Having Automatic Filter Back Wash Control and Method of Operation,
W75-05941 5D

WALTZ, J. P.
A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

WANG, M-S.
A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

WARD, P. R. B.
The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

WATERS, W. E.
The Future Role of Chemicals in Forestry,
W75-05935 4C

WATTS, F. J.
Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

WEATHERFORD, D. J.
Oil Slick Skimmer,
W75-05905 5G

WEEKS, W. F.
Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

WESSELS, G. R.
Apparatus for Sampling Liquids,
W75-05945 7B

WEST, G. F.
Planning Industrial Areas for Barge Ports,
W75-06052 6A

WESTERMAN, H.
Apparatus for Skimming Floating Pollution from a Liquid Surface,
W75-05888 5G

WESTFALL, D.
Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

WHALIN, R. W.
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

WHITEHEAD, D. R.
Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

WHITEHURST, C. A.
Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

WHITLEDGE, T. E.
A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

WHITLOCK, C. H.
The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

WILKINSON, S. R.
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

WILLIAMS, G. P.
Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

WILLIAMS, S. J.
Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

WILLIAMSON, K. J.
Monitoring Dredge Spoils,
W75-06035 5A

WILMOTH, B. M.
Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

WILSON, A. J. JR.
Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

WILSON, S.
A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

WIND, G. P.
A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

WOO, D.-C.
Recent Research in Runoff Estimates from Samll Rural Watersheds,
W75-05980 2A

WOOD, F. C.
The Desalination of Seawater by the Use of Nuclear Energy,
W75-06224 3A

WOOD, J. M.
Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

WOOLCOTT, W. S.
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

WRIGHT, G. A.
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

WRIGHT, S. J.
A General Theory for Flow in Rough Conduits,
W75-06120 8B

WU, C. M.
A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

YAMAMOTO, S.
Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

YEVJEVICH, V.
Stability of Single-Peaked Waves,
W75-06118 2E

YOUNG, G. K.
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

YOUNG, T. C.
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

YOUNGS, E. G.
The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

ZAYTSEV, V. A.
Instruments for Investigation of Fogs and Clouds and Measurement of Humidity,
W75-06041 2B

ZEITLIN, H.
The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

ZOLLER, W. H.
Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

ZUZEL, J. F.
Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

ORGANIZATIONAL INDEX

AGRICULTURAL RESEARCH COUNCIL, CAMBRIDGE (ENGLAND). UNIT OF SOIL PHYSICS.
The Effect of the Depth of an Impermeable Barrier on Water-Table Heights in Drainded Homogeneous Soils,
W75-06294 2G

AGRICULTURAL RESEARCH ORGANIZATION, BET-DAGAN (ISRAEL). INST. OF SOILS AND WATER.
Field Test of a Modified Numerical Model for Water Uptake by Root Systems,
W75-06265 2I

AGRICULTURAL RESEARCH SERVICE, ATHENS, GA.
Using Poultry Litter, Irrigation and Tall Fescue for No-Till Corn Production,
W75-06348 3F

AGRICULTURAL RESEARCH SERVICE, BOISE, IDAHO. NORTHWEST WATERSHED RESEARCH CENTER.
Relative Importance of Meteorological Variables in Snowmelt,
W75-06263 2C

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Diurnal Soil-Water Evaporation: Comparison of Measured and Calculated Soil-Water Fluxes,
W75-05963 2D

AGRICULTURAL RESEARCH SERVICE, TUCSON, ARIZ. SOUTHWEST WATERSHED RESEARCH CENTER.
Bed Material Size Changes and Sediment Transport,
W75-06281 2J

AKTIEBOLAGET GULLSPANG ELEKTROKEMISKA (SWEDEN). (ASSIGNEE)
Method of Separating Metallic Chlorides from an Aqueous Mixture Thereof,
W75-05947 5D

ALABAMA A AND M UNIV., NORMAL. DEPT. OF CHEMISTRY.
Investigation of Water Quality Parameters at Selected Points on the Tennessee River,
W75-06248 5A

ALABAMA UNIV., HUNTSVILLE. CENTER FOR ENVIRONMENTAL STUDIES.
Study to Define Points of Entry for Potential Contaminants in Limestone Aquifers,
W75-06251 5B

ALABAMA UNIV., UNIVERSITY. DEPT. OF CIVIL AND MINERAL ENGINEERING.
Pressure-Fracture Gradient Problems in Deep Well Waste Disposal,
W75-05911 5B

AMOCO PRODUCTION CO., TULSA, OKLA.
Vertical Permeability from Limited Entry Flow Tests in Thick Formations,
W75-06282 4B

AMOCO PRODUCTION COMPANY, TULSA, OKLA. (ASSIGNEE)
System for Removing Floating Oil from Water,
W75-05881 5G

AMSTERDAM UNIV. (NETHERLANDS). LAB. FOR ANALYTICAL CHEMISTRY.
An Analytically Useful Coulometric Generation of Micro Amounts of Metal Ions, Part II. Electrogeneration of Lead (II),
W75-06304 5A

ARIZONA CROP IMPROVEMENT ASSOCIATION, INC., TUCSON.
Effect of Rate and Date of Seeding Shoshoni Winter Wheat on Soil Moisture Depletion,
W75-05854 2G

ARIZONA UNIV., TUCSON. INST. OF ATMOSPHERIC PHYSICS.
The Water Drop Rebound Problem: Dynamics of Collision,
W75-06278 2B

ARKANSAS UNIV., FAYETTEVILLE. DEPT. OF BOTANY AND BACTERIOLOGY.
Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics, Phase 1,
W75-06073 5B

ARKANSAS UNIV., FAYETTEVILLE. DEPT. OF CIVIL ENGINEERING.
Automation of the Continuous Coagulation Monitor,
W75-06074 5F

ARMOUR RESEARCH FOUNDATION, CHICAGO, ILL.
Investigation of Solar Energy for Ice Melting.
W75-06135 2C

ARMY ENGINEER DISTRICT, DETROIT, MICH.
Confined Disposal Facility, Grand Haven Harbor Ottawa County, Michigan (Final Environmental Impact Statement,
W75-06174 5G

ARMY ENGINEER DISTRICT, KANSAS CITY, MO.
Flood Plain Information: Femme Osage Creek, St. Charles County, Missouri.
W75-06107 4A

Flood Plain Information: Hinkson Creek and Tributaries and Bear Creek, Columbia, Missouri.
W75-06108 4A

Flood Plain Information: Rock Creek, Independence, Missouri.
W75-06109 4A

Flood Plain Information: One Hundred and Two River, St. Joseph, Missouri.
W75-06110 4A

ARMY ENGINEER DISTRICT, NEW YORK.
Maintenance Dredging, Port Chester Harbor, New York (Final Environmental Impact Statement),
W75-06176 5G

Maintenance of Mamaroneck Harbor, N.Y. (Final Environmental Impact Statement),
W75-06177 5G

ARMY ENGINEER DISTRICT, NORFOLK, VA.
Norfolk Harbor, Virginia (Maintenance Dredging) (Final Environment Impact Statement),
W75-06173 4A

Water Intake and Pump Station of City of Chesapeake, Virginia (Northwest River) (Final Environmental Impact Statement),
W75-06179 8C

ARMY ENGINEER DISTRICT, PORTLAND, OREG.
Dredging of Lewis and Clark Connecting Channel, Clatsop County, Oregon (Final Environmental Impact Statement),
W75-06169 4A

ARMY ENGINEER DISTRICT, ST. PAUL, MINN.
Flood Plain Management,
W75-06063 4A

ARMY ENGINEER DISTRICT, TULSA, OKLA.
Operation and Maintenance Program, Wister Lake, Poteau River, Oklahoma (Final Environmental Impact Statement),
W75-06170 4A

Deep Fork Log-Jam, Deep Fork River, Oklahoma (Final Environmental Impact Statement),
W75-06172 4A

ARMY ENGINEER DISTRICT, VICKSBURG, MISS. RIVER STABILIZATION BRANCH.
Mississippi River and Tributaries Project, Problems Relating to Changes in Hydraulic Capacity of the Mississippi River,
W75-06212 8B

ARMY ENGINEER DISTRICT, WALLA WALLA, WASH.
Major Drainage Project, Riverview, Vicinity of Pasco, Washington (Final Environmental Impact Statement),
W75-06178 4A

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS. HYDRAULICS DIV.
Shoaling Measurements in Navigable Waters by the U.S. Army Corps of Engineers,
W75-05977 8B

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS. HYDRAULICS LAB.
Criteria for Use of Ripple Tanks: Refraction Scale Effects,
W75-06019 8B

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, CHARLOTTESVILLE, VA.
The Problem of Mercury Contamination of the Biological Environment and Domestic Animals,
W75-06343 5C

ARMY LAND WARFARE LAB., ABERDEEN PROVING GROUND, MD.
Improved Field Water Analysis Tests,
W75-06122 2K

Pesticide Pyrolysis Device,
W75-06227 5G

ASTON UNIV., BIRMINGHAM (ENGLAND).
A Compact Watershed Model System,
W75-06286 2A

ATLANTIC RICHFIELD CO., NEW YORK. (ASSIGNEE)
Insulated Embankment Design Techniques,
W75-05897 8B

ATOMIC ENERGY COMMISSION, WASHINGTON, D.C. (ASSIGNEE)
Method for the Disposal of Combustible and Dilute Aqueous Wastes,
W75-05949 5D

ATOMIC ENERGY ESTABLISHMENT, WINFRITH (ENGLAND).
The Desalination of Seawater by the Use of Nuclear Energy,
W75-06224 3A

AUBURN UNIV., ALA. DEPT. OF CHEMISTRY.
Modification of a Commercial Instrument for low Temperature Absorption,
W75-06092 2K

Spectroanalytical Parameters of Fungal Metabolites. IV. Moniliformin,
W75-06093 5A

AUBURN UNIV., ALA. DEPT. OF FISHERIES AND ALLIED AQUACULTURES.
Sudden Mortality of a Massive Phytoplankton Bloom,
W75-06091 5C

AUTOTROL CORP., MILWAUKEE, WIS. (ASSIGNEE)
Method for the Primary and Secondary Treatment of Wastewater in a Unitary Apparatus,
W75-05890 5D

Method and Apparatus for Upgrading Wastewater Treatment Plants,
W75-05895 5D

BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH. WATER AND LAND RESOURCE DEPT.
A Study of Soil Matric Potential and Temperature in Hanford Soils,
W75-06240 2G

BECHTEL CORP., SAN FRANCISCO, CALIF.
Study of Single-Responsibility Concepts for Water Pollution Control Projects.
W75-05868 5G

BEDFORD INST., DARTMOUTH, (NOVA SCOTIA). ATLANTIC GEOSCIENCE CENTER.
Deglaciation of the Labrador Continental Shelf,
W75-06279 2C

BEDFORD INST., DARTMOUTH (NOVA SCOTIA). MARINE ECOLOGY LAB.
Variation with Chain Length in Acute Toxicity of Alkylhydroxamic Acids to Salmon (Salmo Salar) Fry.
W75-05975 5C

BETHLEHEM STEEL CORP., PA. (ASSIGNEE)
Removal of Cyanide and Color Bodies from Coke Plant Wastewater,
W75-05899 5D

BETZ LABS., INC., TREVOSE, PA. (ASSIGNEE)
Slime Control Compositions and Their Use,
W75-05907 5D

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF CHEMISTRY.
Molecular Emission Cavity Analysis (MECA) - A New Flame Analytical Technique, Part IV the Determination of Arsenic and Antimony,
W75-06302 5A

BLACK, CROW AND EIDSNESS, INC., ATLANTA, GA., AND ATLANTA PUBLIC WORKS DEPT., GA.
Water Quality Decision Making in Atlanta, Georgia, Three Rivers Study,
W75-06058 5D

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF CIVIL ENGINEERING.
The Transverse Distribution of Velocity in Estuary Flow,
W75-06206 2L

BROOM'S BARN EXPERIMENT STATION, BURY ST. EDMONDS (ENGLAND).
Effects of Plant Density, Irrigation and Potassium and Sodium Fertilizers on Sugar Beet: II. Influence of Soil Moisture and Weather,
W75-06317 2I

BUREAU OF OUTDOOR RECREATION, WASHINGTON, D.C.
Proposed Inclusion of the Little Miami River into the National Wild and Scenic Rivers System, Ohio, (Final Environmental Impact Statement),
W75-06182 4D

BUREAU OF RECLAMATION, DENVER, COLO. ENGINEERING AND RESEARCH CENTER.
Polymer-Impregnated Concrete Tunnel Support and Lining,
W75-06234 8F

BUREAU OF RECLAMATION, WASHINGTON, D.C.
Managing Water Resource Projects to Maintain Environmental Benefits,
W75-06066 6G

Environmental Criteria for Reclamation Projects,
W75-06067 8A

Planning Water Resources Projects to Maximize Environmental Benefits,
W75-06068 6B

Construction of Reclamation Projects to Enhance Environment,
W75-06069 8A

CALIFORNIA INST. OF TECH., PASADENA. (ASSIGNEE)
Full Flow Fluid Filter,
W75-05948 5D

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
Meeting Water Demands in the Chino-Riverside Area. Appendix A: Water Supply.
W75-05867 5F

Meeting Water Demands in the Chino-Riverside Area.
W75-06104 6D

Hydrologic Data: 1973; Volume IV: San Joaquin Valley.
W75-06208 7C

CALIFORNIA STATE UNIV., SAN DIEGO. DEPT. OF GEOLOGICAL SCIENCES.
On the Hydrology of the Edwards Limestone, South Central Texas,
W75-06287 2F

CALIFORNIA UNIV., BERKELEY. BIOMEDICAL RESEARCH LAB.
Quantitation of Environmental Hydrocarbons by Thin-Layer Chromatography, Gravimetry/Densitometry Comparison,
W75-06276 5A

CALIFORNIA UNIV., BERKELEY. HYDRAULIC ENGINEERING LAB.
Bolinas Lagoon Inlet, California,
W75-06217 2L

CALIFORNIA UNIV., BERKELEY. HYDRAULIC ENGINEERING LAB., AND

CALIFORNIA UNIV., BERKELEY. SANITARY ENGINEERING RESEARCH LAB.
A Study of Rheologic Properties of Estuarial Sediments,
W75-06222 2L

CALIFORNIA UNIV., DAVIS. DEPT. OF CIVIL ENGINEERING.
Wastewater Treatment for Small Communities: Part Two - Special Design Considerations,
W75-05944 5D

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
In-Situ Permeability Analysis Using Barometric Pressure Fluctuations,
W75-06241 2F

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF GEOLOGY; AND CALIFORNIA UNIV., LOS ANGELES. INST. OF GEOPHYSICS AND PLANETARY PHYSICS.
Variation of Mainstream Length with Basin Area in River Networks,
W75-05960 2E

CAMBRIDGE UNIV. (ENGLAND). ENGINEERING LAB.
A Method of Improving the Uniformity of the Stream in an Open Water-Channel,
W75-06207 2E

CANADA CENTRE FOR INLAND WATERS, BURLINGTON (ONTARIO).
Lead Orthophosphates - IV, Formation and Stability in the Environment,
W75-06303 5B

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. SYSTEMS ENGINEERING DIV.
Coordination of Regional Water Resource Supply and Demand Planning Models,
W75-05856 6A

CATHOLIC UNIV. OF AMERICA, WASHINGTON, D.C.
Hydrologic Estimation Procedures in Water Resources Planning,
W75-06070 2E

CENTER FOR SCIENCE IN THE PUBLIC INTEREST, WASHINGTON, D.C.
Adding Fluorides to the Diet,
W75-06318 5C

CENTRE D' ETUDES ET DE RECHERCHES DE BIOLOGIE ET D'OCEANOGRAPHIE MEDICALE, NICE (FRANCE).
Use of a Neritic Trophodynamic Chain with Mollusks to Study the Transfers of Metallic Pollutants (Utilization D'Une Chaine Trophodynamique de Type Neritique a Mollusques Pour L'etude des Transferts des Polluants Metalliques),
W75-06327 5B

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, BELLEVUE (FRANCE), LABORATOIRE DE GEOLOGIE DU QUATERNAIRE.
Hydrologic Variations and the Extent of the Holocene Lakes in the Danakil Desert, (In French),
W75-06243 2H

CENTRO DI RICERCA IBM DI PISA (ITALY).
An Implicit Method to Solve Saint Venant Equations,
W75-06119 2E

CHICAGO RIVER STEERING COMMITTEE, CHICAGO, ILL.
Floodwater Management Plan, North Branch of the Chicago River, Lake and Cook Counties, Illinois.
W75-06048 4A

CIVIL ENGINEERING LAB. (NAVY), PORT HUENEME, CALIF.
Flexible Breakwaters,
W75-06232 8B

Ice Engineering - Quantification of Subsurface Ice Thickening Techniques,
W75-06254 2C

CLEMSON UNIV., S.C. DEPT. OF AGRICULTURAL ENGINEERING.
Water Management in Livestock Waste Handling Systems,
W75-06087 5D

COASTAL ENGINEERING RESEARCH CENTER, FORT BELVOIR, VA.
Hydraulic Method Used for Moving Sand at Hyperion Beach Erosion Project, El Segundo, California.
W75-06225 8B

Geomorphology and Sediments of the Inner New York Bight Continental Shelf,
W75-06226 2L

COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
Laboratory Preparation of Artificial Sea and Salt Ice,
W75-06253 2C

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF EARTH RESOURCES.
A System for Geologic Evaluation of Pollution Potential at Mountain Dwelling Sites,
W75-06075 5B

COMBUSTION ENGINEERING, INC., NEW YORK. (ASSIGNEE)
Process for Electrical Coalescing of Water,
W75-06339 5G

COMBUSTION ENGINEERING, INC., WINDSOR, CONN. (ASSIGNEE)
Ion Exchange Waste Water Treatment Process,
W75-05906 5D

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL ORGANIZATION, CANBERRA (AUSTRALIA). DIV. OF LAND USE RESEARCH.
The Australian Representative Basins Programme,
W75-05953 7A

COMPAGNIE GENERALE POUR LES DEVELOPPEMENTS OPERATIONNELS DES RICHESSES SOUS-MARINES, PARIS (FRANCE).
Swell Damper,
W75-05896 8B

CONNECTICUT UNIV., GROTON. MARINE SCIENCES INST.
A Survey of Methods for Monitoring Ecologically Important Microorganisms in the Marine Environment,
W75-06039 5A

COOK COUNTY FLOOD CONTROL COORDINATING COMMITTEE, CHICAGO, ILL.
Development of a Flood Control and Pollution Control Plan for the Chicagoland Area: Summary of Technical Reports.
W75-06047 8A

CORPS OF ENGINEERS, OMAHA, NEB. MISSOURI RIVER DIV.
Effects of Sediment on Water Resource Planning,
W75-06056 5C

DELAWARE RIVER BASIN COMMISSION, TRENTON, N.J.
Interstate Planning for Regional Water Supply and Pollution Control.
W75-05860 5G

DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C. (ASSIGNEE)
Nutritional Iron-Protein Complexes from Waste Effluents,
W75-05946 5E

DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA (ONTARIO). EARTH PHYSICS BRANCH.
Recent and Late Quaternary Changes in Water Level,
W75-06260 2H

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, PETONE (NEW ZEALAND). CHEMISTRY DIV.
Mechanisation of New Type of Copper Corrosion in Water,
W75-06111 8G

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). INLAND WATERS DIRECTORATE.
Simultaneous Pumping of Fresh and Salt Water from a Coastal Aquifer,
W75-06296 4B

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). MARINE SCIENCES DIRECTORATE.
Submarine Upwelling Due to a Steady Thermal Front in a Viscid Fluid,
W75-06131 2L

DEPARTMENT OF THE INTERIOR, WASHINGTON, D.C.
Geothermal Leasing Program, Volume 1, Promulgation of Leasing and Operating Regulations (Final Environmental Impact Statement),
W75-06166 4B

DEPARTMENT OF WATER AFFAIRS, PRETORIA (SOUTH AFRICA).
Efficient Gate Operation of the Vaaldam to Minimize Downstream Flood Damage,
W75-06009 4A

DEPT. OF ENVIRONMENTAL SYSTEMS ENGINEERING. CLEMSON UNIV., S.C.
Development of a Method for Measuring Dissolved Color in Wastewaters and Receiving Streams,
W75-06086 5A

DESERT RESEARCH INST. NEVADA UNIV., RENO.
Finite Element Solutions for the Equations of Groundwater Flow,
W75-06083 2F

Analytical Modelling of Surface Runoff Hydrographs for Major Streams in Northeast Thailand,
W75-06269 2A

DOW CHEMICAL CO., MIDLAND, MICH. (ASSIGNEE)
Apparatus for Sampling Liquids,
W75-05945 7B

EAST CAROLINA UNIV., GREENVILLE, N.C. DEPT. OF MATHEMATICS.
On Forced Oscillations in a Rotating Stratified Fluid,
W75-06124 8B

ECKBO, DEAN, AUSTIN AND WILLIAMS, SAN FRANCISCO, CALIF.
Subsurface Water Data of the Upper Michigan Region, Project Sanguine.
W75-06236 4B

ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST (UN), BANGKOK (THAILAND). MEKONG COMMITTEE SECRETARIAT.
Assessment of 1966 Peak Discharge of the Mekong at Vientiane,
W75-05987 2E

Basinwide Flood Forecasting System for the Lower Mekong Basin,
W75-06007 4A

ECONOMIC COMMISSION FOR LATIN AMERICA (UN), MEXICO CITY.
Water Resources Development in Central America, 1970 to 1980,
W75-06270 4A

ECONOMIC DEVELOPMENT ADMINISTRATION, WASHINGTON, D.C.
City of Florence, South Carolina Extension of Water and Sewer Service (Final Environmental Impact Statement),
W75-06181 5D

EDGEWOOD ARSENAL, ABERDEEN PROVING GROUND, MD.
The Influence of Artificial Rainfall and Di-1-p-Menthene on Karbutilate Movement in Greenhouse Soil,
W75-06214 5B

EDINBURGH UNIV. (SCOTLAND). DEPT. OF FORESTRY AND NATURAL RESOURCES.
The Water Balance of an Exceptionally Wet Catchment Area in West Africa,
W75-06292 2A

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND). VERSUCHSANSTALT FUER WASSERBAU, HYDROLOGIE UND GLAZIOLOGIE.
Correction for the Wetting Loss of a Hellmann Precipitation Gauge,
W75-06267 7B

ENVIRONMENTAL HEALTH LAB., KELLY AFB, TEX.
Water Surveillance Program, Eglin AFB FL,
W75-06216 5A

ENVIRONMENTAL PROTECTION AGENCY, ATLANTA, GA. REGION IV.
Central Dade County, Florida (Final Environmental Impact Statement),
W75-06183 5D

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO. RADIOCHEMISTRY AND NUCLEAR ENGINEERING BRANCH.
Monitoring Seawater for Radionuclides,
W75-06031 5A

ENVIRONMENTAL PROTECTION AGENCY, EDISON, N.J. SURVEILLANCE AND ANALYSIS DIV.
Determination of Metals in Sea Water,
W75-06027 5A

Making Artemia Sludge Bioassay More Ecologically Relevant,
W75-06034 5A

ENVIRONMENTAL PROTECTION AGENCY, GULF BREEZE, FLA. GULF BREEZE ENVIRONMENTAL RESEARCH LAB.
Methods and Problems in Analysis of Pesticides in the Estuarine Environment,
W75-06025 5A

Biological Problems in Estuarine Monitoring,
W75-06026 5A

ENVIRONMENTAL PROTECTION AGENCY, NARRAGANSETT, R.I. NORTHEASTERN WATER SUPPLY LAB.
Microbiological Methods for Monitoring Marine Waters for Possible Health Effects,
W75-06038 5A

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C., OFFICE OF MONITORING SYSTEMS.
Proceedings of Seminar on Methodology for Monitoring the Marine Environment.
W75-06020 5A

ENVIRONMENTAL PROTECTION AGENCY, WHEELING, W. VA.
Development of Fresh Ground Water Near Salt Water in West Virginia,
W75-06258 4B

ENVIRONMENTAL QUALITY SYSTEMS, INC., WASHINGTON, D.C.
Waste Oil Recovery Practices--State of the Art.
W75-06347 5D

EXETER SEWAGE TREATMENT WORKS (ENGLAND).
The Countess Wear Sewage-Treatment Works of Exeter City Council,
W75-05940 5D

FEDERAL HIGHWAY ADMINISTRATION, TRENTON, N.J. NEW JERSEY DIV.
Construction of a Drainage Trunk Line Serving Routes 20 Freeway and Interstate 80 in Paterson, New Jersey (Final Environmental Impact Statement),
W75-06168 8A

FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D.C.
Recent Research in Runoff Estimates from Samll Rural Watersheds,
W75-05980 2A

FEDERAL POWER COMMISSION, WASHINGTON, D.C. BUREAU OF POWER.
Chippewa Reservoir Project No 108, Wisconsin (Final Environmental Impact Statement),
W75-06167 4A

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, WASHINGTON, D.C.
Storm and Combined Sewer Research and Development,
W75-06049 8C

FINNISH HYDROLOGICAL OFFICE, HELSINKI.
Evaporation from Snow Cover,
W75-06271 2D

FLINDERS UNIV., BEDFORD PARK (AUSTRALIA).
The Hydraulics of the South Australian Gulf System. I. Circulation,
W75-06115 5B

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF OCEANOGRAPHY.
A Diagnostic Calculation of Continental Shelf Circulation,
W75-06235 2L

FLORIDA UNIV., GAINESVILLE. COASTAL AND OCEANOGRAPHIC ENGINEERING LAB.
The Dynamics of Inlets and Bays,
W75-06223 2L

FMC CORP., CHICAGO, ILL. (ASSIGNEE)
Method and Apparatus for Treating Waste Material,
W75-05894 5D

FOREST SERVICE (USDA), BEREA, KY. NORTHEASTERN FOREST EXPERIMENT STATION.
The Effect of Herbaceous Vegetation on Survival and Growth of Trees Planted on Coal-Mine Spoils,
W75-05920 4D

Changed Spoil Dump Shape Increases Stability on Contour Strip Mines,
W75-05921 5G

Chemical Soil Stabilizers for Surface Mine Reclamation,
W75-06330 4D

All-Season Seeding of Herbaceous Vegetation for Cover on Appalachian Strip-Mine Spoils,
W75-06331 4D

Sediment Yield from Strip-Mined Watersheds in Eastern Kentucky,
W75-06332 4D

Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky,
W75-06334 5B

FOREST SERVICE (USDA), BERKELEY, CALIF. PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION.
Forest and Meteorological Influences on Snow and Snowmelt Water and Their Management,
W75-05913 4D

Modern Techniques in Planning the Management of Wildland Resources,
W75-05915 4A

Sediment Deposition in Reservoirs Associated with Rural Roads, Forest Fires, and Catchment Attributes,
W75-05916 2J

Relative Contribution of Sediment from Source Areas and Transport Processes,
W75-05926 2J

International Symposium on Mathematical Models in Hydrology, Warsaw, Poland, July 26-31, 1971,
W75-05934 2A

FOREST SERVICE (USDA), BOISE, IDAHO. INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Role of Bedrock in Watershed Management,
W75-05932 4D

FOREST SERVICE (USDA), CORVALLIS, OREG. FORESTRY SCIENCES LAB.
Arsenic Levels in Urine of Forest Workers Applying Silvicides,
W75-05930 5A

FOREST SERVICE (USDA), CORVALLIS, OREG. PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION.
Man-Caused Fluctuations in Quality of Water from Forested Watersheds,
W75-05914 5B

Chemical Brush Control: Assessing the Hazard,
W75-05922 5B

Nutrient Budget of a Douglas-Fir Forest on an Experimental Watershed in Western Oregon,
W75-05923 2K

Regimes of Streamflow and Their Modification by Logging,
W75-05925 4C

Comparative Water Quality - Natural and Disturbed Streams,
W75-05927 5A

The Entry and Fate of Forest Chemicals in Streams,
W75-05928 5B

DDT Residues in Forest Floor and Soil After Aerial Spraying, Oregon--1965-68,
W75-05936 5B

Persistence of Some Chemicals in Pacific Northwest Forests,
W75-06335 5B

FOREST SERVICE (USDA), GRAND RAPIDS, MINN. NORTH CENTRAL FOREST EXPERIMENT STATION.
Forest Drainage in North Central United States,
W75-05918 4D

The Hydrologic Characteristics of Undrained Organic Soils in the Lake States,
W75-05924 2G

Pipelines in Forested Wetlands: Cross Drainage Needed to Prevent Timber Damage,
W75-05939 4C

FOREST SERVICE (USDA), KINGSTON, PA. NORTHEASTERN FOREST EXPERIMENT STATION.
Establishing Forest on Surface-Mine Land as Related to Fertility and Fertilization,
W75-06337 4D

FOREST SERVICE (USDA), OXFORD, MISS. SOUTHERN FOREST EXPERIMENT STATION.
Planting Grass and Pine for Erosion Control,
W75-05917 4D

Difficult Eroded Planting Sites in North Mississippi Evaluated by Discriminant Analysis,
W75-05938 4D

FOREST SERVICE (USDA), PARSONS, W. VA. TIMBER AND WATERSHED LAB.
Transition in Research on Small Forested Watersheds in West Virginia,
W75-05919 2A

Problems and Techniques in Sampling Water for Analysis,
W75-05931 5A

Root Distribution Under Some Forest Types Native to West Virginia,
W75-05933 2I

Herbicides and Water Quality in American Forestry,
W75-06333 5B

Indexes to Transpiration by Forest Trees,
W75-06336 2D

FOREST SERVICE (USDA), PORTLAND, OREG. PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION.
The Future Role of Chemicals in Forestry,
W75-05935 4C

FOREST SERVICE (USDA), ST. PAUL, MINN., NORTH CENTRAL FOREST EXPERIMENT STATION.
In-Channel Sedimentation Basins--A Possible Tool for Trout Habitat Management,
W75-05937 8I

FOUNDATION OF CANADA ENGINEERING CORP. LTD., CALGARY (ALBERTA). ARCTIC DIV.
Floating Ice Sheets,
W75-06280 8G

FRESHWATER BIOLOGICAL ASSOCIATION, WINDERMERE (ENGLAND).
Studies on Freshwater Bacteria: The Effect of Enclosure in Large Experimental Tubes,
W75-05875 2H

GENERAL MOTORS TECHNICAL CENTER, WARREN, MICH. MANUFACTURING DEVELOPMENT STAFF.
Optimal Capacity Expansion of a Secondary Treatment System,
W75-05852 5D

GEOLOGICAL SURVEY, UNIVERISTY, ALA. WATER RESOURCES DIV.
Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment,
W75-06072 4B

GEOLOGICAL SURVEY, UNIVERSITY, ALA. WATER RESOURCES DIV.
History of Water Supply of the Mobile Area, Alabama,
W75-06071 3D

GEORGE WILLIAMS COLL., DOWNERS GROVE, ILL. DEPT. OF COUNSELING PSYCHOLOGY.
Renovated Waste Water: The Question of Public Acceptance,
W75-06096 5D

GEORGIA INST. OF TECHNOLOGY, ATLANTA. SCHOOL OF CIVIL ENGINEERING.
Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance,
W75-06076 6F

GEORGIA-PACIFIC CORP., PORTLAND, OREG. (ASSIGNEE)
Process for Flocculation of Solids from Aqueous Suspensions,
W75-05876 5D

GEORGIA UNIV., ATHENS.
An Economic Analysis of the Proposed Water Resources Project for the Upper French Broad River Basin in Western North Carolina,
W75-05857 6B

GHENT RIJKSUNIVERSITEIT (BELGIUM). LAB. OF ANALYTICAL CHEMISTRY.
A Study of the Optimal Conditions for Flameless Atomic Adsorption Spectrometry of Iridum, Platinum and Rhodium,
W75-06307 5A

GLASGOW UNIV. (SCOTLAND). DEPT. OF GEOLOGY.
Structure and Directional Properties of Some Valley Sandur Deposits in Southern Iceland,
W75-06205 2J

GULF SOUTH RESEARCH INST., BATON ROUGE, LA.
Characterization of Wastewaters from the Ethical Pharmaceutical Industry,
W75-06244 5A

HAMEL GEOTECHNICAL CONSULTANTS, MONROEVILLE, PA.
Rock Strength from Failure Cases: Left Bank Slope Stability Study - Libby Dam and Lake Koocanusa, Montana,
W75-06252 8E

HAMPSHIRE COLL., AMHERST, MASS. DEPT. OF POLITICAL SCIENCE.
Obstacles to Taming Corporate Polluters: Water Pollution Politics in Gary, Indiana,
W75-06322 5G

HARCOURT BUTLER TECHNOLOGICAL INST., KANPUR (INDIA). DEPT. OF CHEMISTRY.
Non-Equilibrium Thermodynamics of Thermo-Osmosis of Water Through Kaolinite,
W75-06284 2F

HAWAII UNIV., HONOLULU. DEPT. OF BOTANY.
Lead: Aspects of its Ecology and Environmental Toxicity,
W75-06329 5B

HAWAII UNIV., HONOLULU. DEPT. OF CHEMISTRY.
The Separation of Zinc and Copper from Seawater by Adsorption Colloid Flotation,
W75-06309 5A

HAWAII UNIV., HONOLULU. DEPT. OF CIVIL ENGINEERING.
Flood Computations for the Hawaiian Islands,
W75-05984 4A

HILLSBOROUGH COUNTY PLANNING COMMISSION, TAMPA, FLA.
Natural Environment and Development, A Planning Background Report.
W75-06105 4B

HYDROCOMP, INC., PALO ALTO, CALIF.
Analysis of the Effects of Storage on Flood Magnitude and Stage in the North Branch of the Chicago River.
W75-06059 4A

The Effect on Peak Flow Frequency at the U.S.G.S. Gage No. 11-1627.2 on Colma Creek from the Development of 349 Acres in Guadalupe Canyon.
W75-06060 4A

HYDROMETEOROLOGICKY USTAV, PRAGUE (CZECHOSLOVAKIA).
The Redesign of the Raingauge Network of Zambia,
W75-06268 7A

IDAHO UNIV., MOSCOW.
Analysis and Design of Settling Basins for Irrigation Return Flow,
W75-06078 5G

IDAHO UNIV., MOSCOW. DEPT. OF CIVIL ENGINEERING.
Methodology for In-Stream Rehabilitation of a Silted Stream,
W75-05851 8B

IDAHO UNIV., MOSCOW. DEPT. OF ENTOMOLOGY.
A Model for Physical and Biotic Rehabilitation of a Silted Stream,
W75-06077 5B

ILLINOIS STATE WATER SURVEY, URBANA. WATER QUALITY SECTION.
Measurements of Sediment Oxygen Demand Characteristics of the Upper Illinois Waterway,
W75-05972 5B

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Evaluation of Agricultural Policy Alternatives to Control Sedimentation,
W75-06079 4D

ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Survival of Viruses and Bacteria in a Simulated Sanitary Landfill,
W75-06231 5B

ILLINOIS UNIV., URBANA. SCHOOL OF CHEMICAL SCIENCES.
Biological Cycles for Toxic Elements in the Environment,
W75-06314 5B

ILLINOIS UNIV., URBANA. WATER RESOURCES CENTER.
Study of Stratified Overflows and Underflows,
W75-06081 5B

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF MECHANICAL ENGINEERING.
The Mathematical Modelling of Rivers,
W75-06132 2E

INDIAN INST. OF TECH., BOMBAY. DEPT. OF CHEMISTRY.
Solvent Extraction and Spectrophotometric Determination of Nickel (II) with Thiothenoyltrifluoroacetone,
W75-06308 5A

INDIAN INST. OF TECH., NEW DELHI. DEPT. OF APPLIED MECHANICS.
Flood Computations for Nonuniform Rainfall Distribution,
W75-05993 2A

INDIANA UNIV., BLOOMINGTON. DIV. OF BIOLOGICAL SCIENCES.
Late Glacial and Postglacial Productivity Changes in a New England Pond,
W75-06261 2H

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A Numerical Model for the Simulation of Unsaturated Vertical Flow of Moisture in Soils,
W75-06289 2G

INSTITUTE FOR WATER RESOURCES (ARMY), ALEXANDRIA, VA.
Estimating the Value and Incidence of Recreation Benefits from a Beach Erosion Control Project,
W75-05859 6C

Institute for Water Resources (Army Corps of Engineers), Annual Report, 1972.
W75-06018 6B

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The Permeability and Storage of an Unconfined Chalk Aquifer,
W75-06274 2F

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The Fate of Spilled Oil in the Soil,
W75-06266 5B

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Phytoplankton Primary Production and Its Main Associated Variables in Catedral Branch, Mascardi Lake, (In Spanish),
W75-05968 2I

INSTITUTO NACIONAL DE TECNOLOGIA AGROPECUARIA, MARCOS JUAREZ (ARGENTINA). ESTACION EXPERIMENTAL AGROPECUARIA.
Influences of Mulch Rate and Slope Steepness on Interrill Erosion,
W75-05964 2J

INSTITUTUL DE METEOROLOGIE SI HIDROLOGIE, BUCHAREST (RUMANIA).
Agrometeorological Forecasting, an Important Means for Decision Making in Agriculture (In French),
W75-05855 2B

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Apparatus for the Treatment and the Clarification of Waste Water,
W75-05883 5D

INTERNATIONAL POLLUTION CONTROL SYSTEMS, INC., WASHINGTON, D.C. (ASSIGNEE)
Device for Removing Oil and the Like from Water Contaminated by Oil or the Like,
W75-05889 5G

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Engineering, Legal and Economic Aspects of Storm Sewer Assessments,
W75-06297 5D

IRRIGATION AND POWER RESEARCH STATION, POONDI (INDIA).
Flood Warning Through a Hydrological-Cum-Mathematical Model and VHF Telemetry,
W75-06004 4A

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City of Fresno--Long Range Plan: Metropolitan Area, Trunk Sewer System.
W75-06102 5D

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Mass and Salt Transfers and Halocline Depths in an Estuary,
W75-06133 2L

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Studies on the Phytoplankton in Lake Keurusselka; Finnish Lake District,
W75-05853 2H

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Impact of Turbidity and Lake Sedimentation,
W75-06053 2H

KARLSRUHE UNIV. (WEST GERMANY). DEPT. OF CIVIL ENGINEERING.
Methodology for Optimization of Flood Protection Measures Illustrated by an Example in the German Federal Republic,
W75-05995 4A

KARLSRUHE UNIV. (WEST GERMANY), THEODOR-REHBOCK LAB. FOR RIVER IMPROVEMENT.
A Method to Determine the Vectors of the Average Velocity Field in Uniform Flow,
W75-05974 8B

Some Aspects for the Selection of an Adequate Probability Distribution Function for Flood Analysis,
W75-05990 4A

KEARNEY (A. T.) AND CO., INC., CHICAGO, ILL.
Economic Analysis of Effluent Guidelines. The Electroplating Industry, Copper, Nickel, Chromium and Zinc.
W75-05873 6B

KENTUCKY DEPT. OF HIGHWAYS, LEXINGTON. DIV. OF RESEARCH.
Loads on Box Culverts under High Embankments,
W75-06230 8D

KENTUCKY UNIV., LEXINGTON. DEPT. OF CIVIL ENGINEERING.
Analysis of Unsteady Flow Toward an Artesian Well by Three-Dimensional Finite Elements,
W75-06140 2F

KHORSKII GIDROLIZNYI ZAVOD (USSR).
Utilization of Activated Sludge (Ispol'zovanie aktivnogo ila),
W75-06344 5D

KINKI UNIV., OSAKA (JAPAN). DEPT. OF CIVIL ENGINEERING.
Flood Prediction Method of River with Reservoir and Confluence of Tributaries,
W75-06005 2A

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY, PALISADES, N.Y.
Wind Drift Surface Currents and spread of Contaminants in Shelf Waters,
W75-06187 5B

Inlet Sequence: A Vertical Succession of Sedimentary Structures and Textures Created by the Lateral Migration of Tidal Inlets,
W75-06204 2L

LANCASTER UNIV., BAILRIGG (ENGLAND). DEPT. OF ENVIRONMENT SCIENCES.
Correlation Analysis of the Cellular Structure of Storms Observed by Raingauges,
W75-06293 2B

LIBRARY OF CONGRESS, WASHINGTON, D.C. CONGRESSIONAL RESEARCH SERVICE.
National Goals and Environmental Laws,
W75-06165 6E

LINCOLN COLL. (NEW ZEALAND). TUSSOCK GRASSLANDS AND MOUNTAIN LANDS INST.
The Torlesse Stream Vortex-Tube Sediment Trap,
W75-05954 2J

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk. Executive Summary.
W75-05858 6B

A Modal Economic and Safety Analysis of the Transportation of Hazardous Substances in Bulk, Final Report (Revised).
W75-05870 6B

LOCKWOOD, ANDREWS AND NEWNAM, INC., HOUSTON, TEX.
Planning Industrial Areas for Barge Ports,
W75-06052 6A

LOUISIANA STATE UNIV., BATON ROUGE. COASTAL STUDIES INST.
Form-Process Relationships on Island Coasts,
W75-06229 2L

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF GEOLOGY.
Trace Metals in Oyster Shells,
W75-06312 5A

MADHYA PRADESH GOVERNMENT CONTROL BOARD FOR MAJOR PROJECTS, BHOPAL (INDIA).
Highlights of Flood Protection Works Done on River Narmada at Hoshangabad in Madhya Pradesh State - India,
W75-05998 4D

Norms and Criteria for Initiating Scientific Assessment of Flood Damages in Non-Uniform Conditions in Madhya Pradesh State--India,
W75-06000 2E

MADHYA PRADESH IRRIGATION DEPT., BHOPAL (INDIA).
A General Formula for Determination of Peak Flood,
W75-05983 4A

Design Peak Flood Computation for Major and Multipurpose Reservoirs on Narmada River,
W75-05986 4A

Flood Routing Studies of Gandhisagar Dam,
W75-06003 2E

MALVIYA REGIONAL ENGINEERING COLL., JAIPUR (INDIA). DEPT. OF CIVIL ENGINEERING.
Flood Estimation Methods for Ungaged Catchments-A Review,
W75-05992 4A

Flood Management in Developing Countries,
W75-06002 6F

MARYLAND UNIV., COLLEGE PARK. DEPT. OF CHEMISTRY.
Atmospheric Concentrations and Sources of Trace Metals at the South Pole,
W75-06315 5B

MARYLAND UNIV., COLLEGE PARK. DEPT. OF MICROBIOLOGY.
Sampling Methods for Microbiological Analyses,
W75-06037 5A

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF CIVIL ENGINEERING.
Stochastic Analysis of Phreatic Aquifers,
W75-06138 2F

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. RALPH M. PARSONS LAB. FOR WATER RESOURCES AND HYDRODYNAMICS.
Unsteady Salinity Intrusion in Estuaries, (Part I and Part II),
W75-06184 2L

MASSACHUSETTS UNIV., AMHERST.
Defining Freshwater Wetlands,
W75-06161 4A

Dissolved Silica in Laurel Lake: Influx, Uptake, and Differential Accumulation During Summer Stratification,
W75-06190 5C

Preliminary Observations on the Biogeochemical Cycle of Silica in Stockbridge Bowl (Lake),
W75-06191 5C

MASSACHUSETTS UNIV., AMHERST. DEPT. OF AGRICULTURAL AND FOOD ECONOMICS.
Use of Economic-Environmental Input-Output Analysis for Coastal Planning with Illustration for the Cape Cod Region,
W75-06299 6A

MASSACHUSETTS UNIV., AMHERST. DEPT. OF POLITICAL SCIENCE.
The Role of Citizen Advisory Groups in Water Resources Planning,
W75-06198 6B

MASSACHUSETTS UNIV., AMHERST. WATER RESOURCES RESEARCH CENTER.
Design and Assembly of an Automatic Hydrologic Data Acquisition System,
W75-06197 7A

MCGILL UNIV., MONTREAL (QUEBEC). DEPT. OF GEOGRAPHY.
Hydrochemistry of the Athabasca and North Saskatchewan Rivers in the Rocky Mountains of Canada,
W75-05956 2K

MCQUAY-PERFEX, INC., MINNEAPOLIS, MINN. (ASSIGNEE)
Waste Water Purification System,
W75-05878 5D

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, ILL.
Rock Tunnels Recently Completed in Chicago,
W75-06061 8H

MICHIGAN DEPT. OF NATURAL RESOURCES, LANSING.
Michigan's 1969 Salmon and Trout Sport Fishery,
W75-05864 6B

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF FISHERIES AND WILDLIFE.
Predredging Analysis of Lake Lansing, Michigan,
W75-06199 2H

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Polarographic Oxygen Sensors.
W75-06136 2K

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The Annual Temperature Cycle of Lough Neagh,
W75-06016 2H

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The Analysis of Inflow into some Experimental Agricultural Drains,
W75-06273 4A

The Effect of Permeable Surrounds on the Performance of Clay Field Drainage Pipes,
W75-06283 8B

MINISTRY OF WORKS, WELLINGTON (NEW ZEALAND).
Flood Damage in New Zealand,
W75-06001 4A

MINNESOTA AGRICULTURAL EXPERIMENT STATION, ST. PAUL.
Economics of Small Watershed Planning in Minnesota,
W75-05866 6B

MINNESOTA DEPT. OF HIGHWAYS, ST. PAUL. MAINTENANCE STANDARDS SECTION.
Salt Brine Runoff Control at Stockpile Sites,
W75-06062 5G

MINNESOTA UNIV., MINNEAPOLIS. ST. ANTHONY FALLS HYDRAULIC LAB.
Sediment Inertia as Cause of River Antidunes,
W75-06256 2J

MISSOURI UNIV., ROLLA. DEPT. OF COMPUTER SCIENCE.
Statistical Analysis of Water Temperature Residuals,
W75-05958 2E

MISSOURI UNIV., ST. LOUIS. SCHOOL OF BUSINESS ADMINISTRATION.
A Benefit-Cost Analysis of Alternative Land Disposal Waste Water Methods in an Urban Environment,
W75-06203 5D

MITRE CORP., MCLEAN, VA.
Program Plan for Environmental Effects of Energy,
W75-05871 9D

MONASH UNIV., CLAYTON (AUSTRALIA). DEPT. OF CIVIL ENGINEERING.
Determination of Wetting Front Suction in the Green-Ampt Equation,
W75-05965 2G

MONCTON UNIV. (NEW BRUNSWICK). DEPT. OF ENGINEERING.
On Thermal Stratification in Large Bodies of Water,
W75-05959 2H

MONTANA STATE UNIV., BOZEMAN. DEPT. OF CIVIL ENGINEERING.
Description of Water and Air Movement During Infiltration,
W75-06288 2G

MONTREAL ENGINEERING CO. LTD. (QUEBEC).
Stability of Single-Peaked Waves,
W75-06118 2E

NAGOYA UNIV. (JAPAN). WATER RESEARCH LAB.
Carbohydrates from Lake Sediments,
W75-06125 2H

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CLEVELAND, OHIO. LEWIS RESEARCH CENTER.
Nitric Oxide, Water Vapor, and Ozone in the Atmosphere as Measured in Situ from an Aircraft,
W75-06017 5A

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Radiometry of Water Turbidity Measurements,
W75-06128 5A

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Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume II - Data Acquisition.
W75-06042 7C

Procedures Manual for Detection and Location of Surface Water Using ERTS-1 Multispectral Scanner Data, Volume III - Control Network Establishment.
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The Influence of Surface Waves on Water Circulation in a Mid-Atlantic Continental-Shelf Region,
W75-06137 2L

Application of Monochromatic Ocean Wave Forecasts to Prediction of Wave-Induced Currents,
W75-06246 2L

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. TECHNICAL ANALYSIS DIV.
Cost Sharing for Shoreline Protection,
W75-05872 6C

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Bacteriological Criteria for Ground-Water Quality,
W75-06259 5A

Microbiology-Detection of Bacterial Pathogens and Their Occurrence, (Literature Review),
W75-06342 5A

NATIONAL ENVIRONMENTAL RESEARCH CENTER, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB.
The Properties and Composition of Sludges,
W75-06033 5A

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Operational Control and Plant Performance of the Hampton Roads Sanitation Districts at Williamsburg Waste Treatment Plant.
W75-06341 5D

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Recent Studies on Biological Effects of Crude Oils and Oil-Dispersant Mixtures to Red Sea Macrofauna,
W75-06028 5C

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Interaction of Mercurials with Salmon Serum Lipoproteins,
W75-06321 5B

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A Typhoon Flood Computation Model in Taiwan,
W75-05985 2A

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Trace Element Equilibrium Studies,
W75-06326 5A

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
An Investigation of Surface and Internal Wave-Induced Turbulence in Shallow Water Thermal Microstructure,
W75-06213 2L

Formation and Development of Beach Cusps on Del Monte Beach, Monterey, California,
W75-06250 2L

NAVAL UNDERWATER SYSTEMS CENTER, NEWPORT, R.I.
Current Observations from the Western Mediterranean During Coblamed 69,
W75-05962 2E

NELSON CATCHMENT BOARD (NEW ZEALAND).
Integrated River Basin Development and Regional Planning in New Zealand,
W75-05952 6B

NEVADA UNIV., RENO. CENTER FOR WATER RESOURCES RESEARCH.
Surface Runoff Hydrograph Equation,
W75-06139 2A

NEVADA UNIV., RENO. COLLEGE OF AGRICULTURE.
Adaptation of Game Fish to Highly Alkaline Desert Lakes,
W75-06084 2H

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Relationships Between Rainfall Parameters and Interception by Tropical Forest,
W75-06291 2B

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Conserving Wetland Water by Suppressing Evaporation,
W75-06095 3B

Conserving Wetland Water by Suppressing Evaporation,
W75-06121 3B

NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA). SCHOOL OF CIVIL ENGINEERING.
The Beach Erosion Hazard,
W75-06113 2J

The Case for Flood-Plain Mapping in Australia,
W75-06114 7C

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Comparison of Observed Estuarine Tide Data with Hydraulic Model Data by Use of Cross-Spectral Density Functions,
W75-06209 2L

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A Sociological Approach to the Problem of Water Pollution,
W75-06099 5G

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Observation on the Rate of Phosphorus Input into Lake George and It's Relationship to the Lake's Trophic State,
W75-06064 5B

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An Analysis of Past, Present and Future Hudson River Wastewater Loadings,
W75-06065 5B

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Philosophy and Methodology of Metallic Waste Treatment,
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Some Considerations of Straightness in Channel Form Relating to the Estuary of the Maclennan River, South Otago (New Zealand),
W75-06285 2L

NICHOLLS STATE UNIV., THIBODAUX, LA. DEPT. OF ENVIRONMENTAL ENGINEERING.
Sediment Transport and Erosion in the Fourchon Area of Lafourche Parish,
W75-06211 2L

NO FOREST SERVICE (USDA), PARSONS, W. VA. TIMBER AND WATERSHED LAB.
Quantity and Quality of Streamflow After Urea Fertilization on a Forested Watershed: First-year Results,
W75-06338 5A

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF CIVIL ENGINEERING.
An Evaluation of the Effectiveness and Applicability of Physical-Chemical Treatment of Urban Land Runoff,
W75-06094 5D

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Power Plant Siting-Social/Political Considerations,
W75-06050 6B

NORTHWEST MICHIGAN ECONOMIC DEVELOPMENT DISTRICT AND REGIONAL PLANNING COMMISSION, TRAVERSE CITY.
Regional Water and Waste Water Plan-Northwest Michigan.
W75-06106 5D

NORTHWESTERN UNIV., EVANSTON, ILL. DEPT. OF GEOLOGICAL SCIENCES.
Spatial and Temporal Variations in Geometric and Material Properties of a Natural Beach,
W75-06218 2L

NOVA UNIV., DANIA, FLA. PHYSICAL OCEANOGRAPHIC LAB.
Development of a System for Measurement of Surface Currents and Oceanic Current Observations,
W75-06129 2L

OAK RIDGE NATIONAL LAB., TENN.
A Time-Dependent, Two-Dimensional Mathematical Model for Simulating the Hydraulic, Thermal, and Water Quality Characteristics in Shallow Water Bodies,
W75-06046 5B

OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER, FORT LAMY (CHAD).
The Benthic Mollusks of Lake Chad: Ecology, Study of Growth, and Estimation of Biomasses,
W75-06262 2I

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF AGRICULTURAL ENGINEERING.
Cattle Feedlot Hydrology,
W75-06345 5B

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF CHEMISTRY.
Mass Spectrometry as Used to Determine Trace Organic Constituents in Aquatic Systems,
W75-06188 5A

Determination of Organic Compounds in Aquatic Systems by High Pressure Liquid Chromatography,
W75-06189 5A

ORAL CORP., BOCA RATON, FLA. (ASSIGNEE)
Water Distillation Apparatus,
W75-05893 5F

OREGON FISH COMMISSION, PORTLAND. DIV. OF MANAGEMENT AND RESEARCH.
1970-71 Yaquina Bay Resource Use Study,
W75-05865 6B

OREGON STATE UNIV., CORVALLIS. DEPT. OF CIVIL ENGINEERING.
Monitoring Dredge Spoils,
W75-06035 5A

OREGON STATE UNIV., CORVALLIS. DEPT. OF FISHERIES AND WILDLIFE.
Toxicity of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin (TCDD) in Aquatic Organisms,
W75-05929 5C

OREGON STATE UNIV., CORVALLIS. DEPT. OF VETERINARY MEDICINE.
Decreased Antibody Formation in Mice Exposed to Lead,
W75-06319 5C

OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
Non-Conservation of Heavy Metals in the Columbia River Estuary,
W75-06325 5B

OREGON UNIV., EUGENE. SCHOOL OF LAW.
A 50 Mile Fisheries Zone for Oregon,
W75-06163 6E

OSLO UNIV. (NORWAY). DEPT. OF CHEMISTRY.
The Application of Electrodeposition Techniques to Flameless Atomic Absorbtion Spectrometry Part II. Determination of Cadium in Sea Water,
W75-06301 5A

OXFORD UNIV. (ENGLAND). DEPT. OF GEOLOGY AND MINERALOGY.
Interdistributary Bay Sequences and Their Genesis,
W75-06237 2L

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, OREG.
Mathematical Modeling as a Framework for Coastal Monitoring,
W75-06021 5B

Surface Slicks and Films - A Need for Control,
W75-06023 5A

Adsorption of Orthophosphate on Borosilicate and 'Citrate of Magnesia Bottles' Polyethylene and Polyvinyl Surfaces in a Distilled Water and Seawater Matrix,
W75-06029 5A

Development of a Standard Marine Algal Assay Procedure for Nutrient Assessment,
W75-06030 5A

Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Communities,
W75-06036 5A

PAEDAGOGISCHE HOCHSCHULE, POTSDAM (EAST GERMANY). SEKTION CHEMIE/BIOLOGIE.
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives Part 36. The Extraction and Photometric Determination of Cadmium with Thiodibenzolymethane in Comparison with Other Special Reagents, (In German),
W75-06306 5A

PAPUA AND NEW GUINEA INST. OF TECH., LAE (NEW GUINEA). DEPT. OF CIVIL ENGINEERING.
Effect of Dams on Flood Frequency,
W75-05982 4A

PEDAGOGISCHE HOCHSCHULE, POTSDAM (EAST GERMANY). SEKTION CHEMIE/BIOLOGIE.
Chelation of Beta-Dicarbonyl Compounds and Their Derivatives: Part 34 the Use of Thiobenzoylmethane for the Extraction and Photometric Determination of Traces of Thallium and Mercury, (In German),
W75-06305 5A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
Computing Flood Frequency in the Humid Eastern USA,
W75-05981 4A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. INST. FOR RESEARCH ON LAND AND WATER RESOURCES.
An Analytical Approach to Reorganization of Water Management Systems,
W75-06193 6B

A Method of Predicting Incremental Runoff Sequences,
W75-06194 2A

A Regionalization Procedure with Optimizing Characteristics for Water Disposal Systems,
W75-06195 5D

The Effects of Physiography and Climate on Unit Hydrographs,
W75-06196 2A

Development of Economic Criteria for Regionalization of a Waste Water Management System,
W75-06200 5D

Optimal Antecedent Precipitation Indices for Small Eastern Watersheds,
W75-06201 2A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. SCHOOL OF FOREST RESOURCES.
Watershed Behavior Under Controlled Simulated Rainfall,
W75-06192 2A

PERMUTIT CO., PARAMUS, N.J. (ASSIGNEE)
Process and Apparatus for Removing Impurities from Condensate Water,
W75-05892 5D

PHILLIPS PETROLEUM CO., BARTLESVILLE, OKLA. (ASSIGNEE)
Sewage and Water Treatment with Polyacid Halide Modified Copolymers of Vinylpyridines and Acrylamide or Methacrylamide,
W75-05877 5D

POLISH ACADEMY OF SCIENCES, GOLYSZ. FISH CULTURE STATION.
Determination of Water Temperature in Shallow Water Bodies,
W75-05969 2H

PROPULSION SCIENCES, INC., MELVILLE, N.Y.
Vaporization Response of Evaporating Drops with Finite Thermal Conductivity,
W75-06215 2D

PUERTO RICO UNIV., MAYAGUEZ.
Peak Ratios and Alternate Model Factors for Residential Water Use in Puerto Rico,
W75-06085 6D

PUERTO RICO UNIV., MAYAGUEZ. DEPT. OF CIVIL ENGINEERING.
Estimate of Water Pollution Potential Based on Characteristics of Domestic Sewage in Puerto Rico,
W75-06202 5B

PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF CIVIL ENGINEERING.
A Nonlinear Time Variant Rainfall-Runoff Model for Augmenting Monthly Data,
W75-05957 2A

RESEARCH INST. FOR WATER RESOURCES DEVELOPMENT, BUDAPEST (HUNGARY).
Problems of Nuclear Gauging of Suspended Sediment Concentration,
W75-05978 2J

Forecasting Flood Hydrographs on the Danube Using the Passage Theory,
W75-06006 4A

Determination of Snow Water Equivalent and Snowmelt Water by Thickness of Snow Cover Data,
W75-06272 2C

RESEARCH INST. FOR WATER RESOURCES DEVELOPMENT, DUDAPEST (HUNGARY). DEPT. OF SURFACE WATERS.
Reliability of Bed-Load Sampling,
W75-05979 2J

REX CHAINBELT, INC., MILWAUKEE, WIS. (ASSIGNEE)
Screens for Water Intake Systems,
W75-05879 8I

RHODE ISLAND UNIV., KINGSTON. NARRAGANSETT MARINE LAB.
Current Measurements Under the Gulf Stream Near Cape Hatteras, North Carolina,
W75-06233 2L

ROBERT S. KERR ENVIRONMENTAL RESEARCH LAB., ADA, OKLA.
Subsurface Biological Activity in Relation to Ground-Water Pollution,
W75-06238 5B

ROCHESTER UNIV., N.Y. DEPT. OF RADIATION BIOLOGY AND BIOPHYSICS.
Association of Methionine Requirement with Methyl Mercury Resistant Mutants of Yeast,
W75-06311 5A

ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF. SPACE DIV.
Measurements of the Dielectric Properties of Sea Water at 1.43 GHz,
W75-06247 2K

ROORKEE UNIV. (INDIA). CHEMICAL LAB.
Ion Exchange Behavior of Mercury (II) in Mixed Solvents: Separation from Zinc (II), Cadmium (II), Gold (III), and Thallium (III),
W75-06310 5A

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Problems in Measuring Turbidity as a Water Quality Parameter,
W75-06022 5A

SECRETARY OF THE INTERIOR, WASHINGTON, D.C. (ASSIGNEE)
Process for Producing and Maintaining Purified, Sterile Water,
W75-05904 5D

SHAWINIGAN ENGINEERING CO. LTD., MONTREAL (QUEBEC).
A Study of the Perak River Flood of January 1967 and an Evaluation of the Flood Control Aspects of Temengor Reservoir,
W75-05999 2E

SOIL CONSERVATION SERVICE, LEXINGTON, KY.
Narge Creek Project Measure, Kentucky (Final Environmental Impact Statement),
W75-06171 4A

SOIL CONSERVATION SERVICE, WASHINGTON, D.C.
Buffalo River Watershed Project, Amherst County, Va. (Final Environmental Impact Statement),
W75-06175 8A

WSP2-Water Surface Profile Program, User's Guide,
W75-06186 7C

SOIL CONSERVATION SERVICE, WASHINGTON, D.C. ENGINEERING DIV.
TR-20 Project Formulation--Hydrology, Computer Program User's Manual,
W75-06219 7C

ECON2, Project Formulation--Economics--Computer Program User's Guide,
W75-06220 7C

DAMS2, Project Formulation--Structure Site Analysis, User's Guide,
W75-06221 7C

SOUTH AUSTRALIA RUBBER MILLS PTY. LTD. (AUSTRALIA). (ASSIGNEE)
Drip Irrigation Method,
W75-05885 3F

SOUTH CAROLINA UNIV., COLUMBIA. BELLE W. BARUCH COASTAL RESEARCH INST.
The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton,
W75-06255 5C

SOUTH DAKOTA STATE UNIV., BROOKINGS.
Computer Simulation of Sediment Deposit in an Alluvial Channel,
W75-06051 8B

SOUTHERN ILLINOIS UNIV., CARBONDALE. DEPT. OF GEOGRAPHY.
Public Acceptance of Renovated Waste Water: Myth and Reality,
W75-06097 5D

SOUTHERN RESEARCH INST., BIRMINGHAM, ALA.
Waterborne Wastes of the Paint and Inorganic Pigments Industries,
W75-06249 5B

SOUTHERN RESEARCH INST., BIRMINGHAM, ALA. ECONOMIC RESEARCH AND PLANNING SECTION.
Economic Analysis of Effluent Guidelines: Cement Industry,
W75-05869 5G

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF GEOGRAPHY.
Patterns of Variation in a Fluvial System,
W75-05961 2J

STATE UNIV. OF NEW YORK, BUFFALO. FACULTY OF ENGINEERING AND APPLIED SCIENCES.
A Study of Convective-Dispersion Equation by Isoparametric Finite Elements,
W75-06015 5B

STOCKHOLM UNIV. (SWEDEN). BOTANY INST.
The Reed, Phragmites Communis Trin., in the Brunnsviken, Stockholm 1971 (In Swedish),
W75-05967 2I

SUTCLIFFE, SPEAKMAN AND CO. LTD., LEIGH (ENGLAND); AND POND (ALAN) EQUIPMENT LTD., HARLOW (ENGLAND). (ASSIGNEES)
Filter Systems,
W75-05880 5D

SWISS FEDERAL INST. FOR SNOW AND AVALANCHE RESEARCH, DAVOS-WEISSFLUHJOCH.
Extrapolation of Stage-Discharge Relations for Flood Computations,
W75-05976 4A

TASMANIA UNIV., HOBART (AUSTRALIA). DEPT. OF BOTANY.
Stratification and Biogenic Meromixis in Tasmanian Reservoirs,
W75-06116 5C

TECHNICAL INFORMATION CENTER (AEC), OAK RIDGE, TENN.
Translations of Papers Presented at the Third Panel on the Peaceful Uses of Nuclear Explosions Organized by the International Atomic Energy Agency Held in Vienna, Austria, 27-30 November 1972.
W75-06349 6G

TECHNICAL UNIV. OF BUDAPEST (HUNGARY).
Forecasting of Flood Characteristics of the Nile,
W75-06008 4A

TECHNION-ISRAEL INST. OF TECH., HAIFA.
Benefit-Estimate of Drainage and Flood-Control Works in Small Watersheds of Semi-Arid Climate,
W75-05997 6B

TECHNION-ISRAEL INST. OF TECH., HAIFA. DEPT. OF CIVIL ENGINEERING.
Flow in a Vertical Porous Column Drained at its Bottom at Constant Flux,
W75-06295 2F

TECHNION-ISRAEL INST. OF TECH., HAIFA. FACULTY OF CIVIL ENGINEERING.
Determinations of an Optimal IUH for Linear, Time Invariant Systems from Multi-Storm Records,
W75-06127 2A

TENNESSEE UNIVERSITY, KNOXVILLE, DEPT. OF GEOLOGY.
Heavy Metal Distribution in Bottom Sediment and Water in the Tennessee River-Loudon Lake Reservoir System,
W75-06088 5B

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA.
Briceville Flood Relief Project, Tennessee (Final Environmental Impact Statement),
W75-06180 4A

TENNESSEE VALLEY AUTHORITY, KNOXVILLE. DIV. OF WATER CONTROL PLANNING.
Development of a Comprehensive TVA Water Resource Management Program.
W75-05874 6A

TEXACO, INC., NEW YORK. (ASSIGNEE)
Apparatus for Avoiding Water Pollution at an Offshore Drilling Site,
W75-05900 5G

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF BIOLOGY.
A Limnological Investigation of the Relationship Between the Navasota River, Texas, and a Selected Floodplain,
W75-06242 5B

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF INDUSTRIAL ENGINEERING.
Environmental Control Laboratory Designed for the Specific Needs of the Intern Training Center, Red River Army Depot,
W75-06210 5A

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF OCEANOGRAPHY.
Galveston Harbor: Factors Affecting Pollution and Pollution Monitoring,
W75-06040 5A

TEXAS A AND M UNIV., COLLEGE STATION. WATER RESOURCES INST.
Optimization of Water Use Efficiency Through Trickle Irrigation and the Stress Day Index,
W75-06089 3F

TEXAS STATE OFFICE OF INFORMATION SERVICES, AUSTIN.
Simulation Techniques for Water Project Analyses,
W75-06328 6A

TIPPETTS-ABBETT-MCCARTHY-STRATTON, SEATTLE, WASH.
Ketchikan Waterfront Development,
W75-06055 6A

TIPPETTS-ABETT-MCCARTHY-STRATTON, NEW YORK.
San Juan River Hydroelectric Project. Feasibility Report.
W75-05863 6B

TOKYO INST. OF TECH. (JAPAN). DEPT. OF CIVIL ENGINEERING.
Stochastic Approach to Linear and Nonlinear Runoff Analysis,
W75-05988 2A

TORONTO DEPT. OF PUBLIC WORKS (ONTARIO).
City of Toronto Water Distribution System, Progress Report No. 1,
W75-06057 8A

TORONTO UNIV. (ONTARIO).
A Mosaic Pattern of Balanced Land-Water Planning for Cottage Development and Lake Planning,
W75-06101 6B

TORONTO UNIV. (ONTARIO). DEPT. OF GEOLOGY.
Agricultural Use of Sewage Treatment Plant Sludges: A Potential Source of Mercury Contamination,
W75-06323 5B

TORONTO UNIV. (ONTARIO). INST. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
Optimum Runoff Forecast for a Flood-Control Reservoir,
W75-05994 4A

TOULOUSE-3 UNIV. (FRANCE). LABORATOIRE D'ECOPHYSIOLOGIE DES ANIMAUX.
The Fast and Realimentation in the Carp (Cyprinus Carpio L.): V. The Effect of Four Modes of Realimentation on Glucidic Metabolism, (In French),
W75-06350 8I

TOWILL (R. M.) CORP., HONOLULU, HAWAII.
A Proposed Structure of an Aluminum-Phosphate Species of Importance in Wastewater Treatment,
W75-06300 5D

TUEBINGEN UNIV. (WEST GERMANY). LEHRBEREICH FUER SPEZIELLE BOTANIK.
The Pulvinate Moss Vegetation in the Karadj-Valley (Elburs Mountains, Iran), (In German),
W75-05966 2A

UNION OIL CO. OF CALIFORNIA, LOS ANGELES. (ASSIGNEE)
Method for Tracing the Flow of Water in Subterranean Formations,
W75-05884 2F

UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, MEXICO CITY. DEPT. OF CIVIL ENGINEERING.
Flood Control in the Plain Rivers,
W75-05996 4D

UNIVERSITY OF NEW ENGLAND, ARMIDALE (AUSTRALIA). DEPT. OF PHYSICS.
Freezing Rates of Water Droplets,
W75-06277 2C

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. ALLAN HANCOCK FOUNDATION.
Marine Studies of San Pedro Bay, California. Part VI, Circulation Investigations, Current Measurements in the Outer Los Angeles Harbor,
W75-06245 2L

UNIVERSITY OF STRATHCLYDE, GLASGOW (SCOTLAND). DEPT. OF CIVIL ENGINEERING.
The Applicability of Regime Theory to Tidal Watercourses,
W75-06257 2L

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG (SOUTH AFRICA).
A Simple Procedure for Synthesizing Direct Runoff Hydrographs,
W75-06123 2A

UTAH UNIV., SALT LAKE CITY. DEPT. OF BIOLOGY.
A Study of Natural Water Systems in Western Montana,
W75-06082 5B

VICTORIA STATE RIVERS AND WATER SUPPLY COMMISSION, MELBOURNE (AUSTRALIA).
Unit Hydrographs and Statistical Density Functions,
W75-05991 2E

VIRGINIA INST. FOR SCIENTIFIC RESEARCH, RICHMOND.
Ecological Impact of Thermal Loading on a Piedmont River - An Ecosystem Approach, Vol. 2,
W75-06298 5C

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT VODOSNABZHENIYA, KANALIZATSII, GIDROTEKHNICHESKIKH SOORUZHENII I INZHENERNOI GIDROGEOLOGII, BAKU (USSR).
Mechanism of Bed Load Transport in Channel Flows,
W75-06010 2J

Application of Statistical Methods to the Distribution of Fall Diameter and Flow Turbidity,
W75-06011 2J

Sediment Discharge Control by Means of Settling Basins,
W75-06012 4D

Flood Control Measures Leveeing and Bottom Deepening,
W75-06013 4D

Modelling of Erodible Channels,
W75-06014 2J

WAITE AGRICULTURAL RESEARCH INST., GLEN OSMOND (AUSTRALIA).
The Climatic Adaptation of Populations of Cocksfoot (Dactylis Glomerata L.) from Southern France,
W75-06098 2G

WASHINGTON STATE DEPT. OF ECOLOGY, OLYMPIA. STATE WATER PROGRAM.
Spokane River, Cooperative Water Quality Study,
W75-06103 5B

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF CIVIL ENGINEERING.
A General Theory for Flow in Rough Conduits,
W75-06120 8B

WASHINGTON UNIV., SEATTLE. COLL. OF FISHERIES.
Methods for Monitoring Radioactivity in Aquatic Biota,
W75-06032 5A

WASHINGTON UNIV., SEATTLE. DEPT. OF CIVIL ENGINEERING.
Effectiveness of Bridge Pier Riprap Practice in Washington State,
W75-06228 8D

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
A Systems Approach to Marine Pollution Monitoring,
W75-06024 5A

Theoretical Analysis of Conditions in a Salt Wedge,
W75-06117 2L

WATER ECONOMICS RESEARCH INST., KRAKOW (POLAND). DEPT. FOR WATER PROTECTION.
The Indicator Organisms and Their Ecological Variability,
W75-05970 5A

WATER RESOURCES CENTER, BUDAPEST (HUNGARY).
Distribution of Dynamic Water Level in a Shallow Lake,
W75-06134 2H

WATER RESOURCES ENGINEERS, INC., SPRINGFIELD, VA.
A Methodology for Assessing Economic Risk of Water Supply Shortages,
W75-05861 6B

WATERLOO UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Potential Evaporation as an Unsteady Process,
W75-06290 2D

WATERLOO UNIV. (ONTARIO). SCHOOL OF URBAN AND REGIONAL PLANNING.
Limnology of Duffin Creek and the Location of Century City,
W75-06264 5A

WEST VIRGINIA INST. OF TECH., MONTGOMERY. DEPT. OF CIVIL ENGINEERING.
Flood Prediction - A Bayesian Approach,
W75-05989 4A

WESTERN AUSTRALIA UNIV., NEDLANDS. DEPT. OF PHYSICS.
Air Bubbles in Accreted Ice,
W75-06275 2C

WESTERN AUSTRALIAN DEPT. OF FISHERIES AND FAUNA, PERTH. MARINE RESEARCH LABS.
Reversed Longitudinal Salinity Profile of a Major River in the South-West of Western Australia,
W75-06112 5B

WESTERN ILLINOIS UNIV., MACOMB. DEPT. OF BIOLOGICAL SCIENCES.
The Development of Toxicity Indices for Assessing the Quality of the Illinois River,
W75-06080 5C

WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.
Availability of Sediment Phosphorus to Microorganisms,
W75-06090 5C

WISCONSIN UNIV., MADISON. GRADUATE SCHOOL OF BUSINESS ADMINISTRATION.
The Use of Market Segmentation in Planning for a Recreation-Based Economy,
W75-05862 6B

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Non-Combustible Suspended Matter in Surface Waters Off Eastern Asia,
W75-06239 2J

WYOMING UNIV., LARAMIE. DEPT. OF CIVIL ENGINEERING.
A Sub-Alpine Snowmelt Runoff Model,
W75-05971 2C

ZAKAVKAZSKII NAUCHNO-ISSLEDOVATELSKII GIDROMETEOROLOGICHESKII INSTITUT, TIFLIS (USSR).
Bases of Method and Means of Modification of Hail Processes,
W75-06126 3B

ACCESSION NUMBER INDEX

W75-05851 8B
W75-05852 5D
W75-05853 2H
W75-05854 2G
W75-05855 2B
W75-05856 6A
W75-05857 6B
W75-05858 6B
W75-05859 6C
W75-05860 5G
W75-05861 6B
W75-05862 6B
W75-05863 6B
W75-05864 6B
W75-05865 6B
W75-05866 6B
W75-05867 5F
W75-05868 5G
W75-05869 5G
W75-05870 6B
W75-05871 9D
W75-05872 6C
W75-05873 6B
W75-05874 6A
W75-05875 2H
W75-05876 5D
W75-05877 5D
W75-05878 5D
W75-05879 8I
W75-05880 5D
W75-05881 5G
W75-05882 5D
W75-05883 5D
W75-05884 2F
W75-05885 3F
W75-05886 5G
W75-05887 3F
W75-05888 5G
W75-05889 5G
W75-05890 5D
W75-05891 5F
W75-05892 5D
W75-05893 5F
W75-05894 5D
W75-05895 5D
W75-05896 8B
W75-05897 8B
W75-05898 2J
W75-05899 5D
W75-05900 5G
W75-05901 3F
W75-05902 3F
W75-05903 5G
W75-05904 5D
W75-05905 5G
W75-05906 5D
W75-05907 5D
W75-05908 5D
W75-05909 8C
W75-05910 5G
W75-05911 5B
W75-05912 4D
W75-05913 4D
W75-05914 5B
W75-05915 4A
W75-05916 2J
W75-05917 4D
W75-05918 4D
W75-05919 2A
W75-05920 4D
W75-05921 5G
W75-05922 5B
W75-05923 2K
W75-05924 2G
W75-05925 4C
W75-05926 2J
W75-05927 5A
W75-05928 5B
W75-05929 5C
W75-05930 5A
W75-05931 5A
W75-05932 4D
W75-05933 2I
W75-05934 2A
W75-05935 4C
W75-05936 5B
W75-05937 8I
W75-05938 4D
W75-05939 4C
W75-05940 5D
W75-05941 5D
W75-05942 5E
W75-05943 5D
W75-05944 5D
W75-05945 7B
W75-05946 5E
W75-05947 5D
W75-05948 5D
W75-05949 5D
W75-05950 5D
W75-05951 5D
W75-05952 6B
W75-05953 7A
W75-05954 2J
W75-05955 2I
W75-05956 2K
W75-05957 2A
W75-05958 2E
W75-05959 2H
W75-05960 2E
W75-05961 2J
W75-05962 2E
W75-05963 2D
W75-05964 2J
W75-05965 2G
W75-05966 2A
W75-05967 2I
W75-05968 2I
W75-05969 2H
W75-05970 5A
W75-05971 2C
W75-05972 5B
W75-05973 4A
W75-05974 8B
W75-05975 5C
W75-05976 4A
W75-05977 8B
W75-05978 2J
W75-05979 2J
W75-05980 2A
W75-05981 4A
W75-05982 4A
W75-05983 4A
W75-05984 4A
W75-05985 2A
W75-05986 4A
W75-05987 2E
W75-05988 2A
W75-05989 4A
W75-05990 4A
W75-05991 2E
W75-05992 4A
W75-05993 2A
W75-05994 4A
W75-05995 4A
W75-05996 4D
W75-05997 6B
W75-05998 4D
W75-05999 2E
W75-06000 2E
W75-06001 4A
W75-06002 6F
W75-06003 2E
W75-06004 4A
W75-06005 2A
W75-06006 4A
W75-06007 4A
W75-06008 4A
W75-06009 4A
W75-06010 2J
W75-06011 2J
W75-06012 4D
W75-06013 4D
W75-06014 2J
W75-06015 5B
W75-06016 2H
W75-06017 5A
W75-06018 6B
W75-06019 8B
W75-06020 5A
W75-06021 5B
W75-06022 5A
W75-06023 5A
W75-06024 5A
W75-06025 5A
W75-06026 5A
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W75-06047 8A
W75-06048 4A
W75-06049 8C
W75-06050 6B
W75-06051 8B
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W75-06054 8C
W75-06055 6A
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W75-06057 8A
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W75-06061 8H
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W75-06067 8A
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W75-06070 2E
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W75-06075 5B
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W75-06111 8G
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W75-06113 2J
W75-06114 7C
W75-06115 5B
W75-06116 5C
W75-06117 2L
W75-06118 2E
W75-06119 2E
W75-06120 8B
W75-06121 3B
W75-06122 2K
W75-06123 2A
W75-06124 8B
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W75-06126 3B
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W75-06220 7C
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W75-06222 2L
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W75-06224 3A
W75-06225 8B
W75-06226 2L
W75-06227 5G
W75-06228 8D
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W75-06231 5B
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W75-06270 4A
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W75-06272 2C
W75-06273 4A
W75-06274 2F
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W75-06278 2B
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W75-06280 8G
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W75-06283 8B
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W75-06298 5C
W75-06299 6A
W75-06300 5D
W75-06301 5A
W75-06302 5A
W75-06303 5B
W75-06304 5A
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W75-06310 5A
W75-06311 5A
W75-06312 5A
W75-06313 5D
W75-06314 5B
W75-06315 5B
W75-06316 7B
W75-06317 2I
W75-06318 5C
W75-06319 5C
W75-06320 5D
W75-06321 5B
W75-06322 5G
W75-06323 5B
W75-06324 5G
W75-06325 5B
W75-06326 5A
W75-06327 5B
W75-06328 6A
W75-06329 5B
W75-06330 4D
W75-06331 4D
W75-06332 4D
W75-06333 5B
W75-06334 5B
W75-06335 5B
W75-06336 2D
W75-06337 4D
W75-06338 5A
W75-06339 5G
W75-06340 5C
W75-06341 5D
W75-06342 5A
W75-06343 5C
W75-06344 5D
W75-06345 5B
W75-06346 5D
W75-06347 5D
W75-06348 3F
W75-06349 6G
W75-06350 8I

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-06349	1
Colorado State University, Irrigation Return Flow Quality	W75-06095	1
Cornell University, Policy Models for Water Resources Systems	W75-05852, 05856 06328	3
East Central State College, Agricultural Livestock Wastes	W75-06345	1
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-05940--05951 06341--06342 06346--06347	16
Illinois State Water Survey, Hydrology	W75-05952--05965 05971--05974 05976--06015 06017--06046 06117--06124 06126--06129 06131--06140 06184--06189 06204--06242 06244--06260 06263--06296	206

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE (Continued)		
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-06344	1
University of Florida, Eastern U. S. Water Law	W75-06141--06183	43
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-06096--06097 06099--06110	14
University of Wisconsin, Water Resources Economics	W75-05857--05874	18
B. STATE WATER RESOURCES RESEARCH INSTITUTES	W75-05851, 05911 06071--06094 06190--06202	39
C. OTHER		
BioSciences Information Service	W75-05853--05855 05875 05966--05970 05975, 06016 06098, 06125 06130, 06243 06261--06262 06299, 06317 06340, 06348 06350	22
Commonwealth Scientific and Industrial Research Organization, Australia	W75-06111--06116	6
Engineering Aspects of Urban Water Resources (Poertner)	W75-06047--06069	23

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
C. OTHER (Continued)		
Forest Service (USDA)	W75-05912--05939 06330--06338	37
Ocean Engineering Information Service (Patents)	W75-05876--05910 06339	36
Office of Water Research and Technology	W75-06070, 06203 06297--06298	4
Vanderbilt University, Metals Pollution	W75-06300--06316 06318--06327 06329, 06343	29

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CENTERS OF COMPETENCE
AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
- WATER QUALITY MANAGEMENT AND PROTECTION
- WATER RESOURCES PLANNING
- RESOURCES DATA
- ENGINEERING WORKS
- MANPOWER, GRANTS, AND FACILITIES
- SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

- SUBJECT INDEX
- AUTHOR INDEX
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- ABSTRACT SOURCES

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